Systematic energy efficiency

SIMPLY BY OPTIMISING OPERATIONS, THE JOWA AG COMPANY REDUCES ITS CO_2 EMISSION THROUGHOUT SWITZERLAND BY 1000 T/YEAR AND INCREASES THE ENERGY EFFICIENCY OF ITS BUILDING SERVICES ENGINEERING

++ figure 1

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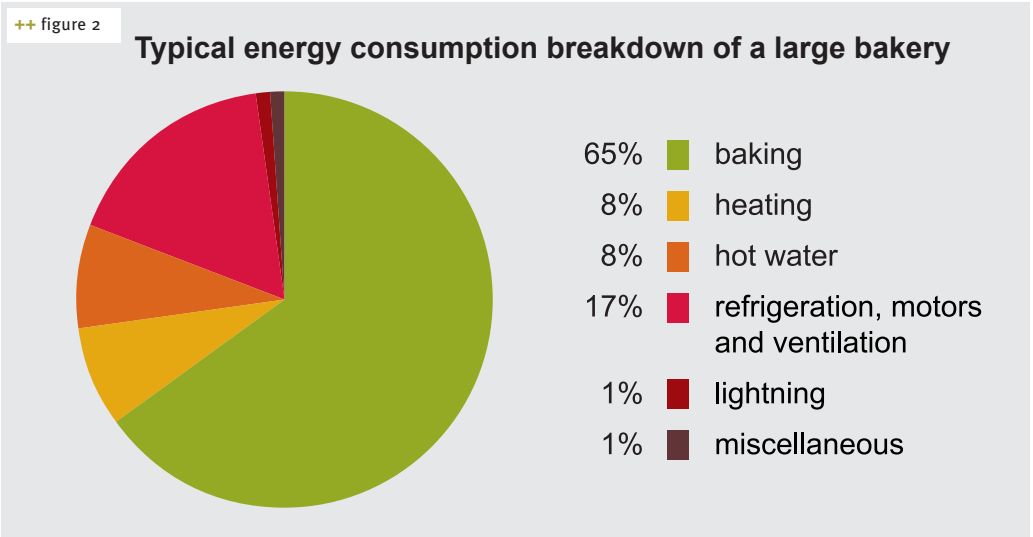
Baking bread is a heat-intensive and electricity-intensive process, and contains a large potential to increase energy efficiency in manufacturing and the infrastructure. As early as 2000 the Jowa AG Company, Volketswil, entered into a contract with the Energy Agency for Industry (EnAW). This contract specified an energy efficiency increase (by 7%) and a reduction in CO_2 emission (of approx. 900 t/year) by 2010. The Amstein + Walthert AG consultancy practice received an order from Jowa for support in identifying potentials. In addition to highlighting economically worthwhile actions, there was a requirement to ensure the implementation and correct documentation of the actions taken. The consultancy company analysed the ten Jowa business operations with regard to the opportunities for optimisation in the areas of heating, ventilation, process heat and steam, air conditioning cooling, industrial cooling, compressed air, sanitation/water and electricity. The defined objectives were achievable just by optimising the operations of the

++ figure 1
The Jowa Bakery in Gränichen/AG

++ figure 2
Typical energy consumption breakdown of a large bakery

++ figure 2



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Jowa AG, Volketswil

The Jowa AG Company was founded in 1931 as a production operation of MIGROS, the cooperatively structured market leader in Swiss food retail. In the beginning the production operation manufactured cocoa powder, chocolate and similar products for shops. Then, in 1948, the cooperative society members founded the first MIGROS bakery in St. Gallen. Fresh products for their own supermarkets are baked in the regional bakeries at Gossau, Carouge, Gränichen, Ecublens, St. Blaise, Volketswil, San Antonnino and Zollikofen, the largest of which also have traditional bakeries. The bakeries also supply catering establishments and filling station shops through the company's own logistics business covering the whole of Switzerland. The Gränichen factory, in particular, has specialised in the manufacture of frozen baked goods. Migros with shops in France and Germany, and Jowa with the JOWA Franche S.a.r.l. Company have now expanded beyond the national frontiers. +++

services supply installations in eight bakeries, one pasta factory and one flour mill. Within one year it was possible to achieve an increase of about 3% in electrical efficiency and of about 6% in heat efficiency. This also enabled Jowa to make a big contribution to protecting the environment, and it reduced its emission of CO_2 by approx. 1000 t/year.

