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klimaaktiv



**GOT YOUR ENERGY COSTS
UNDER CONTROL?
HOW TO BECOME AN ENERGY-
EFFICIENT BUSINESS**



AUSTRIAN ENERGY AGENCY

IMPRINT

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1. WHY INVEST IN ENERGY EFFICIENCY?

ENERGY EFFICIENCY ALWAYS PAYS OFF. Investing in measures to improve energy efficiency also protects you against fluctuating energy prices. But that is by no means all. Energy efficiency makes companies and economies more competitive, increases security of supply, and thus reduces dependence on imports and raw materials.

PROFESSIONAL ENERGY MANAGEMENT WITH KLIMAAKTIV

klimaaktiv businesses are already on the right path here. They are committed to improving energy efficiency in the company and switching to renewables. Implementing an energy management system – for example to the international ISO 50001 standard – ensures that energy and resources are conserved in the company. That is not only worthwhile in itself but also prepares businesses for the new legal requirements under the Austrian Energy Efficiency Act.

POLITICAL BACKGROUND

Energy efficiency is an important lever for the European Union in improving competitiveness, reducing dependence on imports and raw materials, and meeting the agreed climate protection goals: the aim is to reduce primary energy consumption by 20 per cent by 2020. To improve energy efficiency by 2030, a target of at least 27 per cent was set.

In Austria, the National Energy Efficiency Act (“*Bundes-Energieeffizienzgesetz*”) regulates the situation: it requires large companies either to introduce an energy or environmental management system or to have external energy audits performed.

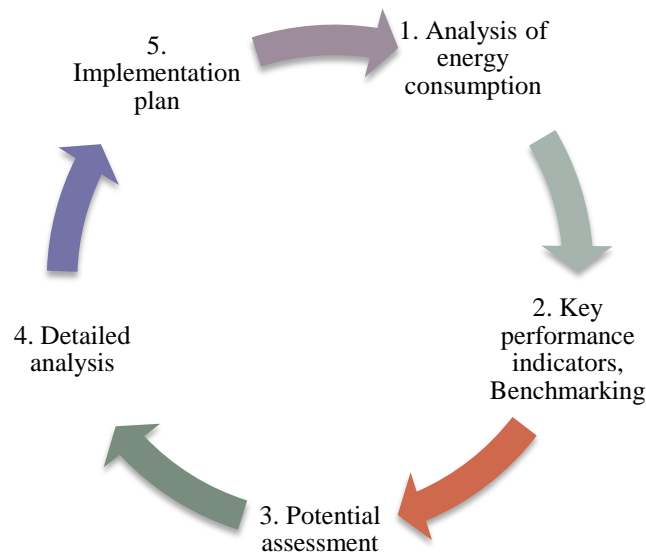
ATTRACTIVE. In Austria, many measures aimed at improving energy efficiency qualify for an **investment subsidy** of up to 30 per cent of the environment-related costs.

2. THE PATH TO AN ENERGY-EFFICIENT BUSINESS

THE AUSTRIAN MINISTRY OF ENVIRONMENT SUPPORTS Austria’s commerce and industry in planning and carrying out energy efficiency improvements with the klimaaktiv energy-efficient businesses programme. It provides:

- a means of comparison with similar businesses based on benchmarks
- analysis tools, sector concepts and technology guides
- staff training
- a network of klimaaktiv consultants and technology partners in cooperation with the federal states for implementing energy efficiency measures
- awards for exceptional best practice examples
- implementation of the basic principles of an energy management system to ISO 50001
- a standardised procedure for energy audits based on training courses, audit guides and report templates.

JOIN THE CYCLE OF CONTINUOUS IMPROVEMENT



The klimaaktiv programme gives companies professional support all the way from initial analysis to implementation of the efficiency measures.

Many companies even continue to cooperate with klimaaktiv afterwards, as can be seen from the successful projects across Austria that receive awards at annual events. In the long run, closer partnerships are also possible.

