



FERTILE GROUND FOR ENERGY-SAVING MEASURES

What properties must flooring have in order to be used in laboratories, radiology rooms or in the electronic industry? It must be both electro-conductive and insulating so as to protect those put at risk through contact with live parts. Swiss-based Forbo-Giubiasco SA specializes in precisely this type of flooring. To make production as energy-efficient as possible, the company enlisted the support of the Energy-Agency of the Swiss Private Sector (EnAW).



Forbo-Giubiasco SA has participated in the EnAW Energy Model since 2009.

Colorex is the name of the non-porous, easy-care, high-tech vinyl flooring. It meets the highest hygiene requirements and is therefore suited for clean rooms. It must have an insulating and antistatic effect vis-à-vis electrical voltages emanating from equipment. If surfaces are not statically discharged, friction with clothing or shoes can produce spark discharges, especially in winter and in dry air conditions. But how is such a product made and what are the most energy-intensive stages of production? Bruno Guidotti, Managing Director of Forbo Giubiasco SA, explains the process.

LIKE BAKING

«Imagine, you are baking a plaited loaf», Guidotti begins. «At the start of process we receive the plastic raw material in powder form. We mix the powder with various additives and a plasticizer. The compound thus obtained is fed into a machine where it is thoroughly mixed and heated, creating a thick mass comparable to a dough. Calender rolls are then used to press the hot mass into a long sheet, which is then allowed to cool in the open air. In the next step, this sheet is shredded into small rectangular chips which are then coated with a black liquid based on carbon black.

The black paste contains conductive material that makes floorings antistatic. The chips are then reheated and pressed in moulds inside a large, high-pressure oven at 45 kg/cm². The resulting slabs are then cut horizontally. Next comes the surface treatment, which consists of sanding, brushing and smoothing. The sheets thus obtained then enter the stress relieving oven, where they are first heated then cooled. At the end of the process, they are cut to order into tiles and meticulously inspected before being palletized and prepared for shipment.»

LESS IS MORE

For over five years now Forbo Giubiasco SA has been participating in the EnAW Energy Model, thereby underlining its commitment to its worldwide motto: «Creating Better Environments». Guidotti is convinced that by cooperating with EnAW and EnAW Consultant Walter Bisang, the company can reduce its ecological footprint as well as pro-actively lower its energy consumption. «Our Environment and Security Officer Giacomo Pansardi, together with Mr. Bisang, have accomplished a lot in five years», he says. One of the most important measures implemented concerns in the stress relieving oven. A pinch analysis (see box, page 2) conducted by DM Energieberatung AG has revealed that

226 000

FRANCS ARE SAVED BY FORBO-GIUBIASCO EVERY YEAR.*

the temperature of 110°C used to heat the plates for stress relief can be reduced to just 60°, thereby economizing 90 000 litres of fuel oil.

INSULATION IS THE MAGIC WORD

Forbo-Giubiasco SA requires a considerable amount of thermal energy for the entire production process. Besides the mixing machine, also the large press too is heated by thermal oil. Previously this heat was simply lost due to the absence of insulation. Pansardi therefore devised a solution to this problem, whereby insulation mats were installed to insulate the press and tubes around the machines from the outside. This ensures that most of the heat remains inside the process. The →

payback period of 2.6 years guarantees the cost-effectiveness of the investment, which is always the central consideration for EnAW. The insulation of these machines alone enables Forbo-Giubiasco SA to save 20 000 francs per year.

CO₂ EMISSIONS REDUCED BY 50%

Compared to 2011/2012, Forbo-Giubiasco SA has effectively halved its CO₂ emissions. From 1,400 tonnes per year initially, the company's annual CO₂ emissions fell to just 700 tonnes in 2016 – a remarkable performance made possible by the process optimizations described above and the use of district heating. The only incineration plant for municipal waste in the Canton of Ticino is located one kilometre from the Giubiasco operating site. «We were one of the first firms to get involved in promoting the development of local remote power and we now heat the entire building with district heating and waste heat from our production processes», says Guidotti. «Calculations have shown that this enables

us to economize some 150 000 litres of oil per year. That annual figure is now as much as 170 000 litres.» We still cannot dispense with oil, however, as the thermal oil needed for our processes cannot be heated up by district heating. Under the target agreement drawn up with the EnAW, Forbo-Giubiasco SA also benefits from the refund of the CO₂ tax, which means savings of 58 000 francs per year.

Yet for Guidotti it is not just about financial incentives. «Involvement in the building of the district heating system was largely influenced by sustainability considerations», he explains.

→ www.forbo.com

* The financial savings comprise the sum of energy cost savings and the CO₂ tax refund. We are assuming average energy costs (electricity, heating oil and natural gas) of 10 centimes per kilowatt hour. The CO₂ tax refund amounts to CHF 84 per tonne of CO₂ (2017 figure).

YOU TOO CAN SAVE



Forbo-Giubiasco SA is saving on energy and costs thanks to its collaboration with the EnAW. Every enterprise can lower its energy consumption and CO₂ emissions through cost-effective efficiency measures. Contact us so that you too can fully harness your establishment's cost efficiency potential.

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The EnAW Consultant responsible for Forbo-Giubiasco SA is Walter Bisang.

Interview with Bruno Guidotti

QUALITY «MADE IN SWITZERLAND»

Mr. Guidotti, Forbo's main product is linoleum. It is not produced in Giubiasco. Why?

In Switzerland we always wanted to focus on a product that did not previously exist. With our industrial product «Colorex» we currently occupy a niche and as such we can also export most of it. Only ten per cent of the end product stays in Switzerland. The rest goes to Europe and the USA, and the bulk of it to Asia.

Asia is home to your biggest worldwide competitors, which produce a similar electro-conductive product. Why is Asia still such a big customer?