Step by Step to the target

In 2008 Amstein + Walthert used Quick-Checks to analyse the energy consumption (heat and electricity) of the principal plants and systems, and presented initial recommendations for optimisation measures to increase efficiency. These included both operational and plant technology actions (see graph with the list of measures). Even simple functional checks and initial measurements on heat recovery and refrigeration/cooling plants promised good opportunities for optimisation. For example, the running items of ventilation plants were matched better to the production operations, air intake temperatures were brought into line and lighting was optimised by installing movement sensors.

In the next project stage in 2009, actions that were easy to put into effect and those with a payback time of up to two years were implemented. That amounted to a total of 94 actions throughout Switzerland, for example, within one year, adapting the heating curve and heating times to the needs.

Replication of actions and implementations

It was possible to adopt repeatedly for other sites the measures that had been successfully implemented, such as optimising heating characteristics, additional insulation of pipes and thermo oil pumps, reducing the level of the ▸

Amstein + Walthert AG, Zurich

The Amstein + Walthert AG Company provides engineering and consultancy activities in the following areas: heating, ventilation, air conditioning, sanitary and electrical engineering, facility and risk management, acoustics, building physics and energy, fire protection, design of the lightning, IT, safety and building system automation. The consultancy services in the area of the energy consulting cover operational optimisation of the heating, ventilation, air conditioning and sanitation installations in industry and in services buildings, from defining the basic principles through analysis and implementation of measures to monitoring success. www.amstein-walthert.ch

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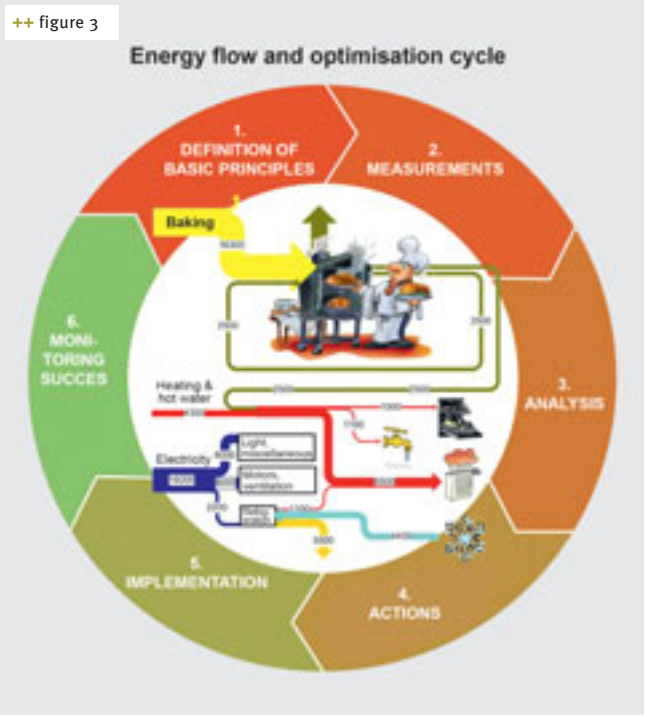


compressed air and the demand-led adjustment of the cold water and re-cooling temperatures.

Simple actions such as eliminating diversion circuits and the use of controlled rotation speed pumps often achieved an efficiency increase of more than 30%, because the heat of condensation also became usable as a result of the lower return temperatures in the heat recovery plants.

Each action was preceded by a detailed analysis of the plants and/or production processes. In addition the implementations were continuously monitored and a success check was carried out after completion. Therefore the parameters to be optimised were measured before, during and after implementing the actions.

Optimisation is ongoing

The "Energy Project" was highly successful for all participants and highlighted the fact that the use of energy in industrial enterprises can be reduced significantly by relatively simple means. As a result of the measures with an average payback time of less than two years, it was possible to reduce the annual CO_2 emissions in the Jowa businesses by 1,000 t and the energy consumption (heat and electricity) by 6,200 MWh/a. This corresponds to the annual energy consumption of 100 Swiss households.