3. KLIMAAKTIV SERVICES

A LACK OF TIME AND/OR KNOW-HOW means it is not always easy for the management of industrial operations to identify inefficient systems or processes and find appropriate solutions for improving energy efficiency. This is where klimaaktiv is the ideal partner. Although initial investment is involved, you will see that many measures soon pay off and thus strengthen the company's liquidity.

klimaaktiv provides three pillars for helping businesses to become energy efficient:

1. QUALIFIED KLIMAAKTIV CONSULTANTS

Companies enjoy a range of benefits if they use the klimaaktiv consultants' services, as they

- guarantee objective advice and transparent results
- filter out the processes requiring closer examination
- first record the rough and then the more detailed data
- analyse the data
- evaluate potential for improvement
- advise or put companies in touch with appropriate specialised companies.

2. TRAINING

In cooperation with the regional subsidy programmes, klimaaktiv organises standardised training courses twice a year. They provide the basic principles and potential solutions for optimising systems in various companies. The courses are directed towards energy managers and engineers of the companies.

Overview of training courses available

- Basic training in energy management and ProTool (an energy audit tool)
- Optimising waste heat recovery
- Optimising steam systems
- Optimising cooling systems
- Optimising compressed air systems
- Optimising lighting systems
- Optimising pump systems
- Optimising fans and ventilation systems
- Measuring technology and verification of energy saving

3. TOOLS

PROTOOL

ProTool is an Excel tool developed by klimaaktiv that is used for comprehensive initial analysis of energy efficiency in a company; it is an easy-to-use programme that meets the demands for energy advice following the National Energy Efficiency Act. It enables users to find out quickly where energy can be saved:

- Overview of the systems consuming the most energy in the company
- Input-output analysis
- Energy use (power, heat, fuels)
- Share of the relevant energy application (e.g. electric motors, electric heating; boilers, systems consuming heat)
- Initial assessment of potential savings
- Evaluation of the systems on a scale of one to five
- Potential savings at technology level
- Overview (is it better to optimise lighting first or systems consuming heat?)

During basic training, ProTool is introduced and tested using practical examples.

PINCH TOOL

Pinch analysis enables the optimum heat recovery system to be determined very quickly without complicated calculations. The tool makes it easy to create and evaluate a heat exchanger network based on real operating data for:

- streams releasing heat
- streams requiring heat from the power supply.

An introduction to Pinch Tool is part of the “Waste Heat Utilisation in Companies” course.

4. ENERGY MANAGEMENT AND BENCHMARKING

AN IMPORTANT GOAL of klimaaktiv is establishing energy management systems in companies.

The klimaaktiv basic training course therefore explains the basic principles of the energy management system according to ISO 50001 to consultants, engineers, and energy managers. In addition, there is also an e-learning system on the website at www.energymanagement.at with step-by-step instructions for implementing ISO 50001. These services are supplemented with an extensive collection of supporting documents, templates and checklists.

Companies will also find the Benchmarking Simple Tool at www.energymanagement.at. It introduces the benchmarks for initial assessment of energy efficiency in the business. There is a wide range of categories for comparing figures depending on the industry (e.g. by turnover, number of employees, manufacturing focus, etc.). To date, benchmarks are available for the following sectors:

- dairies
- bakeries
- butchers
- feed manufacturers
- flour and husking mills
- joiners
- sawmills
- metal working businesses
- printers
- retailers
- dry cleaners
- hotels
- catering trade
- offices
- car service and repair centres
- plastics processing businesses



5. TECHNOLOGY FOCUS

KLIMAAKTIV OFFERS GUIDES to optimising technologies frequently used in operations. These guides provide an overview of what causes inefficiency and describe various possible solutions for the following technologies:

- waste heat recovery
- compressed air systems
- pump systems
- fans/ventilation systems
- steam systems
- cooling systems
- lighting systems.

A guide to measuring and evaluating savings completes the list of services offered.