This is about trust first and foremost. The clean rooms where our products are installed must be immaculate. Bulk buyers in the chip manufacturing industry have been our loyal customers for 30 to 50 years. The question always arises as to whether Chinese plants can consistently



BRUNO GUIDOTTI

Managing Director
Forbo-Giubiasco SA

turn out products of a quality comparable to ours.

The topic of sustainability is deeply embedded in your corporate philosophy. How do you raise staff awareness on the topic?

At the start of our cooperation with EnAW we collected ideas for optimization from our employees. Some of them have already been implemented. With us, sustainability is ever present. We also regularly implement new projects, like «Bike to work», to name an example.

PINCH ANALYSIS

To analyse its energy flows, Forbo-Giubiasco SA opted for a pinch analysis. The pinch analysis method makes it possible to accurately determine and economically exploit a company full CO₂ and energy-saving potential. It is suited to large industrial enterprises and medium-size firms with annual energy costs in excess of 300 000 francs.

→ www.enaw.ch/pinch-analyse

AROSA LENZERHEIDE BERGBAHNEN: GROWING SUSTAINABLY TOGETHER



With 225 km of pistes and 43 transport facilities, Arosa Lenzerheide is the largest contiguous winter sports area in the Grisons.

The energy consumption of mountain transport systems is by no means a constant. Participants in the Energy Agency of the Swiss Private Sector (EnAW), such as Engadin St. Moritz Mountains AG, Savognin Bergbahnen AG, Mottas Naluns Scuol-Ftan-Sent AG, AG Luftseilbahn Corviglia-Piz Nair or Corvatsch AG, face the special challenge of peaks and fluctuations in power consumption. Energy is also being saved in Arosa and Lenzerheide.

Sustainable natural resource management is of fundamental importance to the operation of mountain transport facilities. Unspoiled nature makes all the difference to the mountain experience and is the basis of summer and winter tourism. Environment-friendly, sustainable, authentic, – all these are slogans that impact tourism companies in terms of operations, strategy and communications. Sustainability is not just a buzzword for Arosa and Lenzerheide but has been a high priority for many years now, above all in the technical field. The topic is a key component of the strategy and every effort is made to ensure that our offer to our guests is efficient and sustainable. We have already achieved many milestones, but much still remains to be done.

Joining forces

In the 2013/14 winter season, the two ski resorts of Arosa and Lenzerheide were linked up by the Urdenbahn, which runs from Hörnli in Arosa to Urdenfürggli in Lenzerheide. Arosa Lenzerheide offers 225 km of pistes and 43 transport facilities, making it the largest contiguous winter sports area in the Grisons. Such a link-up has been under consideration and discussion for over 40 years. It is now a reality. Not only do visitors love the new, substantially increased number of pistes available, but the two mountain transport operators describe the connection as a win-win situation.

Ideal partners

Winter sports areas are having to grapple increasingly the very influential factors of weather, economic trends and foreign competition. Winter sport enthusiasts expect perfect snow at all times, immaculately groomed pistes, as well as top-notch cuisine. Connecting two already well established and much loved ski resorts offers guests a very broad choice of possibilities – everyone is sure to find their ideal piste.

Arosa Bergbahnen and Lenzerheide Bergbahnen attract two different types of visitor. While Arosa receives mostly ↻



Samuel Lorez
Chief Engineer
Lenzerheide Bergbahnen AG



Marc Gisler
Chief of Buildings
and Properties
Arosa Bergbahnen AG



Andreas Sturzenegger
Chief Engineer
Arosa Bergbahnen AG

What are the greatest benefits of the Arosa-Lenzerheide link-up?

SL: One key point is undoubtedly the significant expansion of the skiing area. Visitors can enjoy a bigger and more varied panorama.

MG: Visitors will of course find it fantastic that the new Urdenbahn allows them to move from any side to the other, and so take full advantage of the variety of pistes and gastronomy on offer.

What are the most energy-intensive aspects of mountain transport operations?

AS: On the whole we consume a large amount of energy, especially for artificial snowmaking. But that is precisely why we pay special attention to energy-efficient technologies when purchasing new machines and equipment.

SL: Among other things, we consume about nine million kwh of electricity per year. This breaks down into about 40% for transport facilities, 30% for artificial snowmaking and the remainder for operations and catering. In our company too, snowmaking accounts for a rather large share, even though we make snow for just a few days of the year.

«For us, the start of cooperation with the EnAW was a kind of stocktaking.»

Does cooperation with the Energy Agency of the Swiss Private Sector (EnAW) change your outlook on energy efficiency?

AS: For us, the start of cooperation with the EnAW was a kind of stocktaking. And this to some extent validated the work we were doing: we had already been operating in an energy-conscious manner and were already on a path of energy efficiency. Our potential ↻



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week-long guests, Lenzerheide is frequented more by day trippers. Marc Gisler and Andreas Sturzenegger of Arosa Bergbahnen think that this could be because people are put off by the 365 curves in the road from Chur to Arosa. Not every motorist will feel drawn to this – and even less so for a one-day outing – and will therefore opt for Lenzerheide, which can be reached more quickly.

But there are now numerous possibilities on both sides: you can strap on your skis on the Arosa side or the Lenzerheide side and explore the two valleys with ease.

Fine-tuning with the EnAW

The two mountain transport operators are striving to use energy sustainably and efficiently. They have been participating in the EnAW energy model since 2014. Although energy efficiency has been a focus of the two mountain transport operators for many years, they are now engaged in what might be termed «fine-tuning», with the support of EnAW moderator Holger Papst. The target agreements concluded on both sides mean that the cantonal legislation governing large-scale consumers has been implemented and the companies are now exempt from the network surcharge. Moreover, Lenzerheide benefits from the ewz bonus, while Arosa is working towards CO₂ tax exemption for the company's hotel operations, says Papst.

