INITIATIVE EnergieEffizienz+
Industry & Production

dena
German Energy Agency

Guide.

Energy efficiency in heating systems in industry and production.

Energy-efficient heating systems. A lever for reducing process heat costs.

Many industrial production processes and methods require large quantities of process heat and this usually entails considerable energy costs for the businesses. Comprehensive energy optimisation of a heating system can considerably reduce energy consumption and costs for combustion plants, on average by 15 percent. Such energy efficiency measures are highly costeffective and generally pay for themselves within one to four years.

Working jointly with Bundesindustrieverband Deutschland Haus-, Energie- und Umwelttechnik e. V. (BDH) – Federal Industrial Association of Germany House, Energy and Environmental Technology – and with support from Interessengemeinschaft Energie Umwelt Feuerungen GmbH (IG) – Syndicate of Energy Environmental Combustion Systems Ltd., the Deutsche Energie-Agentur GmbH (dena) – the German Energy Agency – is aiming as part of its Initiative EnergieEffizienz campaign to inform businesses about the considerable potential energy savings that can be made in heating systems and to encourage them to invest in energy-saving systems. This factsheet provides basic information about the energy optimisation of heating systems while the four enclosed datasheets describe copybook energy efficiency projects which have been implemented in industry and production.

High energy consumption for process heat.

Process heat is generated from various energy sources (such as electricity, oil and gas), transported in many different ways (e. g. warm / hot water, steam and hot air) and required at different temperature levels. Overall, Germany uses some 400 TWh of final energy per year to supply thermal processes. Economically viable potential energy savings in industry and production for thermal processes amount overall to at least 30 TWh per year (7.5 percent). A further 96 TWh per year are required for space heating, around 18 percent of which can be saved by raising energy efficiency.

Steam and hot water generation.

Accounting for around 30 percent of industrial process heat requirements[1], steam and hot water generation in boiler systems is the commonest method for generating process heat. 80 percent of Germany's industrial heat and steam generating systems are now more than ten years old and are no longer in line with the current state of the art. Just by using more efficient technologies, annual energy savings of 9.6 TWh could be achieved with these existing systems, a saving which nevertheless amounts to two percent of Germany's total energy consumption for process heat.

When heat recovery is included, energy consumption for steam and hot water generation can be reduced on average by 15 percent. Integrated optimisation of the entire heating system by adapting and better matching its component parts to one another is the way to achieve the greatest energy and cost savings.

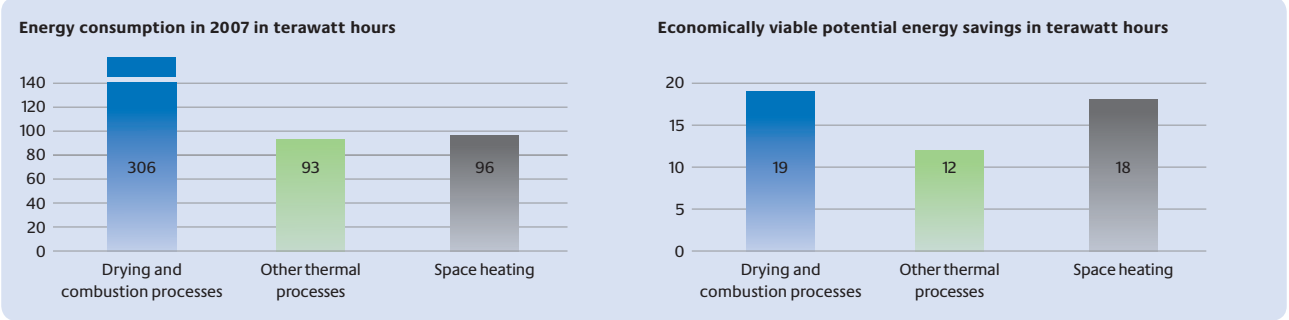
Approach to system optimisation.

Measures for increasing energy efficiency in a heating system should always be regarded as part of the optimisation of the complete system because the greatest increases in energy efficiency can be achieved by matching all the components to one another and optimising the plant's control systems.

If effective energy saving measures are to be devised, the first step should be to carry out a detailed actual analysis of the system's energy consumption, its heating demand and its individual system components. Then the energy efficiency of the individual components should be checked so that any old components, such as burners, can be replaced if necessary. Further savings can be achieved by optimising the combustion plant's control systems. When constructing new systems, attention should be paid from the outset to the energy efficiency of the components and of the overall system.

