



moment[®]

Climate Change

Challenges and opportunities for the "Hidden Champions"

Energy Efficiency

Investments in buildings and plant technology are showing success

CROSSFIX[®]

Facade substructure improves energy balance of buildings



Sustainability

Economic, ecological, social



Dear partners of the EJOT Group,

In Germany and Europe we have been debating for several months, whether and how politics should react to the warming of our planet and to the emerging climate change. This is in part due to Greta Thunberg, the icon of the "Fridays for Future" movement. She says she wants all of us to panic, so that finally something will be done to save the world. She has brought movement into the debate, but "panic" is not a good guide, especially since the tasks ahead are not absolutely clear and some are even contradictory. For example, if we want to reduce CO2 emissions, we could extend the operating time of nuclear power plants and in turn shut down coal-fired power plants faster. When it comes to the topics of diesel and particulate matter, public transport comes into mind, which has particularly high concentrations of both. Bird protection vs. wind power, mining of rare earths vs. electromobility. There are usually no easy answers and the solution seems to me more of a persistent work on these challenges.

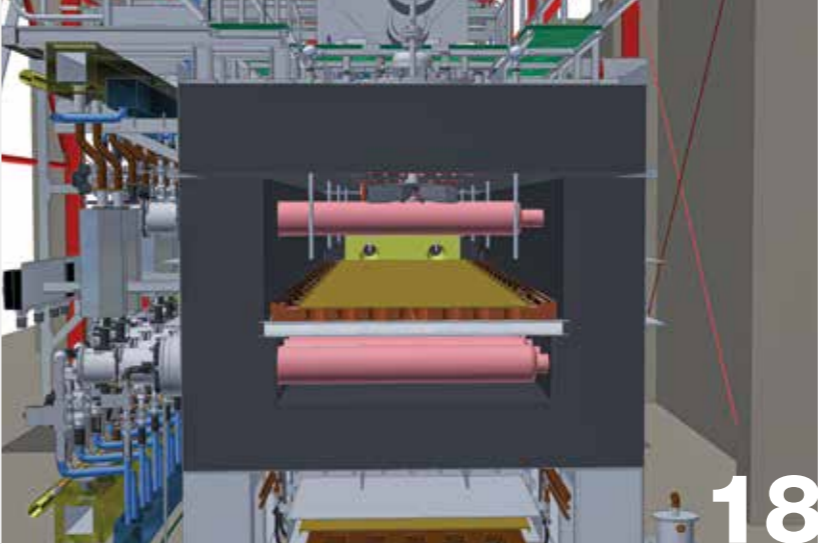
For that reason we have put the topic of sustainability at the focus of this issue of *moment*. We want to shed light on what contribution we can and want to make, in order to constructively work towards the goal of a sustainable planet. We know that as a company, in the past we have focused our efforts mainly on the areas of innovation, costs, quality and reliability. Now another dimension is added. As a group of companies we contribute with our products (lightweight construction, downsizing, thermal insulation) to the saving of resources, a more efficient use of energy and in turn lowering the environmental burden.

I am delighted that with the guest editorials by Prof. Dr. Klaus Töpfer and Dr. Stefan Beyer, we have found two writers who can show the range of sustainability – economic, social, ecological – noting down the contributions that we as a company can afford, for future orientation.

Do you have any suggestions? Criticism or feedback? We are looking forward to it. Please talk to our employees or write to us (moment@ejot.com).

Kind Regards

Christian F. Kocherscheidt
Managing Director



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Smart fastening solution for e-mobility

E-mobility poses completely new challenges for vehicle development. Particularly in battery systems, where the components must withstand the heaviest loads. This applies equally to the fastening technology used, which must protect against the ingress of water from outside across the entire service life of the system, as well as ensuring a safe and durable design. For this challenging application, we recommend flow-drilling fastening with the

EJOT FDS® screw. Equipped with an additional feature, the embossed aluminium sealing washer, this unique fastening solution ensures reliable sealing of the system at the head. The FDS® screw not only supports future-oriented mobility strategies, it can also be recycled in a way that is suitable for the material, as screw connections enable easy dismantling of battery components due to their detachability.



Application example: Battery Pack

The EVolution continues – at the K 2019 in Düsseldorf



trials can thus be reduced to the absolute minimum. The individual, FEM-based component optimisation is particularly efficient in terms of resources, saving both time and money starting with the design of the component.

The EVO PT® is the evolutionary development of the self-tapping screw for thermoplastics. In addition to excellent fastening properties and exceptionally flexible installation, the EVO PT® with the digital calculation service EVO CALC® offers opportunities for the pre-calculation of torques and clamp loads as well as the clamp load relaxation under temperature and over time. Time-consuming component



EJOT EVO PT® at K 2019:
Düsseldorf, 16 to 23 October 2019
Hall 05, stand C03

The series continues – another victory at the German championship

EJOT teams remain the undisputed number one in the triathlon Bundesliga

The EJOT team TV Buschhütten once again set the standard for German team triathlons in 2019: At the fourth and final competition of the 1st Triathlon Bundesliga season in Berlin, the women's and men's teams triumphed over the sprint distance (750 metre swim, 21.6 kilometre cycle and 5 kilometre run), defending their titles from the previous year.

six seconds behind Murray, who had won at the season opener in Kraichgau. Jonathan Zipf took 13th place and the German champion of the elite in 2018, Lasse Lührs, finished 14th in front of the crowds at the Olympischer Platz.

For the men's team, it was their 9th German championship in a row and the 10th overall title win in the past eleven years. "Winning so many titles in a row is great", said sport director Rainer Jung, adding, "We are proud to have won the title again". The South African Richard Murray, the record champion, was also the winner on the day with a time of 54:47 minutes, and the Portuguese Joao Silva took second place in his first race in the red EJOT uniform, only

With the fourth victory in the fourth race, the women's team completed the new team championship perfectly – the 8th title in a row. Rachel Klamer from the Netherlands, who starts for the EJOT team, finished 2nd (59:30 minutes), Italian Anna Maria Mazzetti (1:00:10 hours) took 4th place and Lena Meißner (1:00:17 hours) came in 5th place. EJOT participant Emmie Charayron was involved in a fall shortly after switching to the cycling stage and had no chance of winning after that. However, she gave it her all during the running section and in the end came in 13th place.