As both Arosa Bergbahnen and Lenzerheide Bergbahnen are still very new EnAW participants, nothing can be said about effective CO₂ or kwh reductions until after the first monitoring next year. Based on the current situation and on potential analyses, however, some 140 measures have been jointly approved. If they are all implement-

ed as expected, the energy saving will be about 400 MWh in Arosa and an impressive 800 MWh in Lenzerheide. Besides, in collaboration with the EnAW, the transport operators are striving for CO₂ emission cuts of 45 and 50 tonnes, respectively.

Decentralized measurements

The Grisons mountain transport operators do stand out somewhat among EnAW participants, as they are not conventional companies where it is possible to take readings of all energy-related figures at one place. The spatial distribution of the facilities, workshops and restaurants complicates energy management somewhat. The early stages were therefore a bit challenging, says Samuel Lorez, Chief Engineer at Lenzerheide Bergbahnen. If energy accounting is to be properly done, data must be available from every single facility – including from every snow cannon, for example.

In dealing with the problems posed by spatial distribution, however, the Grisons has even become something of a pioneer. Thanks to a technologically sophisticated building services management system, it has been possible since 2009 to centrally monitor, steer and optimize all heating, ventilation and lighting systems as well as kitchen technology in Lenzerheide. What Lorez likes about the system is that it is possible to fix minor technical problems directly from the central command post. From the computer he can easily regulate overly-high temperatures in unused or underused rooms, for example. The sum of such adjustments is highly beneficial in terms of energy consumption. Yet at no time do guests lack the comfort they want. And this is the prime objective on both sides of the Urdenbahn.

for improvement, our 10-year target, was therefore judged quite favourably. Even so, we are still always open to good ideas from the EnAW. The advantage for us is that we can get answers to a large number of questions from one place.

How can visitors to the ski resort contribute to energy efficiency?

SL: A large part of the emissions associated with today's «mountain transport product» results from modes of individual transport. We have taken this responsibility on board and introduced a ticket that includes public transport. With a valid ski pass (day or season), winter guests at the Arosa-Lenzerheide ski resort can travel the entire Arosa-Chur-Lenzerheide route by public transport to practise their favourite sport then return to their point of departure, free of cost. If visitors leave their cars at home, they need not worry about parking or about buying several different tickets. Their day pass is all-inclusive, and they are doing something for the environment.

ENERGY AGENCY OF THE SWISS PRIVATE SECTOR (EnAW)

Since 2001 and based on energy and product neutrality, we have been providing our participants with tried and tested, all-round assistance in energy management through excellent products, services and ISO 50001-compliant tools that are recognized by the authorities. In implementation, we rely on cost-effective efficiency measures that reduce every company's energy consumption and CO₂ emissions. The EnAW is a non-profit organization run by business, for business.

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SIGNIFICANT ENERGY SAVINGS THANKS TO MANY YEARS OF EXPERIENCE



Higher quality energy can be obtained in the thermo-reactor, which is then transferred to the production process via so-called thermal oil.

Amcor Flexibles manufactures packaging films and recovers part of the process energy using a thermal exhaust air cleaning plant. Integrated into the Energy model of the Energy Agency of the Swiss Private Sector (EnAW), the Kreuzlingen company achieves energy savings totalling 24%.

Amcor Flexibles Kreuzlingen AG, today part of the Australian Amcor Group, can trace its history back to Dr. Lauber, Neher & Cie, which began rolling aluminium foil more than 100 years ago, a pioneering achievement at the time. Nowadays, Amcor Flexibles manufactures flexible packaging – coated aluminium films and printable composite materials made from aluminium and plastic films.

Robert Greuter has spent his entire working life in varying roles within the company. At one time he worked as a designer

developing operational improvements in the field of rolling and finishing. He is now the person best able to provide information on the energy-saving efforts of the last few years. «Because it's always about the big picture», says Greuter, «i.e. the entire cycle.» And this is what he has again and again thought through and recalculated with the support of Daniel Meier, consultant at EnAW. This has led to the discovery of numerous opportunities for optimisation that have now been implemented.

Energy from solvents

As in any company, the focus is on the product – packaging films, still produced from aluminium and plastic foil but adapted to many different requirements using a wide variety of varnishes and coatings. Large and small machines coat, print and laminate (composite of several layers of foil). The drying process requires large ↻



Robert Greuter

*Engineering & Infrastructure
Amcor Flexibles
Kreuzlingen AG*

Robert Greuter, you stress that it is important to see the big picture with regard to saving energy. What does that mean in your case?

Specialist technical knowledge is necessary at many points in our production facility. For example, the thermo-reactor is a highly sophisticated piece of equipment. It must be designed and maintained by specialists. This is why we often work together with external experts and the staff of our suppliers. But somebody has to be there who keeps track of everything and recognises where things fit together.

That somebody is you, clearly.

It will soon be somebody else since I'll be retiring. A certain passion for technology is necessary if you are going to perform this task. I have always had an affinity for technology. However, I've always seen myself as something of a theoretician. It is always a great joy when something that you worked out in theory and never previously tested actually works in practice.

You have seen constant change in your company.

This is why I have again and again been given new responsibilities. It keeps you young – at least your mind. And now my principal task lies in ensuring that the expertise of the specialists in different disciplines is pooled and that the required information is available at the right interfaces. It is only then that we can achieve optimum results.

Do you have to know your own processes inside out in order to find the optimum configuration?

Precisely! And to achieve this we make our own calculations and also repeatedly find support from external experts and the EnAW. Their consultant, Daniel Meier, took on the problems of our production processes. Collaboration with a group of competitors in the EnAW Energy model who also recover energy from solvents is helping us make further improvements.

Is the company also benefiting from this?

You must remember that solvents simply ↻



As a consumer you are most likely to encounter products from Amcor Flexibles Kreuzlingen AG in the form of packaging for medication.

quantities of air heated to around 100° C. The exhaust air from these machines contains a couple of grams of solvents, so-called VOCs (volatile organic compounds), per cubic metre. These are substances that cannot simply be allowed to escape into the environment. At the same time, solvents contain a large amount of energy. The contaminated air is therefore fed through an exhaust air cleaning plant. Depending on its operating state, this equipment, also called a thermo-reactor, requires auxiliary energy to be fed in or supplies excess energy that can, for example, be used generate warm water for the heating system. However, since the temperature in the thermo-reactor exceeds 800° C, higher quality energy can be obtained and transferred to the production process via thermal oil where it replaces some the fossil fuel, in this case natural gas.