If upstream measures for reducing heat loss have been fully utilised, it makes sense to exploit waste heat by heat recovery. Some 40 percent of the energy used to generate industrial process heat is lost as waste heat. It is helpful here to draw up a heat flow chart which records all the temperatures and quantities of heat transported and transferred in the process. A pinch analysis will reveal how the most efficient use may in each case be made of the available waste heat.

Energy consumption and potential energy savings in industrial process heat applications.



[1] *In the above figure, these applications are assigned to the categories other thermal processes and space heating.*

How to optimise the overall heating system.

1 Minimise demand and losses.

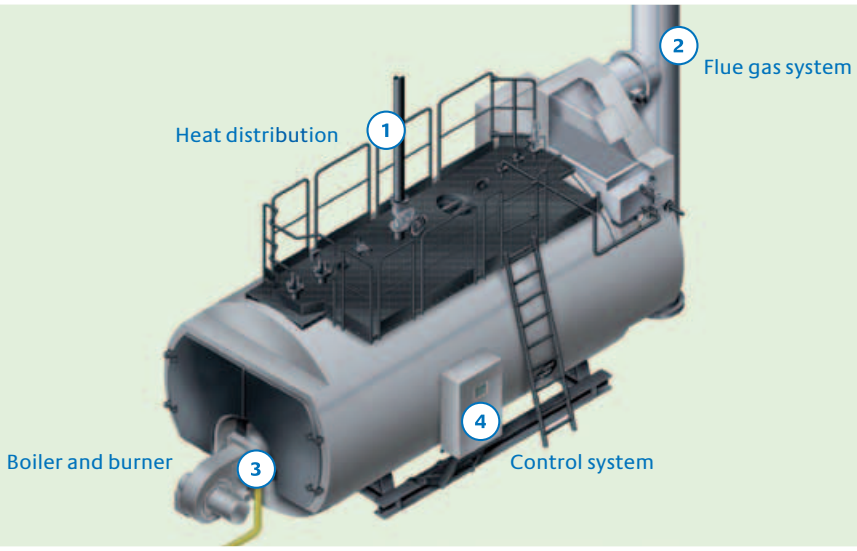
Before optimising the individual components of a heating system, steps should first of all be taken to **minimise heating demand and losses.** Electrical energy should here be ranked as more valuable than steam and steam as more valuable than hot water. Depending on requirements, the **lowest value energy supply medium** should thus be selected for each process step. Efficiency can be raised by 10 to 15 percent just by using warm water instead of steam. In many cases, **reducing the temperature** of the supply medium makes it possible to use heat recovery and cogeneration to reduce energy requirements still further.

In order to **minimise losses,** the thermal insulation on heat generators, pipework and any heat stores should be checked and, if necessary, repaired.

2 Use heat recovery.

Heat recovery measures maximise the efficiency of the overall system and thus increase its energy efficiency. As a rule of thumb, heat recovery becomes more worthwhile the greater is the **difference between the waste heat temperature and the required temperature.**

Heat potential should be used locally and as directly as possible. Waste heat may be put to further use for heating process water, for water heating, for preheating combustion and drying air or as space heating. It is advisable, for example, to use an **economiser** for preheating feed water. In condensing **boiler technology,** an additional heat exchanger is provided downstream of the economiser. This heat exchanger cools the flue gases to below the condensing temperature of water, so making it possible to utilise the heat of condensation of the water present in the flue gas.



3 Use energy-efficient components.

Even when energy-efficient components are used, the goal should always be to optimise the entire system. This is achieved by effectively matching all new and existing components to one another.

Modulating (controllable) burners may be used over extensive partial load ranges. They are substantially more efficient than burners which are switched on and off individually.

Flue gas temperatures and energy consumption can be reduced thanks to **boilers with large heat exchange areas.** It is advisable to use energy-efficient condensing boilers for warm water systems because such boilers give rise to considerably lower flue gas temperatures and they operate at a distinctly higher level of efficiency.

Speed-controlled drive motors for forced-draught burners and pumps enable considerable savings in energy consumption.

4 Optimise control systems.

Combustion plants should in principle be designed on the basis of the actual heating demand. For instance, a **multi-boiler control system** ensures that only the necessary number of boilers is switched on in accordance with requirements.