YOUR BENEFITS FROM OPTIMISED SYSTEMS

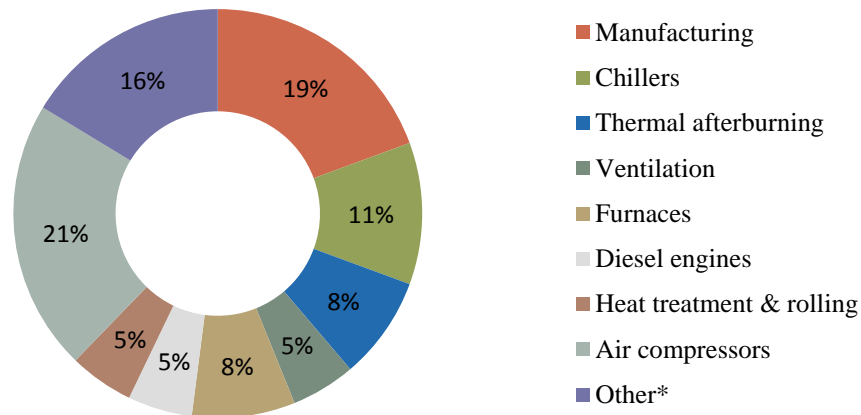
- Lower energy consumption
- Reduced operating costs
- Lower CO2 emissions



RECYCLE WHAT YOU CAN – HEAT RECOVERY IN OPERATIONS

IN AUSTRIA two thirds of all energy used in manufacturing goods is required for heating. Up to 70 per cent of the heat used is then lost in exhaust air or wastewater. This heat can, however, be utilised in heat recovery systems and thus offers economic benefits.

The figure below shows the percentages of various heat recovery sources from 37 award-winning klimaaktiv projects:



* District Heating (3%), sewage works (3%), steam turbine (3%), kitchen (3%), piping (3%), tanks (3%)

COST EFFECTIVE

Experience shows that **recovering heat from systems used in operations pays off within two to five years.**

The most important factors affecting cost effectiveness are the operating hours, energy content of the heat recovery source, heat recovery options, temperature level of the heat recovery source and sink, type of media and composition or contamination.

klimaaktiv best practice example:

GREINER PACKAGING: optimisation of heat recovery from the compressed air system resulted in savings of 777,400 kWh per year

SAVINGS IN THE AIR – COMPRESSED AIR AS A COST FACTOR

OPTIMISE YOUR COMPRESSED AIR SYSTEM and save money from more efficient operation. Accounting for up to 20 per cent of the total electricity costs, compressed air systems are a major cost factor. Optimisation makes savings of up to 20 per cent possible.

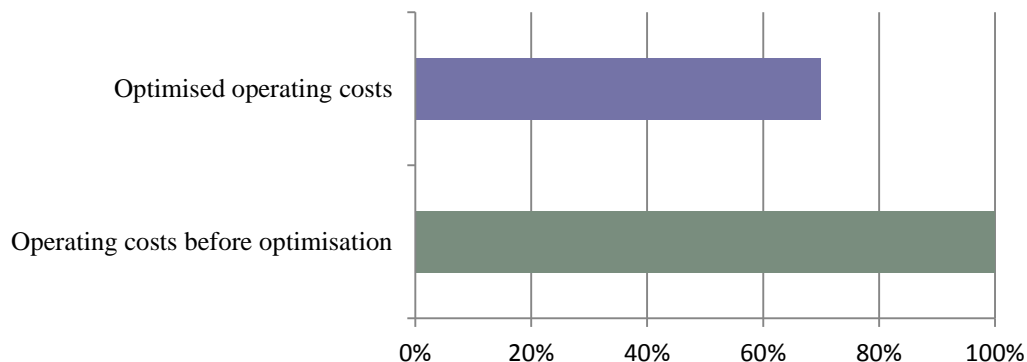
THE MOST IMPORTANT COST-CUTTING MEASURES:

- optimise systems consuming energy
- switch off machinery and systems consuming energy outside working hours
- reduce leaks
- optimise system pressure
- improve control
- reduce percentage of idling
- recover heat.

EFFICIENT SYSTEMS: WORTHWHILE INVESTMENTS

It is important to think about energy efficiency before buying systems! Energy costs account for about three quarters of a compressed air system's total costs. They exceed the purchase costs after only a few years. Efficient systems on the other hand quickly pay off and make good business sense.