«It's always about the big picture.»

The operation of the thermo-reactor plays a major role in the amount of energy consumed and thus in the total energy bill. According to Robert Greuter, when the plant operates at a steady rate and provided there is a sufficiently high proportion of

VOCs, the plant can produce heat without auxiliary energy having to be fed in.

Process optimisation

The success of this improved management has had a significant effect. Less auxiliary energy is required to operate the thermo-reactor and additional process energy is obtained. Further improvements resulted from concentrating the exhaust from all machinery in the production facility, which is now fed through a single thermo-reactor. This has served to statistically even out production interruptions and fluctuations in the solvent content levels of exhaust gas somewhat. The plant runs more stably and achieves better results. Technical measures have been undertaken to increase the effectiveness in the thermo-reactor itself, as well. The autothermal point is now reached at only two grams of solvent per cubic metre of air (previously three grams). This also increases the overall energy yield.

«Everything OK?», asks Robert Greuter. «We could also now speak about insulated windows and modern lighting, which also contribute to energy savings. We are active in these areas, too. But it's the measures we undertook in the area of the production process and treatment of exhaust gas that have brought us the major benefits.»

**2200
t CO₂/a
saved**

used to escape into the atmosphere. That's no longer the case today. We succeed in using about half the energy from the solvents as process heat. This is a win-win situation for the environment and for business.

THE 2011 ENERGY-SAVING MEASURES IN NUMBERS

- Electricity, gas and heating oil used: 39,000,000 kWh
- Effective measures; savings: 12,500,000 kWh (24%)
- Quantity of CO₂ saved: 2,200 t

ENAW ENERGY MODEL

The Energy model is tailored to the needs of medium-sized and large companies with annual energy costs in excess of CHF 500,000 in manufacturing, services, commerce and transportation. Amcor Flexibles Kreuzlingen AG is a participant in the Energy model. It is a member of the SOLV group (Swiss organisation of industrial companies for solvent recovery in the field of packaging). The Energy model groups allow the exchange of experience among companies and provide the opportunity to determine comparative data.

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CLIMATE PROTECTION WITH EFFICIENCY AND PASSION



Energy-saving machine:
Alcatel-Lucent's new heat pump.

Alcatel-Lucent has drastically reduced its energy consumption thanks to a number of individual measures and in cooperation with the Energy Agency of the Swiss Private Sector (EnAW). The installation of a reversible heat pump was highly successful.

In the course of 2009 there was drilling for groundwater along with the relevant pumping tests at Alcatel-Lucent Switzerland's head office at Friesenbergstrasse in Zurich. The hope was to tap this energy source for operating heat pumps and thereby achieve some ambitious energy savings and CO₂ reduction targets. There was indeed sufficient groundwater but its quality was not appropriate for the purpose envisaged. A setback of sorts!

Daniel Wermuth, Head of Facility Management at Alcatel-Lucent Switzerland, tells the story in a relaxed manner, for there was a happy end after all. Any discouragement on the part of the Facility Management team at the disappointing geological facts

was only short-lived. No time was lost in seeking and indeed finding another equally abundant source of energy: Alcatel-Lucent now operates a heat pump that utilises all the waste heat from the testing and laboratory facilities.

Heating oil needs cut by 75 per cent

Given the year-round need for cold water, the team was able to develop a reversible heat pump system, an innovative measure that cuts annual heating oil needs by a hefty 75%. Substantial savings in electricity could also be made, since it also led to the actual cessation of cooling at the Tiergarten Street building. The group invested some one million francs in the project, which includes a refrigeration system, the installation of a heat pump and the renovation of the boiler plant. It will be possible to recoup the investment within five years. Daniel Wermuth is convinced of the efficiency of utilising this waste heat and believes that there is just as much ↻



Daniel Wermuth
Head of Facility Management
Alcatel-Lucent Switzerland

Alcatel-Lucent cooperates with the Energy Agency of the Swiss Private Sector (EnAW) – is this a compulsory exercise for reasons of image?

There is no question of compulsion whatsoever. Networking amongst technical maintenance teams through the practical sharing of experience gives companies an effective platform for optimising costs and energy consumption. Besides, the EnAW's professional monitoring represents a substantial pool of expertise for all participants.

Do voluntary measures too lead to meaningful progress?

We are in a marathon, for we must first develop an awareness of the subject in order to see the opportunities! In the long run, many small steps yield impressive results.

What are the conditions that must be met within the company?

The basic condition is for the company to have a vision and be determined to manage and optimise energy consumption. In addition, precisely in today's environment marked by cost pressure, streamlining and increased outsourcing, the key to success lies in competent and professionally trained staff who identify strongly with the employer. Success and sustainability ultimately depend on staff interest and commitment.

Do you also encourage your personnel to save energy?

As part of our corporate responsibility we support several international climate initiatives such as the UN Global Compact initiative and FTSE4Good. Locally, we use Swiss rail checks to encourage our workers to leave their vehicles behind and take public transport to work. Besides, our vehicle fleet now consists of lighter vehicles, and some of our vehicle-dependent, travelling staff have received eco-driving courses. These measures have considerably lowered our CO₂ emissions.

Your company is part of a global group. Do group structures hamper local energy-saving endeavours?

Alcatel-Lucent recognised very early ↻



As a consumer you are most likely to encounter products from Amcor Flexibles Kreuzlingen AG in the form of packaging for medication.

potential for optimisation in many companies.