If a **flue gas sensor control system** is installed, the flue gas composition can be continuously measured. Air feed is controlled on the basis of the optimum oxygen (O_2) content in the flue gas. Reducing the O_2 content by just one percent results, depending on the age of the system, in a 0.5 to 1 percent improvement in efficiency. Energy consumption can be further reduced by monitoring and controlling further combustion parameters such as CO content, flue gas temperature, soot index or combustion chamber pressure and by installing automatic flue gas or combustion dampers.

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Energy optimisation of industrial heating systems.

This factsheet was prepared jointly by dena's *Initiative EnergieEffizienz* campaign and the Bundesindustrieverband Deutschland Haus-, Energie- und Umwelttechnik e. V. (BDH) with the support of Interessengemeinschaft Energie Umwelt Feuerungen GmbH (IG). dena's *Initiative EnergieEffizienz* is a Germany-wide information and motivation campaign which promotes efficient electricity use in all consumption sectors. Target group-specific campaigns are used to inform end consumers in private households, in industry and production and in the service and public sectors about the options for efficient energy use and to motivate them to act in an energy-efficient way. The campaign is funded by the German Federal Ministry of Economics and Technology. *Initiative Energie-Effizienz* also offers businesses information and practical assistance in many further areas, ranging from energy management to financing, to help them make more efficient use of electricity and cut costs. More details from: **www.industrie-energieeffizienz.de**

Bundesindustrieverband Deutschland Haus-, Energie- und Umwelttechnik e. V. (BDH) and Interessengemeinschaft Energie Umwelt Feuerungen GmbH are industry organisations representing the commercial, technical and political interests of their members to policy makers, government and the general public. The companies in BDH manufacture energy-efficient utility engineering systems based on gas, oil and electricity and particularly for utilising renewable energy sources focusing on heat generation for private households, commercial buildings and industrial applications. **www.bdh-koeln.de**

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Energy efficiency of heating systems in industry and production.

Bayerische Staatsbrauerei Weihenstephan: optimising the entire heating system at the world's oldest brewery.

The Initiative EnergieEffizienz campaign of the Deutsche Energie-Agentur GmbH (dena) – the German Energy Agency – presents exemplary projects promoting efficient energy use in industry and production to encourage businesses of all sizes and kinds. The projects described provide innovative solutions for generating energy and cost savings and can readily be transferred to other businesses. Why not emulate them? Further information on energy efficiency in industry and production from: www.industrie-energieeffizienz.de.

Project description.

Bayerische Staatsbrauerei Weihenstephan and its some 100 members of staff produce around 250,000 hectolitres of beer per year. In 2010, the brewery modernised and optimised the combustion plant with the aim of reducing emissions, energy consumption and costs.

The first step was to replace the brewery's heavy oil boiler with a modern, natural gas-fired steam boiler with a power output of 6.5 MW. As a result of changing over to natural gas and replacing the boiler, emissions of nitrogen oxides, sulfur oxides and particulates were considerably reduced, while ammonia emissions were cut to zero. In addition to installing the steam boiler, further components were installed which helped to increase energy efficiency: the brewery had a flue gas heat exchanger for preheating feed water fitted to make better use of waste heat. A condensing flue gas heat exchanger also helps to heat the brewing water and so further reduce waste heat losses.

Energy efficiency was boosted by integrating the refrigeration plant into the heating system, a further newly installed heat exchanger now utilising the waste heat from the refrigeration plant among other things for preheating the combustion air. The combustion plant's control system was also optimised, the residual oxygen content in the flue gas for instance being cut to below one percent by volume by implementing a CO combustion control system with flue gas sensors, so further optimising boiler efficiency. All components were designed such that, if necessary, the entire plant can be operated with liquid or gaseous biofuels in a co-combustion system.

In addition to measures for reducing fuel requirements, control of the combustion air blower was also optimised, the installation of a speed control system for instance reducing the combustion plant's electricity consumption by more than 45 percent.

Energy efficiency measures.

- Replacement of the existing heavy oil boiler
- Installation of a heat exchanger for preheating feed water
- Installation of a condensing heat exchanger for heating brewing water
- Installation of an air preheater (CAP) for utilising waste heat from the refrigeration plant
- Installation of a CO control system
- Speed control system for the combustion air blower

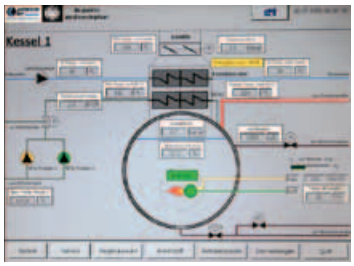
Figures which speak for themselves.