The optimisation work is still not completed. The postponed measures with a payback period of up to five years will be implemented in 2010. When doing this, special attention

++ figure 3
Energy flow and optimisation cycle

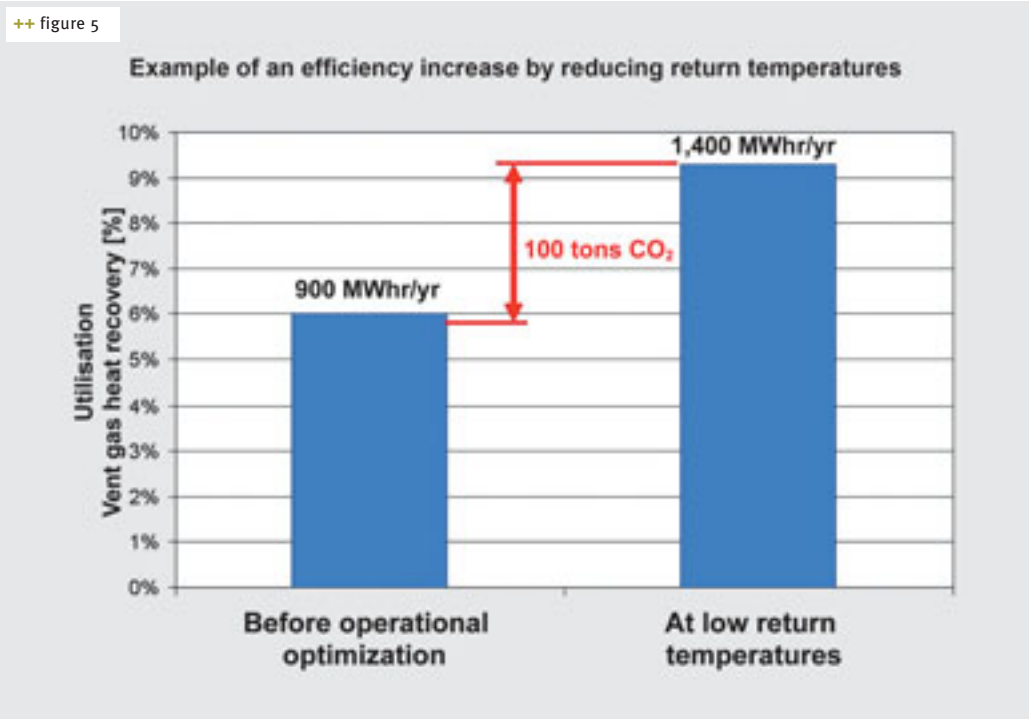
++ figure 4
Extract from the list of actions

++ figure 4

Extract from the list of actions

Description of the action	Pay-back [Years]
Functional testing and maintenance of heat recovery plants: - Defects and malfunctions are not detected by the control system - Adjusting temperature levels - Regular success checks	0 ... 3 years
Optimising the operating mode of the refrigerators: The temperature levels of the cold water and re-cooling decisively affect the refrigerator's efficiency	0 ... 2 years
Compressed air plant, leakage losses and energy efficiency: - Periodical search for leakage losses - Measurement of compressed air consumption and effective air compressor capacity utilisation - Reducing the pressure level by matching it to production - Investigate the retrofitting of heat recovery	0 ... 3 years
Adjust timeswitches of ventilation plant, heating and lighting to demand	0 ...1 year
Optimise heating controllers Adjust heating curves and heating times to demand	0 ...1 year
Thermal insulation of pipes and pumps Heat transfer oil, hot water, heating	1...3 years
Warm water Economy showers, temperature level	1 ... 3 years

++ figure 5



++ figure 5
Example of an efficiency increase by reducing return temperatures

will be given to the process-related consumption of energy. An energy management system was introduced to enable the sustainability of the measures that are implemented to be guaranteed, even in the long term. This system automatically and regularly informs the employees about the energy consumption of their plants, and highlights discrepancies immediately. Raising employee awareness about the energy consumption of their plants will also make an important contribution to optimising the Jowa AG Company's operations in the future. +++