But Alcatel-Lucent has been pursuing an energy-saving policy through a range of projects since the mid-1980s. In 2001 Alcatel-Lucent Switzerland voluntarily agreed on targets with the EnAW and committed itself to cutting its overall energy consumption by 21 per cent between 1996 and 2010. This target has been surpassed by far, and the success is down to a constant policy of small steps, says Josef Imhof, head of building services engineering at Alcatel-Lucent Switzerland.

66%
heating oil
reduced
since 1996

«The Green Touch initiative should improve the energy efficiency of communications networks by a factor of 1,000.»

This is impressively illustrated by a long-term comparison: the same building was consuming 300,000 litres of heating oil annually 20 years ago. Now it is barely 25 000 litres – one twelfth of the amount back then. The small measures implemented over the years include, for example, the insulation of roofs, optimising operating times, organisational operating measures and the optimal maintenance of the facilities.

A major step still lies ahead, says Daniel Wermuth, that of completely renovating the building envelope. This would nevertheless involve massive investments that could no longer be recouped in just a few years. «Despite the considerable energy savings potential – heating and cooling costs could be more than halved – this is not very significant when weighed against the cost of the investment. We have already brought our 30-year-old building to a relatively good level of energy efficiency through numerous individual measures,» says Wermuth.

Global profile in green IT

At the Swiss head office we feel supported by the parent company our energy-saving endeavours. Alcatel-Lucent is profiling itself globally in green IT. Alcatel-Lucent's research arm Bell Labs is striving to improve the energy efficiency of today's communications networks by a factor of 1000 thanks to the Green Touch initiative. What this means in practice is that worldwide communication networks, including the Internet, should in future be able to run for three years on the amount of energy now being consumed in a single day. And the Internet consumes an enormous amount of energy, adds Daniel Wermuth.

on that its own energy consumption was a non-negligible cost factor. Local energy-saving efforts within the group have therefore always been supported. Subsidiaries in other countries are now keen to adapt our measures as best they can to their local infrastructure.

ALCATEL-LUCENT SWITZERLAND – FACTS AND FIGURES

- Headcount: 650
- Number of measures implemented: 84
- Energy efficiency gain:
 - Agreed 2010 target: 123%
 - Actual 2010 figure: 188%
- Reduction in heating oil use since 2001: 54%
- Reduction in heating oil use since 1996: 66%
- Reduction in power consumption since 1996: 42%
- Cut in heating oil use in 2010 thanks to the new heating project incl. heat pump: 75,000 litres
- Total 2010 investments: 1 million francs

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MAPEI: STRONGLY PRO-ENVIRONMENT



Mapei is a world market leader in the production of construction chemical products such as adhesives and other materials for installing all types of floor and wall coverings. The company began as a small Italian family business in Milan and in the almost 75 years since then has evolved into a global corporation. The 63 subsidiaries of the Mapei Group employ over 7,500 people across 27 countries and 58 production facilities.

Mapei produces 17,000 tonnes of building materials worldwide every day. The group's overall energy consumption is therefore not negligible, says Stéphane Ropraz, Production Manager at Mapei's Swiss branch. Within the group, Mapei Suisse SA (Suisse) is a major supplier of polymer powders. These are used as binders in tile adhesives or sealants. Mapei Suisse has 70 employees, of which 30 are engaged in sales and technical advice in the field, 23 in production, and the remainder in administration.

Thanks to the support of the Energy Agency of the Swiss Private Sector (EnAW), Ropraz can look back on impressive accomplishments in energy savings. It has

managed to cut energy costs despite strong growth and increased production (see box).

Stéphane Ropraz observes that energy saving and environmental protection have been part of the philosophy of the Mapei group and are an essential component of its success, the key concepts being innovation and responsibility.

Technological measures

At Mapei's Swiss plant, spray drying in what are known as drying towers plays an important role in the production process. Liquid polymer is converted to powder form without the addition of solvents. The water present in the emulsion evaporates instantaneously.

Drying is an energy-intensive process, says Stéphane Ropraz. Two boilers are used to supply the steam required and this heats the air stream to 150 degrees. More than 87% of the energy used is therefore thermal, and just about 13% is electric power.

Mapei Suisse SA first looked into those areas where major savings were possible with relatively little outlay. Yet it has never neglected to take advantage of savings ➔



Stéphane Ropraz

Production Manager
Mapei Suisse SA

Switzerland is an expensive production location – does your Sorens factory also face competitive pressure within the group?

Four factories within the Mapei group produce polymer powders. This makes for a detailed analysis and precise cost comparisons. Mapei Switzerland operates the principal drying unit – and the one with the highest efficiency factor.

Does that mean you have invested a lot?

Of course, we have invested substantially and continuously in recent years, so that we now have high-performance facilities with state-of-the-art technology. But our success is down to our personnel, their motivation and their commitment. And no less important have been our constant endeavours to optimise our production processes. Switzerland's strongpoints include its location at the heart of Europe – both from a logistical and a cultural standpoint. Many threads come together here. And naturally, Switzerland's political and social stability is attractive to a multinational company.

Do your experiences also impact the entire group?

The individual subsidiaries in our group of course report to the parent company, including on their activities to boost productivity and on their technological improvements. This makes for a two-way sharing of experiences. For us the best thank you is the knowledge that our measures are being recognised and appreciated within the group and are often cited as «a good example.»

It has always been generally said that energy consumption increases with economic growth. Yet you are showing declining energy consumption even with increased production. Why is that?

Increased productivity and energy efficiency go hand-in-hand. Energy too is a cost factor. This is why, besides the numerous technological innovations and improvements and the optimisation of production processes, we have also taken organisational measures. These include the total shutdown of energy-consuming facilities on weekends, ➔



The new energy-saving spraying tower, Mapei Suisse SA.

possibilities even with limited potential, for it is often the cumulation of small savings that yields major savings. Every effort has been made to increase efficiency and productivity at the Sorens production facility, and always with energy consumption in mind.