Energy sources	Natural gas/ heating oil	Electricity
Reduction in energy consumption	2,800,000 kWh/year	45,000 kWh/year
Percentage energy saving	10.5 %	45.5 %
CO_2 reduction*	2,230 t/year	28.5 t/year
Capital cost	154,800 €	5,500 €
Reduction in costs	153,500 €/year	9,000 €/year
Return on investment	99 %	164 %

** Based on the following equivalent values according to GEMIS 4.5: German power mix 633 g CO_2/kWh, natural gas 244 g CO_2/kWh, heating oil 302 g CO_2/kWh.*

Evaluation.
Thanks to the measures which have been implemented, the Weihenstephan brewery is making good use of a large proportion of its waste heat. This is primarily made possible by using a condensing flue gas heat exchanger. Making additional use of the waste heat from the compressed air system, using a modern CO control system and installing a speed control system all go to show how maximum benefit can be drawn from potential energy efficiencies by optimising the complete system. Staatsbrauerei Weihenstephan now has one of the brewing sector's most modern, and efficient, boiler systems.

Result: annual cost savings of EUR 162,500.
Implementing the energy efficiency project gave rise to an annual energy saving of approx. 2,845,000 kWh and thus annual cost savings of approx. EUR 162,500. The return on the energy saving investment amounts to 101 percent. Just installing the O_2/CO control system results in annual gas savings of around 640,000 kWh.



From left to right:
Economiser and downstream condensing economiser, gas burner with air preheater for utilising excess compressor waste heat, CO control system

The user.
Bayerische Staatsbrauerei Weihenstephan, founded in 1040, is the world's oldest brewery still in existence. Publicly owned by the Free State of Bavaria, the brewery is operated as a modern company which distributes its beers to more than 35 countries worldwide. The brewery has been awarded the "Premium Bavaricum" quality mark and has won numerous national and international prizes for its speciality beers.

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Further references and information from: **www.industrie-energieeffizienz.de.** Contact: **info@industrie-energieeffizienz.de.**

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INITIATIVE EnergieEffizienz
Industry & Production

Energy efficiency of heating systems in industry and production.

GRUNDFOS Pumpenfabrik GmbH: energy modernisation of heating station.

The Initiative EnergieEffizienz campaign of the Deutsche Energie-Agentur GmbH (dena) – the German Energy Agency – presents exemplary projects promoting efficient energy use in industry and production to encourage businesses of all sizes and kinds. The projects described provide innovative solutions for generating energy and cost savings and can readily be transferred to other businesses. Why not emulate them? Further information on energy efficiency in industry and production from: www.industrie-energieeffizienz.de.

Project description.

In 2008, GRUNDFOS Pumpenfabrik GmbH carried out an energy analysis at its Wahlstedt manufacturing plant. The analysis came to the conclusion that considerable savings in energy consumption and costs could be achieved by modernising the heating station. In the course of a comprehensive plant modernisation, old burners were replaced with new designs. A multi-boiler control system was also implemented which ensures that only the actually required number of boilers are operated. In this way, exactly the required volume is delivered, ensuring that the boilers can be operated at their optimum load point and at maximum efficiency.

At 8.5 MW, total output of the heating system was overdimensioned to allow for spare capacity and redundancy. The hydraulic system was also not matched to output resulting in load fluctuations. The total output, originally divided between three boilers, was divided between two boilers of 0.9 MW and 1.95 MW, since one boiler could no longer be operated and was decommissioned. Installing a multi-boiler control system, which was integrated into the existing building management system, allowed optimum use to be made of the output from the available boilers. In addition to new boilers with flue gas heat exchangers, two energy-efficient burners with speed and O_2 control were installed. Within just two years, this optimisation cut fuel consumption by 1.8 million kWh per year. Further positive effects: thanks to the control system for the two heat generators, it has been possible to optimise plant operation. Load fluctuations are now reliably compensated and temperature fluctuations can no longer occur in the network.

Not only the supply of heat, but also its distribution were adapted, the entire hydraulic system being optimised by decoupling the heating and process heat circuits. Thanks to a speed control system, the installed pumps can now be controlled on the basis of the actual volumetric flow rate. Overall, these additional measures have generated annual electricity cost savings of EUR 66,500.