The competitions of the 1st Bitburger 0.0% Triathlon Bundesliga were broadcast live on ARD and ZDF for the first time – in front of an audience of millions. The best possible advertising for the two dominating EJOT teams.

Photo: iStock



When should stainless steel flat roof fasteners be used?

Understanding the regulations for working on flat roofs

Would you have known? When should corrosion-protected fasteners be used in flat roofs, and when should corrosion-resistant fasteners be used? What needs to be considered during renovations? Which set of regulations provides the decisive information? EJOT sheds light on the darkness of the flat-roof 'legal jungle'.

Anyone who carries out roof covering and sealing work on flat roofs needs to be familiar with the relevant regulations. In addition to the standards, there are guidelines and technical rules, as well as the German Construction Contract Procedures, known

as VOBs, that all provide information on the correct execution of work on flat roofs. Specifically when it comes to the mechanical fastening of roofing membranes, the contracting company is faced with the question: stainless steel or no stainless steel?

Let's get it out of the way: Yes, stainless steel fasteners are more expensive than alternatives made from coated steel. But one thing is also clear: The applications in which stainless steel fasteners can be avoided are subject to some very specific conditions. If you decide against stainless steel, make sure your decision is based on legal aspects, not financial! Because the decision to use a

less expensive product may later turn out to be a costly mistake: For example, if an expert appointed by the client determines that the fasteners used do not comply with the stipulations of the relevant regulations and must be replaced. Retrofitting the fasteners at a later date is much more expensive than the original material price. And if any damage occurs, it can be extremely expensive if the additional costs for the remediation are to be borne by the contracting firm.

But just what are the investment costs for stainless steel fasteners? Using the example of a collated EJOT flat roof fastener HTK2G-M/TKR-140-95/70 for an insulati-

on thickness of 140 mm, the costs increase by about 86 cents per square metre when changing to stainless steel. That is not much, when one considers that the material costs for a corresponding roof construction are around 40 to 60 euros, and for a full refurbishment, including insulation, around 120 to 240 euros per square metre. For the comparatively low additional cost of stainless steel fasteners, you benefit from a safe and durable fastening solution!

But back to the regulations. The **standard** is **DIN 18531** from July 2017. It describes the current state of the art as well as the technical contract conditions for roof covering and sealing work. This standard states that **corrosion-resistant screws** must be used for seals of **application class K2**. For renovations, the standard does not make any statements with regard to the screw material to be used.

The Zentralverband des Deutschen Dachdeckerhandwerks (Central Association of the German Roofing Trade) and the Hauptverband der Deutschen Bauindustrie e.V. (Federation of the German Construction Industry) publish the **Flat Roof Directive**. The current version was published in November 2017. This **technical guideline** is a national supplement to DIN 18531 and is something like a Bible for roofers, as it comes from their own association. Unlike the standard, the Flat Roof Directive is not legally binding with commands or prohibitions, but is based on a voluntary commitment. The Flat Roof Directive stipulates that **corrosion-resistant fasteners** should be used for **renovations**.

The third regulation is the **VOB, the Vergabe- und Vertragsordnung für Bauleistungen** (German Construction Contract Procedures). It is published by the Deutscher Vergabe- und Vertragsausschuss für Bauleistungen (German Procurement and Contract Committee for Construction Services) and is comprised of three parts. The VOB is not law, but instead has the character of general terms and conditions with agreed executions of construction work, provided that it was agreed by the contracting parties. **Part C** is the most relevant here. These general technical contract conditions currently consist of 57 individual standards for different trades. The **DIN 18338 – Roofing work** – from September 2016 states that **corrosion-resistant fasteners** are to be used for mechanical fasteners.



Fully equipped: EJOT stainless steel flat roof fasteners combined with stainless steel or plastic disc washers.