Over the past ten years Mapei has thus steadily reduced its energy consumption in kWh per kilo produced thanks to over a dozen individual measures that have all proved effective. Technological improvements were the most instrumental factor. For example, the previous heat recovery systems were replaced and new filters installed, the steam conduits to the three drying towers were repaired and newly insulated, the old compressors replaced by variable-output, lower-pressure units, or new, more energy-efficient steam boilers were installed.

Process optimisation

The production process too was optimised by altering the initial equipment so that drying now takes less energy. Maintenance was adjusted such that breakdowns that would necessitate repairs are being averted. With less than twenty hours lost in

over 6,000 hours of production (round-the-clock operation) Mapei is now close to its target. This positively impacts the energy balance as well.

Mapei Schweiz AG owns no trucks. To import the range of products - mainly from the nearby facility in Italy as well as from Germany - and for direct deliveries to customers, the company works with a transporter that uses only Euro 5 standard-compliant trucks. «We also use rail transport where possible,» says Ropraz. But unfortunately, the Sorens facility has no rail connection.

«The cumulation of small savings yields major savings.»

Stéphane Ropraz mentions his company's slogan, which is «Mapei - Technology you can build on.» This is indeed a claim, an assertion that is used for advertising, and must therefore make an impact externally. But it also has an impact inside the company, and shows what the company considers important, namely reliability and sustainable quality. In other words, environmentally friendly products and production.

the regular review of all work methods, etc. It is crucial to recognise parasitic energy consumption so as to be able to avoid it. It is amazing how much energy is consumed all over a company with no measurable benefit or advantage.

Do your building materials now really contain less so-called «grey energy»?

Of course the increase in energy efficiency makes it possible to decrease the grey energy. Our research and new product development are also oriented along these lines. At Mapei we devote more than five per cent of turnover and 12 per cent of our personnel to new product development, specifically including eco-friendly products such as those in our ECO-line. These are tested by internationally recognised and accredited testing institutes and may carry the «EMICODE EC1» logo, which certifies them as low-emission products.

MAPEI SUISSE SA – FACTS AND FIGURES

- 2010 energy consumption: 21,510 MWh
- Energy efficiency gain 2000 – 2010: 195%
- 2010 CO₂ emissions: 3,979 tonnes
- Reduction of CO₂ intensity 2000 – 2010: 73%
- 2010 energy savings thanks to spraying tower: 5,615 MWh
- CO₂ emission cut thanks to spraying tower: 1,490 tonnes

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ONE STEP AHEAD OF THE TIMES AND COMPETITION



Novel energy efficiency measures at the Bopp AG company building as well.

In 2010 Bopp AG signed an agreement with the Energy Agency of the Swiss Private Sector (EnAW) to reduce energy consumption and CO₂ emissions, involving binding targets valid until 2019. The 2018 targets have already been far surpassed.

It began with fruit baskets, fish traps and coarse wire mesh fencing. Today, Bopp AG is one of the world's top three producers of ultra-fine wire cloths and meshes. They are used across a wide range of industries – from the aircraft to the pharmaceutical industry. Even the Olympic torch in Sydney contained Bopp AG wire cloth. Basically, the cloths are used for screen printing and filtration, as Marketing Manager Rudolf Voegeli explains.

Product development since the company's establishment in 1881 has been a prime example of the endeavour and need to be always at least one step ahead of the international competition. Today, Bopp AG

weaves wires 1/15,000th of a millimetre in diameter. These wires are so fine that even the slightest room temperature changes can paralyse the looms, which were developed and built by the company itself.

BOPP AG's headquarters in Zurich-Affoltern was completely renovated in 2007. As Voegeli explains, the commitment to climate change is rooted, on the one hand, in financial incentives, and on the other, in an awareness of the issue both on the part of customers and the company management. Already during the alterations to the building, much emphasis had been placed on energy efficiency and climate-friendliness. «I was all the more surprised when EnAW consultant Stefan Eggimann identified so many possibilities for further improvement,» says Operations Manager Felix Meier.

Residual heat twice over

Bopp AG processes metals – a very energy-intensive activity. The Zurich power ⚡



Hans-Ulrich Bigler

*Director
Swiss Industry and Trade
Association*

What does environmental protection mean to Swiss SMEs?

On the one hand, environmental protection is an obligation to pass on the world to our children in a good state. Environmental protection also brings major economic opportunities owing to the potential offered by resource conservation, greater energy efficiency and the development of environmentally friendly production methods. Above all, however, wise climate policies can lead to more innovation and hence to new markets both at home and abroad. The SME sector is keen to seize these opportunities.

Industry has outperformed the climate change targets over the past few years. What part does the Energy Agency of the Swiss Private Sector (EnAW) play in this success story?

Owing to the voluntary measures taken by industry, Switzerland is virtually the only country in the world that can achieve its Kyoto targets. That is a major success. The EnAW plays an important role in that it has far exceeded its reduction targets and has done so in an enterprising manner. It is the participating companies that are optimising their processes, thereby reducing overall energy consumption. This is giving rise to new production technologies and even new products. The work of the EnAW is therefore a win-win situation for both companies and the environment.

The EnAW also supports companies in improving energy efficiency, thereby lowering energy costs. In which sectors do you see the greatest savings potential?

It can be said with confidence that there is potential in all sectors! Implementation is another matter, however. All manufacturing industries constantly point to the need for increased energy efficiency, be they food or metal-processing industries. Service providers such as those in tourism or commerce too offer potential, as their energy needs are trending upwards. But beyond this, improving energy efficiency is incumbent on Switzerland as a whole.



As a consumer you are most likely to encounter products from Amcor Flexibles Kreuzlingen AG in the form of packaging for medication.

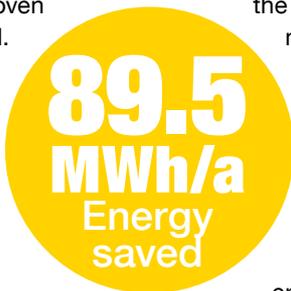
company therefore brought the EnAW programmes to Bopp's attention. The EnAW proposed sixteen measures to facilitate more efficient energy use and lower consumption.