The graph below shows the potential savings from optimising compressed air systems:



[klimaaktiv best practice example:](#)

TEXTILSERVICE BROLLO: optimisation of the compressed air system at the Wiener Straße branch in Graz resulted in savings of 51,700 kWh per year

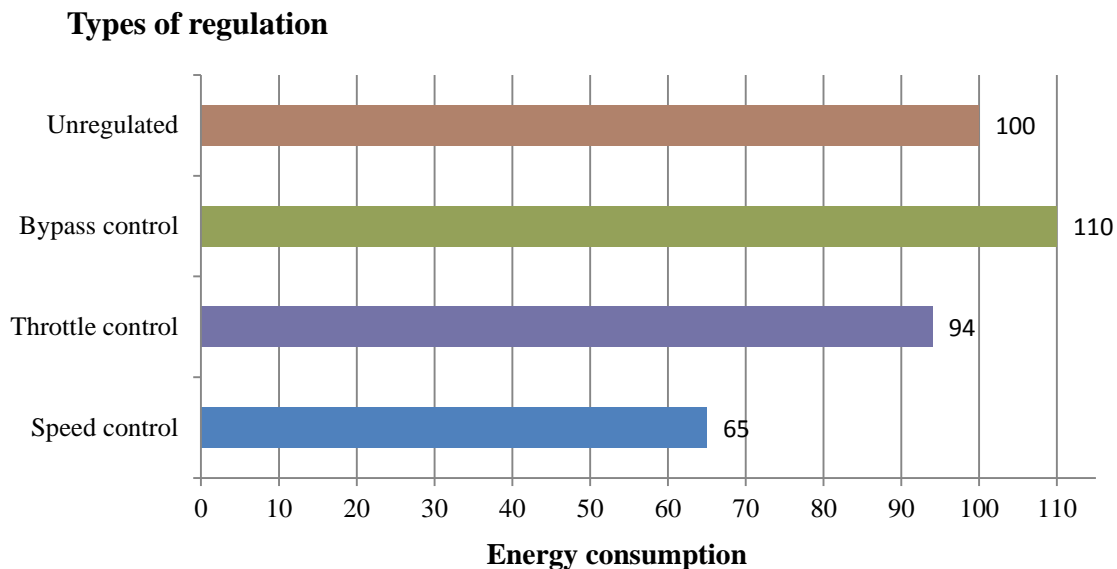
PUMP WITH PRECISION – OPTIMISING PUMP SYSTEMS

PUMPS IN MANUFACTURING FACILITIES often consume the most electricity. Around 25 per cent of the electricity generated is used for operating pump systems.

THE MOST IMPORTANT COST-CUTTING MEASURES:

- determine the pump's operating point
- control and adjust the power
- replace system components (pump, motor, etc.)
- optimise the piping system
- service and maintenance.

The graph below shows the potential savings from appropriate pump control (relative energy consumption when reducing the delivery rate by 20%):



Source: Grundfos pump guide, p 113, Grundfos Management GmbH, 2004

THE COSTS ARISING FROM ENERGY CONSUMPTION AND MAINTENANCE over the pump's entire life cycle generally amount to many times the purchase costs. Criteria such as the right rating and use of highly efficient motors or low-loss piping should therefore be taken into consideration before purchasing pumps.

[klimaaktiv best practice example:](#)

A&R CARTON GRAZ GMBH: replacement of fixed with variable circulation pumps that adapt to the flow rate or differential pressure resulted in savings of 130,200 kWh per year

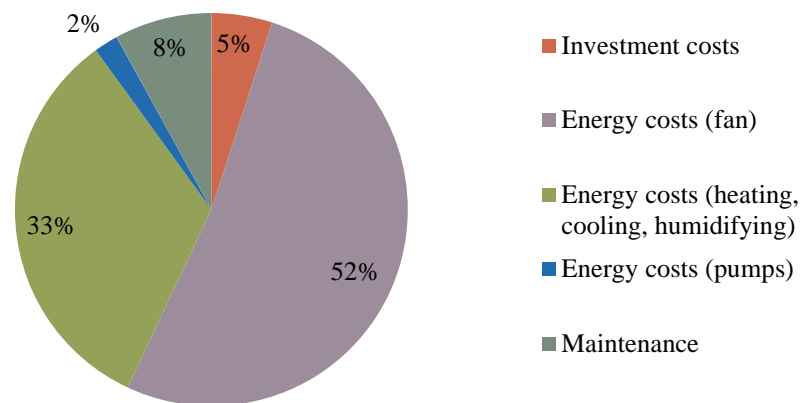
FAN OF SAVINGS – VENTILATION SYSTEMS AND FANS

ACCOUNTING FOR 20 per cent of energy consumption in industrial operations, the power required by fans and ventilation systems is a relevant factor for businesses. What is often neglected is that the potential for improving existing systems can be over 50 per cent of the energy used. When buying new systems, it therefore pays off to consider energy efficiency: Remember that the operating costs exceed the purchase costs in most cases.