Quality beats price

The success story of the two-part insulation support anchor

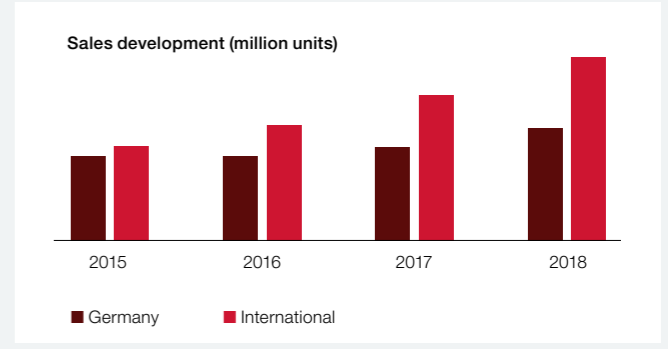


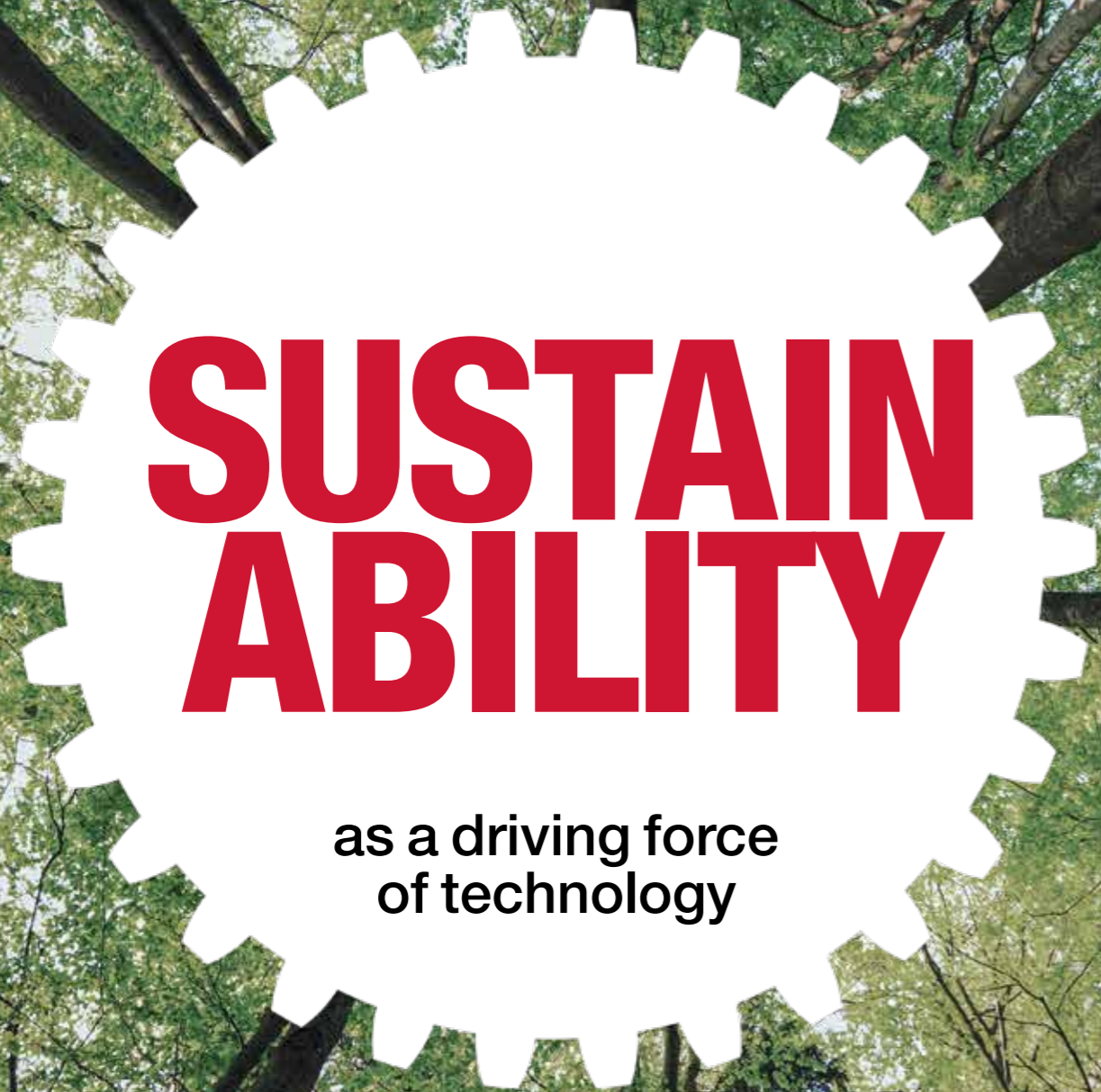
In 2014, EJOT revolutionised the market for insulation support anchors by developing their innovative new insulation fastener that is made from two parts, which was a world-first and has since been patented.

No high technical or market demands are made of insulation fasteners; the insulation behind a rear ventilated façade cladding "only" needs to be fixed. Insulation support anchors do not require approval and do not need to be made of any particular material or in a specific form. Therefore, many manufacturers have a product development strategy of "the cheaper, the better". The challenge: EJOT bucked the trend and presented the market with a new two-part insulation support anchor made of high-quality material at a higher price. This project initially seemed hopeless and doomed to failure. But the opposite proved true: Many customers appreciated the quality and the technical added value of the new insulation support anchors and decided against using the low-cost strategy of the market leaders.

Two significant advantages of the two-part insulation support anchor are decisive here: Firstly, the two-part design reduces the packaging volume by over 60 per cent – saving on storage costs. Secondly, it improves handling on the construction site for technicians, as they can carry more than 50 insulation support anchors at a time and do not need to worry about fetching further supplies. This accelerates installation and thus also saves on costs.

Furthermore, it also reduces the "quilt effect" due to retrofitting the washer. This effect occurs when conventional one-part insulation support anchors are driven too deep into the substrate. The two-part insulation support anchor also prevents the joints between the individual insulating panels at the joining edges from gaping.





SUSTAINABILITY

as a driving force of technology

Opportunities for “hidden champions” in the German medium-sized business sector

Sustainability is not a short-term hype that will go away again. It is a challenge for “hidden champions”, for entrepreneurs who see themselves as committed to future generations beyond the dictates of short-termism.

>>Text: Prof. Dr. Klaus Töpfer



I was responsible for the United Nations' environmental policy for eight years – I was something like the “Environment Minister” in Kofi Annan's cabinet. The United Nations Environment Programme is headquartered in Nairobi, Kenya. I visited capital cities all around the world, called on many governments and attended many events – I negotiated with many government officials, held discussions with people responsible for the economy, debated with non-governmental organisations, and spoke with many people in everyday life about their hopes and needs.

Over and over, these discussions were focused on improving the living conditions of these people. We discussed clean water, air pollution control, opportunities for young people through vocational training, jobs and fair pay. Concrete solutions were required for preventing waste, for encouraging recycling, for protecting people against all kinds of chemicals. The list could go on and on. But again and again, the common denominator: Concrete solutions were and are expected, not just clever analyses and grandiose speeches.



Prof. Dr. Klaus Töpfer

Klaus Töpfer is Germany's most prominent environmental politician. He has been a persistent and consistent advocate of protecting the environment for decades. He is especially committed to the search for an ecologically satisfactory, economically viable and socially balanced solution to the increasingly urgent global environmental problems. He was honoured on German Sustainability Day in 2010 as the most important political figure for sustainability issues.

Born in 1938 in Silesia, Klaus Töpfer studied economics at the universities of Mainz, Frankfurt and Münster, and graduated with a doctorate in 1968 with the title Dr rer pol. From 1965 to 1971 he worked as an assistant and later as head of the Central Institute for Spatial Planning at the University of Münster.