«The targets agreed for 2019 have almost been attained already.

At its Affoltern headquarters, the company cuts wire cloth woven by the subsidiary in Appenzell. That process uses, inter alia, a laser cutting machine, the cooling of which releases heat. That residual heat will soon serve to heat production areas. Once this is operational, the annual energy savings will be 38,995 kWh.

Almost as much energy can be saved again through a similar measure that uses the residual heat from the server room's cooling system to provide hot water. This measure is not yet fully implemented, but once fully in place it can yield further savings of 37,565 kWh per year.

These two measures will yield the biggest savings and require the most investment. Although these two systems are not yet operational, Bopp AG has already cut its energy consumption by 80,793 kWh in 2011. The agreement with the EnAW runs until 2019, by which time it envisages a reduction of 84,306 kWh. The final target has therefore almost been attained already.



Simply efficient

Of the 16 measures planned, more than two thirds have already been implemented. «I was amazed at just how many kilowatt hours could be saved with the simplest improvements», says Meier. And indeed, lowering the heating limit from 16°C to 15°C means cutting annual energy consumption by 22,230 kWh and CO₂ emissions by 4.4 tonnes. An investment of CHF 500 was budgeted for this adjustment. The annual savings are worth CHF 1,729. For most of the other measures too the investment cost is less than CHF 1000.

The payback periods are often shorter than a year.

Bopp AG is already far ahead of schedule in boosting climate-friendly production. If all the measures are implemented they will considerably outperform the targets.

BOPP AG – FACTS & FIGURES

- 2010 energy consumption: 1,129,620 kWh
- Cut in power consumption since 2010: 89,536 kWh
- 2010 CO₂ emissions: 105 tonnes
- in CO₂ emissions cut since 2010: 12 tonnes
- Energy saved by a 1°C lowering of the heat limit: 22,230 kWh/year



Felix Meier
Operations Manager
G. Bopp + Co. AG

Mr. Meier, the two measures to utilise residual heat from the server room and the laser cutting machine are about to be implemented and will enable you to cut energy consumption by twice the amount foreseen in the agreement with the Energy Agency of the Swiss Private Sector (EnAW). Where does your motivation come from?

As in other companies, we too have developed a much greater awareness regarding the environment and resources in recent years. At the same time, economic trends have led to much greater cost consciousness. Whenever we see opportunities to make one or another improvement we seize them, provided the required effort is worth it.

In 2011 you have almost already met the reduction targets for 2019, the final year of the agreement. What are the reasons for implementing most of the measures so quickly?

Merely checking off a to-do list on schedule was not my priority. Once we recognised that besides the environmental benefits, completion of the measures would also yield major financial benefits, it obviously made sense from a business standpoint to implement the list as quickly as possible, financial resources allowing.

What added value do you derive from co-operation with the EnAW?

As a small-to-medium-sized enterprise we have neither the comprehensive expertise nor the internal resources to be always up to date in environmental matters. It therefore makes perfect sense for us to be supported by outside experts.

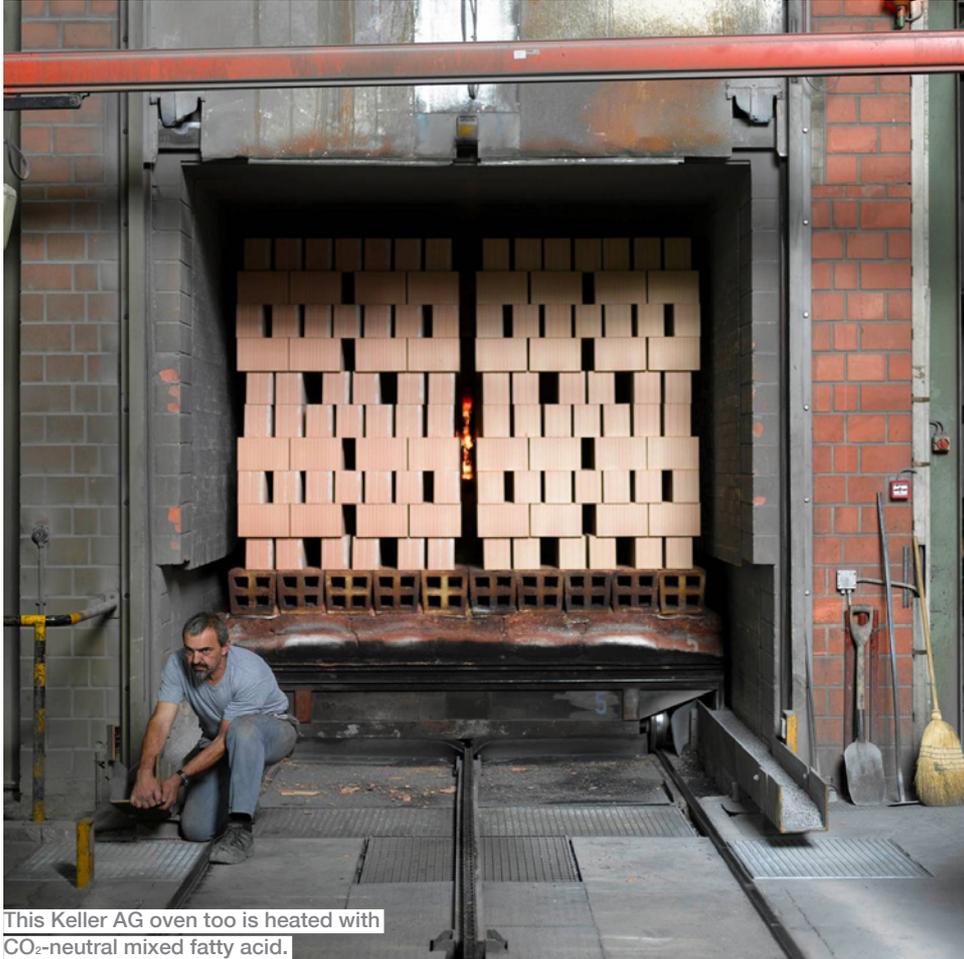
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USING WASTE TO MAKE ECO-FRIENDLY BRICKS



This Keller AG oven too is heated with CO₂-neutral mixed fatty acid.