Energy efficiency measures.

- Replacement of existing boilers with condensing boilers with flue gas heat exchangers and complete flue gas system
- Installation of two new burners including speed and O_2 control
- Installation of a multi-boiler control system
- Adaptation of the entire hydraulic system including decoupling of the heating and consumption circuits and the use of speed-controlled pumps and control by measuring the volumetric flow rate

Figures which speak for themselves.

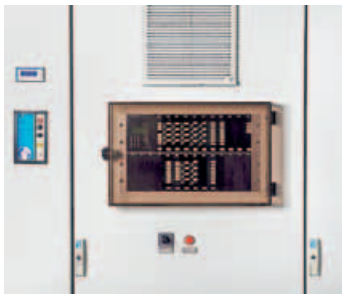
Reduction in fuel consumption	1,806,000 kWh/year
Reduction in electricity consumption[1]	60,000 kWh/year
Percentage energy saving in the year	22 %
CO_2 reduction[2]	479 t/year
Capital cost	265,000 €
Cost reduction	66,500 €/year
Return on investment	25 %

[1] *Electricity savings can only be estimated as there is no separate electricity meter for the boiler house.*

[2] *Based on the following equivalent values according to GEMIS 4.5: German power mix 633 g CO_2/kWh, natural gas 244 g CO_2/kWh, heating oil 302 g CO_2/kWh.*

Assessment.
In addition to optimising the heating supply, the comprehensive package of measures also included adaptation of the heating system, so allowing a considerable reduction in space heating demand. Energy efficiency was a key factor in selecting new components, e. g. condensing boilers with flue gas heat exchangers. A multi-boiler control system permits demand-based operation of the boilers. The electricity consumption of the pumps used in the heating system was also substantially cut by speed control and control on the basis of volumetric flow rate. All in all, it is clear that demand-based, optimally matched control of energy flows is the cornerstone for optimising energy consumption in the overall system.

Result: annual cost savings of EUR 66,500.
In addition to annual cost savings of approx. EUR 58,700 thanks to the measures for optimising the heating system, there are also further savings of EUR 7,800 per year thanks to reduced electricity consumption. The return on the energy saving investment is 25 percent. Lower fuel use and reduced electricity consumption cut CO_2 emissions by 479 tonnes per year.



From left to right:
Modernised boiler house with new burners,
burner fitted with frequency converter,
PLC control of the multi-boiler control system

The user.
The GRUNDFOS Group's Wahlstedt site is home to GRUNDFOS Pumpenfabrik GmbH, a production company specialising in the manufacture and assembly of circulating pumps for heating, ventilation and air conditioning applications and of high pressure centrifugal pumps and pressure boosters for water supply systems.

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The supplier.
Weishaupt is a leading international manufacturer of burners, heating and condensing boilers and of solar engineering, heat pump and building automation systems. The Weishaupt Group, with its 20 subsidiary companies worldwide, has some 3,000 staff, around 1,000 of whom work at its headquarters in Schwendi, Germany.

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Energy efficiency of heating systems in industry and production.

Pulcra Chemicals GmbH, Geretsried plant: optimisation of steam generation.

The Initiative EnergieEffizienz campaign of the Deutsche Energie-Agentur GmbH (dena) – the German Energy Agency – presents exemplary projects promoting efficient energy use in industry and production to encourage businesses of all sizes and kinds. The projects described provide innovative solutions for generating energy and cost savings and can readily be transferred to other businesses. Why not emulate them? Further information on energy efficiency in industry and production from: www.industrie-energieeffizienz.de.

Project description.

In its Geretsried plant, Pulcra Chemicals GmbH produces process chemicals such as dyes and auxiliaries for the textile, fibre and leather industries. Since thermal energy is required for many production steps, the plant's steam supply plays a central role. Due to more stringent emission requirements and higher fuel costs, the company decided in 2008 to increase the energy efficiency of steam generation at the Geretsried plant. To achieve this, the steam generation system was fitted with the latest combustion technologies and combustion management systems.