TIPS FOR PURCHASING

You can save a lot by ensuring that the system's rating and control are tailored to actual needs. Modern control systems for example adjust power consumption to demand and can save over 30 per cent of energy costs in many cases. Other options include purchasing highly efficient motors or installing heat and moisture recovery systems.

The chart below shows the typical distribution of life cycle costs for a central ventilation system operated continuously. Energy costs account for over 85 per cent of life cycle costs.



THE MOST IMPORTANT COST-CUTTING MEASURES

- reduce operating hours
- adjust flow rate
- replace system parts
- recover heat
- recover moisture
- service and maintenance.

klimaaktiv best practice example:

FLUGHAFEN WIEN AG: conversion of ventilation control to meet actual demand resulted in savings of 1,766,700 kWh per year

GET UP STEAM FOR ENERGY EFFICIENCY

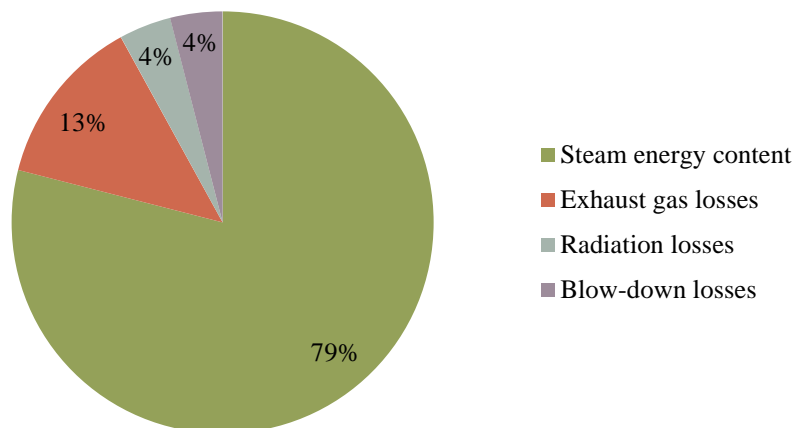
THE ENERGY REQUIRED by steam systems in Austria is about 40 per cent of the total amount of fuel used in industry. Half of the total alone is supplied in the form of natural gas.

In terms of total final energy consumption, the paper, timber, chemical and food industries but also dry cleaners use between 30 and 70 per cent in the form of steam. Relatively simple ways of saving costs can reduce consumption by at least 10 per cent. An optimised system tailored to demand saves operating costs with lower fuel consumption. Another advantage is reduced maintenance costs.

THE MOST IMPORTANT COST-CUTTING MEASURES:

- reduce exhaust gas losses
- improve burner settings, reduce flue gas oxygen content
- reduce blow-down losses
- insulate pipes
- repair leaks in pipes and condensate drains
- exploit energy content of flash steam with a smart cascade system.

The chart shows typical distribution of life cycle costs for a central ventilation system operated continuously:



EFFICIENT STEAM DISTRIBUTION

When steam distribution or condensate systems are installed correctly, transfer losses to the system consuming steam can be reduced by up to 30 per cent. Other benefits include the prevention of blockages, back pressure and leaks due to the condensate drains functioning properly.

[klimaaktiv best practice example:](#)

SALESIANER MIETTEX GMBH: modernisation and conversion of the steam boiler resulted in savings of 430,600 kWh per year

COOL CALCULATIONS – OPTIMISE YOUR COOLING SYSTEM

SIMPLE MEASURES can reduce the amount of energy required to operate cooling systems by up to 15 per cent and technical investments by another 40 per cent.