The drying and firing of clay for ceramics production is highly energy-intensive. Keller AG brick and tile works has invested much time and money to sustainably reduce CO₂ emissions in these processes through innovative procedures.

Anyone who did pottery at school is bound to remember that once a vase was done you still had to wait before being able to take it home to your mother. Your work of art still had to go into the oven to be made stable and resistant enough to display all types of flowers to their best advantage for decades thereafter.

The ceramics industry is rather energy intensive, since products like bricks and clay roof tiles must be baked at extremely high temperatures. Swiss ceramics manufacturers therefore concluded a voluntary

agreement in 2001 with the Energy Agency of the Swiss Private Sector (EnAW) to reduce energy consumption and CO₂ emissions and thus cut costs. These voluntarily agreed targets would later be made binding as a way of becoming exempt from the CO₂ incentive tax.

Keller AG brick and tile works operates two production plants. A special approach has been adopted at the Paradies plant in the Canton of Thurgau, where they have developed a procedure for using a CO₂-neutral fuel to heat the oven, with a smaller carbon footprint.

CO₂-neutral waste

At its Paradies plant, Keller AG brick and tile works produces mainly SwissModul bricks in compliance with prescribed standards. Clay with different properties is first extracted from various pits. It is ↻



Christian Keller

CEO Keller AG brick and tile works

Mr. Keller, you experimented extensively before finally deciding to replace heavy oil with mixed fatty acid as the fuel for oven heating. What are the advantages of mixed fatty acid?

We tested various biogenic fuels during the project with Axpo. The advantages of mixed fatty acid lie in the similarity of its properties to those of heavy oil both in terms of handling and calorific value. Only minor changes to the burners are therefore needed. Mixed fatty acid is readily available and mixes well with heavy oil. This was an important criterion for the adjustment. Besides, the extra cost compared to fossil fuels is reasonable.

Do you think that mixed fatty acid will come into its own as fuel? Will other ceramics manufacturers follow your lead or is the adjustment too complex?

For enterprises still operating with heavy oil, mixed fatty acid is certainly an alternative. Many brickworks have reconverted to natural gas in the past 10-15 years, which already means appreciable CO₂ cuts compared to heavy oil. I believe that the only enterprises that will consider switching are those that still have the necessary infrastructure such as storage tanks, and for which low-carbon production is paramount.

You sell CO₂ certificates to Axpo. Is this an incentive for further action to reduce CO₂ emissions?

The use of mixed fatty acid is the outcome of over three years of cooperation with Axpo. It had been the intention from the start to sell some of the CO₂ savings to Axpo for its services. It is worthwhile only insofar as the higher cost of mixed fatty acid relative to fossil fuels can be somewhat offset through the sale of certificates.

What part has the Energy Agency of the Swiss Private Sector (EnAW) played in the measures you have taken?

So far we have had only very good experiences with the EnAW, which is practically indispensable especially for formulating and calculating the measures. Besides, we always get good tips and ideas for further savings. ↻



Eco-friendly production of Keller AG SwissModul bricks.

then mixed and combined with additives such as foundry sand and paper industry sludge. Once the required consistency is achieved, bricks are pressed from the wet mixture. With a moisture content of 20% at that stage, they would explode in the oven. They must therefore first be dried at 80°C until their moisture content is just 2%. The bricks are then fired at 950°C for 40 to 60 minutes.

Kilns normally operate non-stop, in other words 24 hours a day, 365 days a year. When ovens are turned off they take six to eight weeks to be made ready for use again. Until recently, Keller AG brick and tile works heated its ovens with natural gas and heavy oil in ratio of 60:40. After extensive efforts to find a suitable fuel and much experimentation and testing, heavy oil was finally replaced at the end of 2010 by CO₂-neutral mixed fatty acid. Keller AG brick and tile works was the first ceramics company to use this fuel. The use of this by-product of the edible oil industry means a 1,700-tonne reduction in annual CO₂ output.

Lower costs, higher turnover

But the company has taken numerous other steps to cut its energy needs and

CO₂-emissions. Lowering the so-called maturing temperature – the maximum burner temperature – from 980°C to 950°C reduced energy consumption by 111 MWh/year and CO₂ emissions by 22 tonnes. The dryer used to reduce the moisture content of the bricks was gradually renovated. This shortened the drying time by one third. Amongst other things, the heavy oil burner was replaced. By heating the drier exclusively with natural gas and using the residual heat from the burner, CO₂ emissions were cut by a further 229 tonnes per year.

836t
CO₂ output
reduced
in 2010

«Our vision is and will remain CO₂-free brick production.»

On balance, the improvements to the production process have brought more than just an exemption from the CO₂ tax and substantially lower energy costs. Keller AG brick and tile works also sells CO₂ certificates to Axpo, thereby generating additional earnings through its climate protection measures. The company will be working with the EnAW to be even more climate-friendly in the future.

Do you have concrete plans for further steps to improve climate protection?

We need most of the energy for drying and baking the bricks. In another project we are testing a brick-making method that dispenses with the drying process. Our vision is and will remain CO₂-free brick production!

KELLER AG BRICK AND TILE WORKS – FACTS AND FIGURES

- 2010 energy consumption: 37,802 MWh
- 2010 reduction in weighted energy consumption: 1,468 MWh
- 2010 CO₂ output: 6,796 tonnes
- Reduction in 2010 CO₂ output: 836 tonnes
- Annual CO₂ savings thanks to mixed fatty acid: 1,700 tonnes

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