In its original state, the system consisted of a steam boiler for generating up to 6 t/h of steam and a light oil burner with a combustion power of 4 MW. However, elevated flue gas temperatures of up to 270 °C led to a low level of boiler efficiency of at most 86 percent. To boost system efficiency, the existing light oil burner was replaced with a new, energy-efficient gas burner, while the system was also retrofitted with an economiser and a flue gas condenser so that the thermal energy present in the flue gas could be utilised. In the economiser, the boiler feed water is firstly preheated by the hot flue gases. Just reducing the flue gas temperature by 100 Kelvin raises boiler efficiency by four percent. With the assistance of the flue gas condenser, the heat of condensation of the steam in the flue gas can be recovered to preheat fresh water. Retrofitting is especially advisable if the return temperature of the process streams is particularly low, since in this case the flue gas temperature can be lowered to a particularly low level (down to 60 °C).

System optimisation has led to the flue gas from the steam generator being cooled down to 60 °C, so minimising flue gas losses. Under full load, overall boiler efficiency is increased from 84.9 percent to 98 percent. Since natural gas is virtually sulfur-free, there is no risk of the flue gas falling below the acid dew point despite the low flue gas temperatures. The gas burner moreover reduces nitrogen oxide emissions from the system (low-NOx gas burner). Thanks to this energy optimisation, the company has been able to reduce the system's annual energy consumption by around 1.4 million kWh.

Energy efficiency measures.

- Replacement of the oil burner with a low-NOx gas burner
- Retrofit of an economiser
- Retrofit of a flue gas condenser

Figures which speak for themselves.

Reduction in fuel consumption	1,420,000 kWh/year
Percentage energy saving in the year	10 %
CO_2 reduction*	1,170 t/year
Capital cost	240,000 €
Reduction in energy costs	57,000 €/year
Return on investment	24 %

**Based on the following equivalent values according to GEMIS 4.5: natural gas 244 g CO_2/kWh, heating oil 302 g CO_2/kWh.*

Assessment.
When it came to system modernisation, energy efficiency was a key factor in selecting components, such as low-NOx gas burners. Equipping the system with a combustion management system means that all parameters which have a major influence on the combustion process can be continuously controlled and monitored. The system's energy efficiency is additionally boosted by using heat recovery. All these factors, installation of energy-efficient components, optimisation of system control and heat recovery, work together to optimise the overall efficiency of the steam generation system.

Result: annual cost savings of EUR 57,000.
By retrofitting the steam boiler with a flue gas condenser, an economiser and a low-NOx gas burner, Pulcra Chemicals GmbH has been able to cut its annual fuel consumption by 10 percent, resulting in annual energy cost savings of EUR 57,000. The return on the energy saving investment is 24 percent. Moreover, thanks to the lower fuel consumption and fuel changeover, CO_2 emissions have also been reduced by 1,170 tonnes per year.

From left to right:
Steam boiler with economiser and flue gas condenser, steam boiler before retrofit, flue gas condenser and economiser

The user.
In its Geretsried plant, Pulcra Chemicals GmbH's staff of 100 produces textile, fibre and leather auxiliaries which are required for manufacturing clothing, shoes and leather products for automotive and furniture use. The company, which has its head office in Düsseldorf, employs around round 500 staff worldwide.

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The supplier.
The SAACKE Group is one of the world's leading suppliers of industrial oil and gas burners and of energy equipment and technology. A family-owned, medium-sized corporate group headquartered in Bremen, SAACKE has some 1,000 staff worldwide.

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Energy efficiency of heating systems in industry and production.

Rittal International GmbH & Co. KG, Rittershausen plant: modernisation of heat generation.

The Initiative EnergieEffizienz campaign of the Deutsche Energie-Agentur GmbH (dena) – the German Energy Agency – presents exemplary projects promoting efficient energy use in industry and production to encourage businesses of all sizes and kinds. The projects described provide innovative solutions for generating energy and cost savings and can readily be transferred to other businesses. Why not emulate them? Further information on energy efficiency in industry and production from: www.industrie-energieeffizienz.de.

Project description.

Rittal International GmbH & Co. KG manufactures around 2,500 large switchgear cabinets per day on a manufacturing area of 65,000 m² at its Rittershausen site. Between 2006 and 2009, numerous energy efficiency measures were implemented to cut energy consumption and greenhouse gas emissions. Heat is primarily supplied to the plant by two boiler plants, each of which is operated with an efficient burner. Both burners are already equipped with O_2 and speed control systems. The total output of the two boilers amounts to 4.76 MW.

A 420 kW, bio-oil-fired[1] CHP plant and two catalytic purification systems for waste gases from production are also available to supply heat. The main consumer of the resultant heat is the paint shop, whose pretreatment tanks have to be maintained at a constant temperature in both summer and winter. Over the winter months, the heating of buildings consumes the largest proportion of energy at the Rittershausen plant.