In 1971, Klaus Töpfer moved into politics, initially as Head of the Planning and Information department in the State Chancellery of Saarland. He was appointed to the position of State Secretary in the Ministry of Social Affairs, Health and the Environment in Rhineland-Palatinate in 1978. He then became the Minister for the Environment in Rhineland-Palatinate in 1985 and from 1987 to 1994 he was Germany's second Federal Environment Minister. In 1994, he moved to the Federal Ministry for Spatial Planning, Building and Urban Affairs.

Then, in 1998, Klaus Töpfer took up a post as the Executive Director of the UN Environment Programme in Nairobi (UNEP), which he held until 2006. Subsequently he was appointed Professor of Environment and Sustainable Development at Tongji University in Shanghai.

In 2009, Klaus Töpfer was the founding director of the Institute for Advanced Sustainability Studies (ASS) in Potsdam, a leading research institute that focuses on climate change, the earth system and sustainability, which underscores the strong position that Germany holds in this field. After the nuclear catastrophe in Fukushima, Chancellor Angela Merkel appointed Klaus Töpfer as one of the two chairmen of the new panel of experts on the future of nuclear energy.

Klaus Töpfer has been honoured many times for his dedication to environmental policy – with the Federal Cross of Merit, several honorary doctorates and a range of environmental awards.

Prof. Dr. Klaus Töpfer was awarded with the NRW state prize in September 2019. He has been "persistent in the preservation of the creation" and committed to sustainable development, read the statement. In her laudatory speech, German Chancellor Angela Merkel (CDU) praised Töpfer as a "pioneer and a man of action". Töpfer has advocated renewable energies and a CO₂ reduction campaign early on, and he often felt like a "voice in the wilderness". In his acceptance speech, Töpfer called on the youth not only to protest, but also to assume responsibility in politics. "Politics is too serious to let it become just a simple happening."

Partner and problem solver

Whenever there was a need for specific action, when examples needed to be convincing, I was asked about "The German Mittelstand" – small- and medium-sized businesses. With respect, often also with enthusiasm and admiration, and always with the hope of constructing similar structures in their own country in order to create economic stability and ensure social equity. The people I spoke had come to know these medium-sized business sector as problem solvers and reliable partners, and identified them as the root cause of the economic strength and export success of the German economy.

"The German Mittelstand" – The people I spoke with wanted to, quite rightly, integrate this foundation of economic stability and social responsibility of the German economy into the solutions for their problems. Over 50 % of the jobs and exports and over 80 % of the vocational education – just two indicators of the importance of medium-sized businesses for German society. "The German Mittelstand" – often businesses that have been owned by the same family for generations. Entrepreneurs and companies that are not primarily focused on maximising short-term profits, but instead on the medium- and long-term economic stability of the company for future generations.

These are the decisive indicators of the companies that are extremely important for the German economy, the "hidden champions". "Hidden champions" – companies that are not well known to the general public, or only in their own circles. Companies that have developed a highly specialised product range as world market leaders. Always at the cutting edge of economic and social developments, in tune with the market. Always on the lookout for further development – innovators – inventors – producers. I found this sentence in an EJOT magazine: "Everything that cannot be calculated is determined through experimentation". Finding new ways based on solid experience, and committing to these new ways with a sense of proportion and protected by your own examinations, self-confidence without arrogance.

The motto "We've always done it this way" is not the guiding principle for "hidden champions". It applies only to the process that consistently takes existing technology and existing products as a viable starting point for change, for new market sectors, for new successes. Not defending the old, not "preserving" it, but making it the starting point of something new.

These "hidden champions" face particular challenges in times of disruptive upheavals. We are currently living in a time that is both exciting but also troubling for many people. The required "revolutions" are almost overtaking each other: The energy revolution – the mobility revolution – the agricultural revolution. And this list is far from complete. There is one thing that all these upheavals have in common: They are looking for answers to the mistakes of previous economic growth and seeing these as a challenge for the future. They make it clear that this growth is associated with passing on the costs of these actions to the future, to emerging generations, to other regions of the world.

Wherever any costs are passed on in this way, that action is not "sustainable" – it leaves the bill open for nature, for people who will later pay for the elimination of these negative consequences. "Beggar thy neighbour" policy as a guiding principle can only be the opposite of sustainability. If you consciously or unconsciously expect your "neighbour" to deal with the problems caused by your own actions, you are not sustainable and are causing conflict between humans and nature.

EJOT is, without doubt, this type of "hidden champion". The criteria mentioned match exactly to its corporate philosophy and its practical implementation. It is therefore important not to passively endure the numerous disruptive changes we are currently facing. It is a matter of actively pursuing the shift towards sustainable economies and societies, and harnessing the entrepreneurial opportunities this offers for success at an early stage, before

others start heading in this direction. The social market economy will become an ecological and social market economy.

Around 100 years ago, the economist Schumpeter coined the term "creative disruption" for disruptive economic and social upheavals. Countless examples prove the effect of this on markets and technology. A typewriter was found in every office just a few decades ago, yet today this technology, in which Germany was once the world market leader, has largely disappeared. The creative disruption was virtually swept away by IT technologies with completely new and wide-ranging opportunities for companies and customers.

Demographic developments require changes

Sustainability as a driving force behind technology and markets can be found wherever shortages must be overcome. Global

Approximately 9 billion people will populate the earth in 2050



Photo: iStock

population trends are forcing sustainability in the use of energy and resources. Our world will support and endure about 9 billion people in 30 years – when I was born, the global population was “only” 2.5 billion. Sustainability is incompatible with waste, with throwaway culture, with rubbish. A circular economy in all areas will eliminate bottlenecks, use scarce resources multiple times and search purposefully for substitutes, and reward new technologies in production geared towards reuse. A sharing society – a society that does not own objects, only uses them, will require new markets and new organisational structures and infrastructures. The challenging changes that are to be expected with the digital revolution will strengthen sustainability and open up new perspectives for entrepreneurs and society.