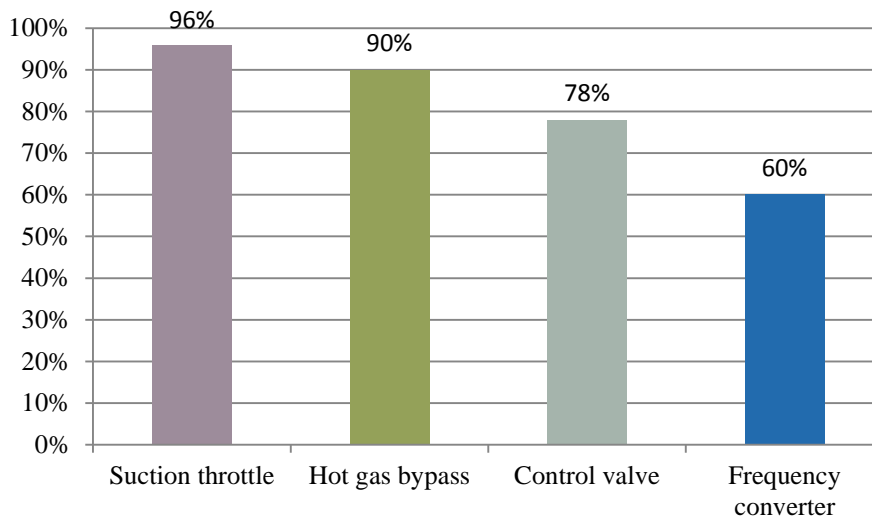
COOLING-INTENSIVE SECTORS

The sectors requiring most cooling are the food industry with a 30 per cent share on average and meat processing with up to 70 per cent of total electricity consumption used for cooling. In addition, the chemical, pharmaceutical, electrical and electronics industries also have savings potential.

THE MOST IMPORTANT COST-CUTTING MEASURES:

- determine power consumption of the system components (compressors, pumps, fans)
- assess the system's energy efficiency
- identify and reduce cooling loads
- optimise system temperatures
- control individual components and overall system
- check and install heat recovery system
- reduce leaks.

The bar chart shows the electricity consumption for compressors at 60 per cent of the cooling load (without adjusting the evaporation or condensation temperature).



Graph: AEA, Cascade Energy Engineering, 2004

HEAT RECOVERY

After lowering the cooling load, heat recovery is a relatively simple and very worthwhile way of reducing energy consumption.

[klimaaktiv best practice example:](#)

SANDOZ GMBH: replacement of 17 cooling systems resulted in savings of 1,001,700 kWh per year

SWITCH OFF – OPTIMISING LIGHTING SYSTEMS

IN EUROPE 75 PER CENT of industrial and office lighting is outdated or inefficient. A cost factor in commercial and industrial operations frequently underestimated is the lighting of large areas such as halls, retail space, office buildings, or industrial facilities.

Nevertheless, the lighting system's share of total electricity consumption can vary significantly:

- industry: 5 to 10 per cent on average
- food retail sector: 20 to 30 per cent
- commerce: up to 30 per cent (e.g. car showrooms: 14 per cent, joiners: 30 per cent)
- offices: 30 to 50 per cent
- warehouses and logistics: 60 to 80 per cent
- multi-storey and underground car parks: virtually 100 per cent.

When viewing the measures that can be taken as a whole, there are profitable direct and indirect effects. Not only are the energy costs saved an asset: just think of the improvement in light quality and, as a result, your staff's increased sense of wellbeing and ability to work better.

In the table below you will find a comparison of optimisation measures.

	Energy saving potential	Potential regarding improvement in light quality	Probability of being implemented based on investment costs
Optimise daylight use	Low to high	Medium to high	Low to medium
Optimise light control	Low to high	Low to high	Low to high
Optimise utilisation factor	Low to high	Medium to high	Medium to high
Replace equipment	Low to high	Low to medium	High
Replace lights	Low to high	Medium to high	Medium to high
Replace lamps	Medium to high	Low to medium	Medium to high

klimaaktiv best practice example:

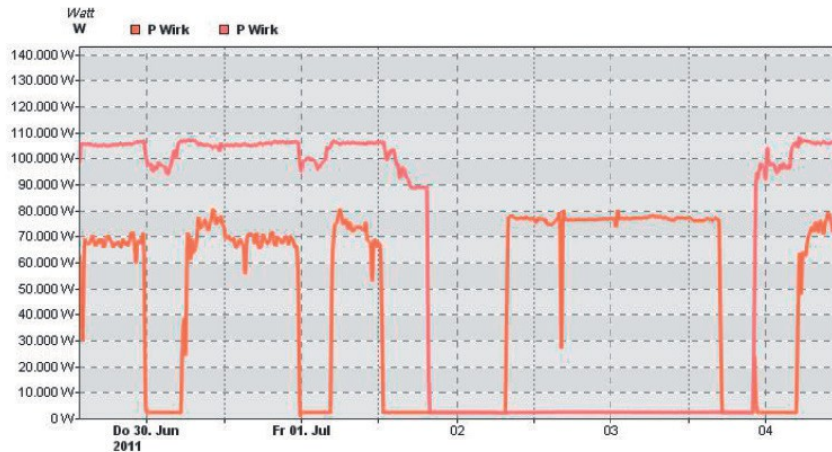
Autohaus Narowitz GmbH: replacement of the lamps in the repair shop, office, and showroom with LEDs resulted in savings of 45,000 kWh per year

STOP ESTIMATING – METER ACCURATELY

ONLY WHEN ENERGY CONSUMPTION IS MEASURED is there a sound basis for assessing the efficiency of the main systems consuming energy, for instance, or for evaluating cost-saving measures.

Metering and evaluating consumption helps with investment decisions and effective energy and energy cost management. It also provides feedback on cost-saving measures implemented and leads to a better understanding of the systems.

You will find an example of meter readings below.



Source: netconnect, Armin Zingerle

SIX STEPS TO MEASURING ENERGY CONSUMPTION:

- define the scope and purpose of the task
- define the system limits
- determine existing metering points
- develop the meter plan
- carry out the metering
- evaluate the results.

ACCURATE METERING – as simple as possible, as complex as necessary

Metering should at any rate be accurate, quick, comprehensible and therefore easily documented and cost effective.

[klimaaktiv best practice example:](#)

RONDO GANAHL AG: compressed air optimisation in machinery and infrastructure used for manufacturing (see figure above) resulted in savings of 489,200 kWh per year

6. SECTOR FOCUS

THE AIM OF THIS FOCUS is to analyse the energy efficiency potential within various sectors and suggest packages of measures. This shows individual companies within a sector the specific opportunities available for improving their energy performance.

The klimaaktiv services include:

- describing the relevant sector's significance in terms of the economy and energy economy
- describing the main systems consuming energy per sector
- presenting key performance indicators
- indicating potential savings, taking production processes into consideration
- listing the measures for putting the potential savings into practice.

Efficiency concepts are available for the following sectors:

- metal working and construction
- warehouses
- flour and husking mills, animal feed manufacturers
- timber industry
- plastics processing
- bakeries
- butchers
- joiners
- car repairs and servicing
- metal processing
- dry cleaners, laundries, dyers
- sawmills

7. BUILDINGS AND MOBILITY

OFFICE AND SERVICE BUILDINGS

If you construct or renovate a building to the klimaaktiv building standards, you ensure that your office building or manufacturing facility conforms to the latest efficiency standards. You will thus benefit from low energy costs and your staff from a high level of comfort. The first klimaaktiv consultation is free and your company will receive support in determining the quality criteria for a new build or renovation.

Contact:

klimaaktiv building & renovation

ÖGUT – Österreichische Gesellschaft für Umwelt und Technik
(Austrian Society for Environment and Technology)

Inge Schrattenecker

E-mail: klimaaktiv@oegut.at

Website: www.klimaaktiv.at/english/buildings

TRANSPORT MANAGEMENT FOR COMPANIES

Smart traffic concepts not only have the potential to make transport eco-friendly, but also save costs from a long-term point of view. klimaaktiv mobil supports companies throughout Austria in developing transport concepts and submitting projects for the klimaaktiv mobil funding programme.