A multi-boiler control system was installed at the site to optimise operation in 2007. In the course of this work, the primary and secondary circuit pumps were replaced with speed-controlled pumps. The volumetric flow rate meter required for the multi-boiler control system was fitted in the primary circuit (heating system), while the secondary circuit (secondary consumers) was decoupled by a hydraulic separator. It has proved possible to adapt heat generation to actual demand by installing additional temperature sensors. The energy-efficient boiler circuit pumps of the heat generators ensure a balanced water flow rate in the system and correct any deviations in good time before a temperature trend disadvantageous to the system can arise.

This ensures that the CHP plant supplies the necessary base load all year round, while the waste heat from the flue gas system may constantly be fed into the system. The two heating boilers thus now only need to be used to meet temporary peak demand levels. The boilers were also fitted with flue gas heat exchangers in the course of the conversion work. In comparison with 2006, the energy efficiency measures have cut the plant's consumption by around 9 percent.

Staging of the implementation of energy efficiency measures.

- Installation of the multi-boiler control system and an efficient burner
- Installation of a further burner, commissioning of the bio-oil-fired CHP plant. Changeover from thermal waste gas purification to catalytic waste gas purification with heat recovery
- Installation of flue gas heat exchangers in the existing boilers

Figures which speak for themselves.

Reduction in gas consumption	8.056 million kWh/year
Bio-oil consumption for heating	6.72 million kWh/year
Reduction in energy consumption	1.337 million kWh/year
Percentage savings	9 %
CO_2 reduction[2]	1,095 t/year
Capital cost	620.000 €
Cost reduction	270.670 €/year
Return on investment	44 %

[1] *CO_2 emissions are calculated assuming the use of rapeseed oil.*

[1] *Based on the following equivalent values: natural gas 244 g CO_2/kWh (GEMIS 4.5), rapeseed oil 129.6 g CO_2/kWh (German biomass electricity sustainability regulation).*

Assessment.
Rittal GmbH is achieving considerable energy and cost savings thanks to the measures which have been implemented. These savings are primarily possible thanks to the use of the multi-boiler control system in conjunction with a CHP plant to supply the thermal base load. Making additional use of the waste heat from catalytic waste gas purification and using a flue gas heat exchanger go to show how maximum benefit can be drawn from potential energy efficiencies by optimising the complete system.

Result: annual cost savings of EUR 270,670.
Implementing the project for increasing energy efficiency generated annual energy savings of 1,337,000 kWh and thus annual cost savings of EUR 270,670. The energy costs for providing process heat from the CHP plant are completely covered by sale of the electricity generated in the CHP plant. The return on the energy saving investment amounts to 44 percent.

From left to right:
Gas burner, heating circuit manifold, switchgear

The user.
Rittal International GmbH & Co. KG is part of the Friedhelm Loh Group (Hesse), which has a staff of 11,100 worldwide. At the Rittershausen site, the company has 1,000 staff who produce switchgear cabinets (and other products) for the international market. Project implementation was supervised by Max Weishaupt GmbH Siegen.

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The supplier.
Weishaupt is a leading international manufacturer of burners, heating and condensing boilers and of solar engineering, heat pump and building automation systems. The Weishaupt Group, with its 20 subsidiary companies worldwide, has some 3,000 staff. Some 1,000 staff work at its headquarters in Schwendi, Germany.

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The *Initiative EnergieEffizienz* campaign of the Deutsche Energie-Agentur GmbH (dena) – the German Energy Agency, Bundesindustrieverband Deutschland Haus-, Energie- und Umwelttechnik e.V. (BDH) – Federal Industrial Association of Germany House, Energy and Environmental Technology – and Interessengemeinschaft Energie Umwelt Feuerungen GmbH (IG) – Syndicate of Energy Environmental Combustion Systems Ltd. present exemplary projects promoting "energy efficiency of heating systems in industry and production". The industrial partners in this project are members of BDH. The *Initiative EnergieEffizienz* campaign informs businesses and consumers about the advantages of and opportunities arising from efficient energy use. The campaign is funded by the German Federal Ministry of Economics and Technology.

Further references and information from: **www.industrie-energieeffizienz.de.** Contact: **info@industrie-energieeffizienz.de.**

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