The future dimension will not become any less significant with the shift towards sustainability – quite the opposite: We are already living under the dictate of short-termism, facing an acceleration of change. Sustainability is severely endangered when this dictate of short-termism neglects considering the medium- and long-term consequences, or is misunderstood as an annoying delay in quick decision-making.

Upheavals are required in areas that are currently seen as completely unproblematic. A current example: Increasingly, we are being told that concrete sand will become a major bottleneck, in a world that currently uses around 50 billion cubic metres of sand each year. What new construction materials will replace sand, and will these have consequences for the products that EJOT has already developed in its Construction division? How can resource use cycles be further closed in this sector?

The same applies to the automotive industry, where e-mobility is displacing the combustion engine. This, in turn, poses major challenges for the suppliers, the important “hidden champions” of the German economy.

Flexibility and adaptability

These upheavals place high demands on the adaptability and flexibility of people far beyond the technical solution possibilities. Medium-sized companies are, as I have already emphasised, the key providers of vocational training. This must also be further developed with concentrated technical and financial collaboration with public institutes to prevent these upheavals. The requirements placed on employees’ capacity to think and cooperate with others will in no way diminish with the leaps and bounds that are expected in the field of artificial intelligence (AI). On the contrary. The use of artificial intelligence in the company must be recognised and implemented to strengthen competitiveness. This also offers great entrepreneurial opportunities. People’s fears that this will have consequences that will threaten social cohesion must not and cannot be simply avoided – these technological developments must be recognised for the opportunities they present to overcome these differences.

Climate policy is currently a major driving force behind technology. The social upheaval in the fight against climate change,



Photos: iStock

largely based on scientific evidence and the climate extremes being experienced worldwide, is forcing disruptive changes under considerable time pressure, particularly in energy policy and agriculture. In the field of solar energy in particular, Germany has made a decisive contribution to the dramatic reduction in costs per kilowatt hour of harvested solar energy, thanks largely to research and development and also through achieving economies of scale. Currently the price per kilowatt hour is around 5 euro cents, and in the sunnier countries in the south, it is even less. The days of the exorbitant cost of one euro per kilowatt hour of solar energy are over. And this development is by no means complete; there are decentralised applications that have not yet been utilised. Storage technologies are being researched and developed for large-scale applications. Battery technology is also being reinvented in many sectors. The conversion of renewable energy into gas, chemical products and especially in hydrogen does not just pose challenges and problems, it also means new products, markets and economic opportunities. Renewable fuels are also associated with this. Such as the restructuring of energy infrastructure: charging stations for e-mobility, using hydrogen – climate policy is driving technology!

The drastic cost reduction of solar energy has made this energy suitable for globalisation. It is competitive with conventional energy generation technologies such as coal-fired power and nuclear energy. For many countries, this is highly significant; for example, India alone consumes 14-16 million cubic metres of water each day in its thermal power plants. And this is a country that suffers enormously from growing water scarcity; it urgently needs new energy technologies that drastically reduce its water consumption.

Reducing costs can enable the desperately needed economic growth process in developing countries, primarily in Africa, to be implemented in a climate-friendly manner. These successes have been achieved in Germany and refinanced through electricity prices amounting to billions. These successes are surely the largest contributions of German climate policy to the required global reduction of coal, petroleum and gas consumption and thus to a successful global climate policy.

Sustainability is not just hype that will later go away and possibly leave behind new problems. Sustainability is a policy of peace for a world that is increasingly characterised by social disruptions in view of the disparities in prosperity. These, in turn, become the triggers for social conflicts in these countries; they will become the most common cause of migration, which will have destabilising effects internationally and cause conflicts. Sustainability as a driving force for new economic challenges must be used as an economic opportunity for a world with 9 billion people. It is a challenge for “hidden champions”, for entrepreneurs who see themselves as committed to future generations beyond the dictates of short-termism

E



Q&A

>>Interview: Andreas Wolf

Corporate Carbon Footprint report

The corporate carbon footprint – also known as a CO₂ footprint – represents the sum of all the company's greenhouse gas emissions. This records all the major emissions caused in the individual process stages, from the development, manufacture and transport of the raw and intermediate materials, to the production and distribution, to the use and disposal.

CCF accounting is voluntary, but is carried out according to recognised international standards. The Greenhouse Gas Protocol is the foundation for calculating the CO₂ footprint, and also forms the basis of ISO standard 14064 (Environmental management – Measuring, reporting and verification of greenhouse gases).

In 2013, EJOT published its first Corporate Carbon Footprint (CCF) report with the relevant environmental data. What are EJOT's objectives in doing this?

Firstly, it is important to us as a company to disclose our environmental performance as well as our economic performance. In addition, the European Union has introduced obligatory reporting for companies. Our customers are also increasingly requesting information about our environmental impact and sustainability approaches.

What exactly is documented in the CCF report?

The CCF report focuses on the significant and influenceable emission sources of the EJOT group. That means that all relevant environmental data are presented transparently and unambiguously. We also disclose our CO₂ emissions for the volume manufactured by our production units, for the purposes of monitoring our environmental performance. We will continue to report this key strategic figure in the EJOT Group, among others. By reporting in accordance with the internationally recognised Greenhouse Gas Protocol guidelines we expose our environmental performance and in doing so allow comparison to other companies and also lay the foundation for the consideration of a CO₂-neutral factory.

What has changed since the first publication in 2013?

We have continuously improved the data in the CCF reports. For instance, we included our international production sites for the first time in the 2017 CCF report. This creates transparency

and trust. As a company that is growing on a global scale there are both strengths and weaknesses at every site, which we need to work on. In addition, the international standard for sustainability reporting, GRI, has also evolved,

What measures and programmes are being implemented at the sites to further improve ecological performance?