Contact:

klimaaktiv mobile advisory programme for companies, developers and fleet operators

Herry Consult GmbH

Markus Schuster, Bettina Pöllinger

E-mail: office@mobilitaetsmanagement.at

Website: www.klimaaktivmobil.at

8. BECOMING A KLIMAAKTIV PARTNER

THERE ARE TWO OPTIONS FOR COMPANIES to cooperate with klimaaktiv in the long term:

PROJECT PARTNERS

klimaaktiv project partners are companies that take action to reduce CO₂ emissions in their own operations. To become a partner, you have to have implemented at least one energy efficiency measure and signed a klimaaktiv agreement on energy efficiency targets. The Environment Minister awards outstanding measures implemented by companies and their consultants. You are then entitled to use the klimaaktiv project partner logo.

Project partners benefit from the expertise provided by the klimaaktiv programme team and technology partners. You will be invited to exclusive energy-specific workshops and contacted to take part in public relations activities for the programme.

PROGRAMME/TECHNOLOGY PARTNERS

Programme partners are companies and organisations that work in the defined areas of the technology and energy management focus. They are speakers at klimaaktiv training courses and workshops with project partners. They contribute their know-how and market experience to the klimaaktiv tools and training courses and vice versa use klimaaktiv as a platform for demonstrating their expertise.

If you have any questions on a klimaaktiv partnership, please contact:

Karin Hauer

klimaaktiv energy-efficient businesses

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Tel: +43 1 586 1524 178

E-mail: karin.hauer@energyagency.at

9. SPECIALLY FOR ENERGY CONSULTANTS

BUSINESS ENERGY CONSULTANTS can become klimaaktiv expertise partners if they meet certain requirements.

KLIMAAKTIV EXPERTISE PARTNERS

These are trained experts who draw on and disseminate the latest findings in the fields of energy efficiency and renewables in their own areas of work on an ongoing basis. Energy consultants who advise manufacturing facilities on determining energy efficiency measures can thus enter into a partnership with klimaaktiv.

Requirements for an expertise partnership

- at least two years' experience as an energy consultant in companies
- relevant basic training for energy consulting in manufacturing companies (proof to be provided with at least 6 training points in the area of Processes under the "System for proving the expertise of auditors according to *EEffG*")
- valid authorisation to provide energy consulting services.

Additional training required and consulting

- Attending the klimaaktiv basic training course on energy management and ProTool is mandatory for expertise partners.
- Afterwards, an energy consultation must be carried out in a manufacturing company with klimaaktiv ProTool and the report and the ProTool sent to the programme for review. Contact: Konstantin Kulterer, klimaaktiv energy-efficient businesses, E-mail: konstantin.kulterer@energyagency.at
- If the report passes the review, the expertise partner agreement will be issued for three years. It can be renewed at any time by providing proof of further consultations and attending training courses.

Benefits of an expertise partnership

Expertise partners are listed on the [klimaaktiv map](#) and promoted at events. Expertise partners who support companies in submitting efficiency measures for the klimaaktiv awards are also given special recognition by the Environment Minister (see next page).

10. AWARDS AND BEST PRACTICE

SHOW YOUR SUCCESS. klimaaktiv offers companies the opportunity to promote their commitment to climate protection in public. Since 2008, a klimaaktiv conference has been held annually where the Environment Minister presents awards to companies for outstanding energy efficiency measures.

HOW CAN YOU ENTER THE KLIMAAKTIV AWARDS?

- You have to have successfully implemented an energy efficiency measure within the past two years.
- Enter your measure(s) on the website www.effizienzprojekt.at
- After the jury approves your entry, you will be invited to the awards ceremony.
- If you sign the agreement on energy efficiency targets, you can also become a klimaaktiv project partner and the Environment Minister will present you with a badge at the awards ceremony.

LEARNING FROM THE BEST

Projects from other people may well be a source of inspiration for your company. Use this [link](#) to find over 200 best practice examples in various industries and areas of technology (in German language).

11. CONTACT US

The programme “klimaaktiv energy-efficient businesses” is part of the climate protection initiative klimaaktiv of the Austrian Ministry of Agriculture, Forestry, Environment and Water Management. It offers special information and consulting for industry and commerce, shows ways to discover savings potential and offers support in the implementation process.

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