In general, we have focused on heat recovery and efficient energy use. All non-existent or insufficient energy sources have been examined with regard to their efficient use and then optimally implemented into a range of projects. We have converted the lighting from conventional systems to LED at various sites. Highly efficient air compressors offer enormous potential for energy savings, and we have implemented these at our sites in Ciasna, Poland, and Tambach-Dietharz, Thuringia, for example. HVAC systems are gradually being upgraded to the state of the art. For example, our site in Istanbul, in Turkey, is implementing performance-adapted ventilation drives. Another approach is the bell mouthing of heat recovery units in HVAC systems. This enables more energy resources to be conserved or used. Interwoven energy systems are particularly exciting; the energy gained is used in the heating system and for operating our large wash systems in production. The two large sites in Bad Berleburg and Tambach-Dietharz have both started using cogeneration units. In Ciasna, Poland, the new building was equipped with a building management system and an energy measurement system. Other site-specific projects are in the planning phases.

These are significant investments that EJOT has made in this sector in recent years.

Yes, correct. EJOT has been investing in sustainable equipment and plant technology for years. An integrated understanding of economics and ecology is important; this has been implemented with many of these investments.

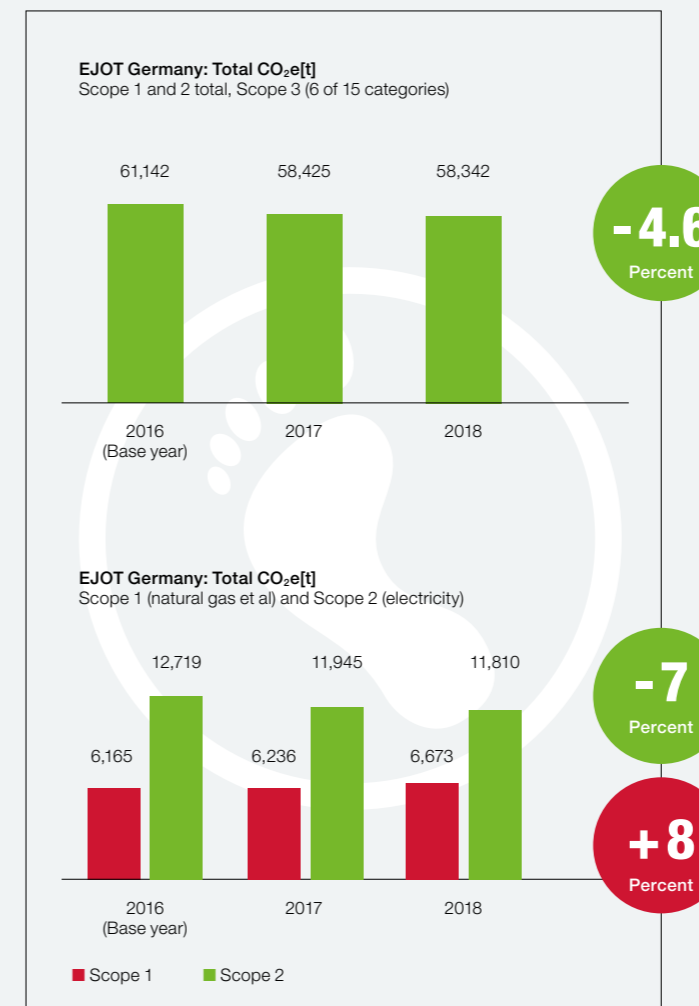
How have the greenhouse gas emissions developed in recent years?

If we consider the absolute emissions from our electricity consumption (Scope 2), we have achieved a reduction of 7 per cent in Germany in the period from 2016 to 2018. In the same period, overall CO₂ emissions in Germany were reduced by 4.6 per cent. Direct emissions from the combustion of natural gas and diesel fuels, however, saw an increase of 8 per cent. This is, in part, the consequence of energy conversion through using natural gas-powered cogeneration units. Overall, though, the development shows an increase in efficiency at EJOT. Our

investments in building, machinery and system technology are showing long-term success.

Large corporations such as Bosch or VW are increasingly demanding that their customers meet sustainability standards – right down to reducing emissions to zero. This will likely require very substantial investments? How and when can this goal be achieved?

I also foresee the substantial investments for this ambitious goal. Our customers can easily determine the speed themselves, by specifying investments in sustainability and specifically for CO₂ neutrality as supplier criteria. I see this as a type of "entry ticket" to further economic negotiations. Then the companies that continually pursue sustainable growth on their path to global production will be rewarded. This approach could also reduce many of the fears about the globalisation of the economy. When our employees see that their performance is being recognised, then we at EJOT can look positively towards the future.



Heiko Stötzel

Head of the Environmental/Energy Management division, Occupational Health and Safety and Facility Management for the EJOT Group

Works at EJOT since 1998



The dashboard of the Building Management System can be used to call up and control a wide variety of parameters



Energy Recycling

Efficient processes and energy savings are central features of EJOT's expansion of the production site in Ciasna, Poland. Two new building complexes have been constructed in two construction stages.

>>Text: Bartłomiej Szymaniak, Andreas Wolf

In 2016, the 4,600 square metre plastic operations area was completed, and in 2019 a production hall for manufacturing fastening elements for the automotive sector was put into operation. The overall production area is now 7,100 square metres.

How can the energy released from the production processes be sensibly fed back into the energy cycle, in order to achieve sustainable CO₂ savings? A central question that was intensively discussed in the planning phase of the new construction projects. A building management system (BMS) is used to connect and

manage various systems such as automatic material feed, machine cooling, heating control, LED lighting and fire protection. This allows for real-time reactions to changes in external and internal conditions to ensure optimal energy consumption. The building management system uses sensors installed in every room to measure temperature, humidity, air quality and the presence of people. The lighting, heating, cooling, air conditioning and ventilation systems are then controlled automatically. In addition, it is also networked with the alarm system, which registers smoke as well as an open window. This improves functionality as well as the safety and comfort of the employees.

Excess energy in the cooling system of the injection moulding machines heats the entire building complex. Cooling and heating the production rooms, communal and office spaces is carried out using concrete core temperature control, in which water pipes run through the ceilings and use the storage mass of the solid components to regulate the temperature. This method cools the building in summer and heats it in winter. Laying the pipes in the building ceiling allows a standardised, comfortable temperature, because the adjacent walls also contribute to the temperature output.

The air compressors were another challenge. They also emit excess energy, which is used for heating the building and the water in the communal areas. The advantage is that the boiler room is no longer needed for heating water and thus CO₂ emissions are significantly reduced.

The lighting also plays an important role in this new building project with regard to its functionality and energy efficiency. LED

lighting was installed with a range of features such as automatic darkening and brightening, Wi-Fi ("Wireless Fidelity") networking and mobile control via tablet, smartphone or the building management system.

A comparison of the heating energy between hall A and hall B for the period from April 2018 to April 2019 shows the extent to which this modern technology has affected CO₂ emissions.

Hall A	49,814.30 cubic metre gas equates to an emission of 100,425.00 kilogram CO ₂
Hall B	37,817.00 kWh equates to an emission of 24,210.00 kilogram CO ₂



Energy efficiency clearly improved

The award in the “Outstanding Development” category for the THREAD FORMING division as part of the “Factory of the Year” benchmark competition topped off the 25th anniversary of the EJOT site in Tambach-Dietharz. The site has been continually expanded and upgraded since 1993, when EJOT acquired part of the former Vereinigte Schraubenwerk company.

>>Text: Andreas Wolf

In addition to the THREAD FORMING division, Tambach-Dietharz is home to two other, highly innovative divisions: EJOSYST combines the technologies of injection moulding, cold forming and installation. EJOWELD is the largest development project in EJOT’s history. Here, hybrid components, in particular lightweight materials such as aluminium and advanced high-strength steel, are combined in car body construction with a robot-compatible friction element setting tool.

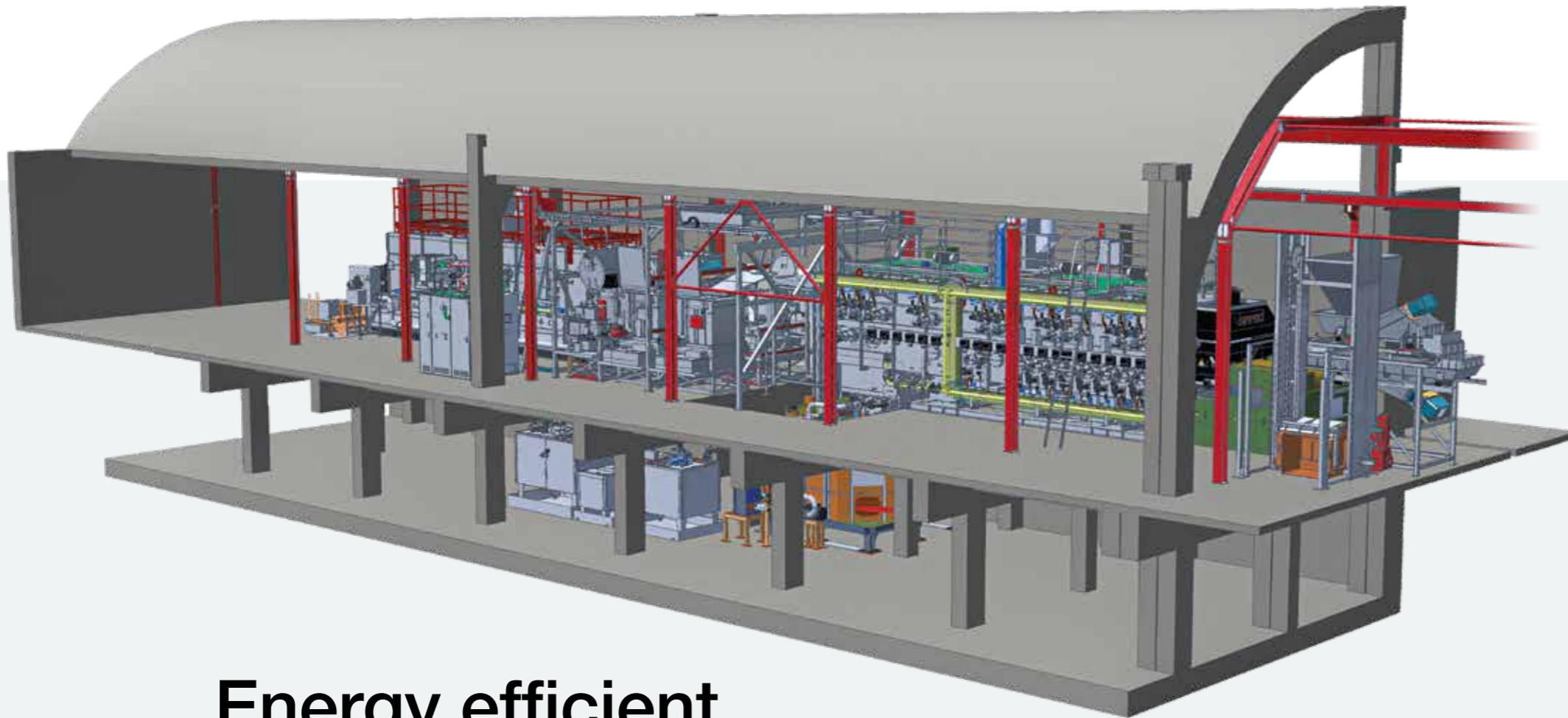
But the development of the EJOT site in Tambach-Dietharz did not stop in 2018: An area of 8,750 square metres has been prepared at the north of the site, which can be developed in multiple construction stages. The main part is the new surface technology and heat treatment centre, which will bundle the technology in this sector for all the German EJOT sites after completion.

Ecological aspects are also central to this strategy of technical development and modernisation. The energy efficiency has been significantly improved through numerous technical and structural measures. The new heat treatment centre will be completed in 2019 and the installation of the surface technology is planned for 2020.

A new, ultra-modern furnace has been purchased for the new heat treatment centre, and using this will contribute to energy savings. The cooling of this new heat treatment system has been deliberately set at a considerably higher temperature (35/45 degrees Celsius). A new cooling machine will be used for this purpose, which works much more efficiently than the previous machines and is therefore also more environmentally friendly. The new unit will only be cooled via the external closed-circuit cooling system, which reduces power consumption. The warm



The new building complex at EJOT in Tambach-Dietharz



Energy efficient heat treatment

EJOT Tambach now requires all major plant suppliers to show their “green side” – by proving the specific measures undertaken to improve energy and environmental efficiency.

The new high-temperature furnace from Aichelin has a range of features that significantly reduce energy consumption in comparison to the existing furnaces. EJOT has invested an additional 120,000 euros in this machinery.

Using the ecoBOX reduces the consumption of inert gas and the energy required for heating the fresh inert gas. The aim is to save approximately 28,800 kWh per year over approximately 7,600 hours of operation.

More energy savings are achieved through using especially high-quality insulation for the furnace. This enables the external temperature on the steel housing to be reduced by about 5 per cent, thus also achieving better climatic conditions in the environment due to the reduced heat



Screws are cooled to below 50 degrees Celsius at the end of the tempering furnace, the heat of the cooling flow is used to preheat the screws before they reach the tempering furnace.

reflection. The saving is estimated at 84,000 kWh each year and the amortisation period is 1.5 years.

Another important factor in using the new unit is the increased capacity: The new furnace has a processing capacity of approximately 400 kilograms per hour for case hardening and approximately 800 kg/h for hardening and tempering, compared to the other units that have a capacity of around 150 kg/h for case hardening and approximately 400 kg/h for hardening and tempering.

Installing heat recovery on the tempering furnace means that screws are cooled to below 50 degrees Celsius at the end of the tempering furnace, the heat of the cooling flow is used to preheat the screws before they reach the tempering furnace. This means that no heat is introduced into the production hall without a purpose, and also that the screws no longer need to be cooled over many hours after the hardening process; instead, they can be immediately fed into the next processing stages in the production chain.

water, at approximately 45 degrees, is led directly over the cooling towers and cooled to around 35 degrees. This means that the oil bath for quenching the heat-treated screws can be kept at approximately 65 degrees. In order to further reduce energy consumption, another heat treatment furnace, which has been used for four years already, will also be integrated into this new cooling system.

Switching to particularly efficient air compressors and air dryers, using waste heat

With the commissioning of an ultra-modern air compressor plant, EJOT is combining ecological, social and economic factors in its sustainability philosophy. This project was supported by the Free State of Thuringia as well as the Kreditanstalt für Wiederaufbau (KfW) to the tune of 180,000 euros.

An expert analysis showed that replacing the air compressors and air dryers with new generations and using the waste heat from these machines would offer great potential for energy savings. The report recommended, among other things, using energy-saving dryers for technical compressed air preparation and targeted use of waste heat from air compressors, as well as a flexible closed-circuit cooling design. That is why new water-cooled compressors will be installed for supplying compressed air to the entire site, and the waste heat will be integrated into the entire energy design so that it can be used.

In addition, it is planned to use the air compressors in combination with the cogeneration unit and to use an absorption system to generate cooling from waste heat, which can be used for cooling several areas of the surface treatment and heat treatment centre. Closed-circuit cooling for the components is an integral part of the two-temperature cooling design developed for the site. This means that water-cooled compressed air generation is implemented solely with evaporative cooling (adiabatic cooling).

The new compressed air supply unit improves the specific output by 22 per cent. The supply is 61.5 m³/min at a pressure of 7.5 bar. This means that efficiency is optimised from 7.87 kW/m³/min to 6.15 kW/m³/min. With the associated adjustment of the maximum supply of 61.5 m³/min at 7.5 bar, EJOT will operate a highly modern air compressor plant.

Sustainability also needs to include the immediate surroundings, which is why the closed-circuit cooling system was designed to reduce noise to a minimum. Each cooling unit generates a noise level of just 37 dB(A) at a distance of ten metres. **E**

Effective climate protection through energy-efficient building renovation

The climate goals that Germany has set for itself are ambitious: By the year 2030, the CO₂ output should be limited to 55 per cent of the 1990 level. And by the middle of the century, Germany aims to be largely greenhouse gas-neutral.

>>Text: Andreas Wolf

The target of reducing greenhouse gas emissions by at least 40 per cent of 1990 levels before 2020 has already been missed by 8 per cent. The federal government has to do better – there is an urgent need for action.

“The fastest and easiest way to mitigate climate change is to save energy”, says the Federal Environment Office, which is focusing on the energy-efficient refurbishment of buildings: “Extensive renovation of a building’s energy efficiency can reduce primary energy consumption by up to 90 per cent”. But not only the

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Climate protection program 2030

The Cabinet Committee on Climate Change presented the results of its work on 20 September 2019. The members of the committee agreed on the cornerstones for the Climate Change Program 2030, which contains a number of measures across all sectors. Measures in the building sector include:

Tax incentives for energy-efficient refurbishment

measures: The central measure is the introduction of attractive, simple and technology-friendly tax incentives for energy-efficient building renovation measures. The tax incentive will be introduced from 2020 as a supplement to the existing funding scheme as a further pillar of support. Funding will be provided for measures such as the installation of new windows or the insulation of roofs and exterior walls. For example, replacing old windows with modern insulating windows can reduce the tax liability – spread over 3 years – by 20 percent of the costs.

Investment subsidy for energy-efficient building

refurbishment: The KfW subsidy is supplemented by an investment subsidy. This will reach further individuals (e.g. tax-exempt housing cooperatives, housing companies with high loss carryforwards, persons with no or low tax liability such as pensioners, landlords or owner-occupied buildings).

Renewal of heating systems: In order to increase the replacement rate of oil heating systems, a “replacement premium” with a subsidy rate of 40 percent will be introduced for a new, more efficient heating system.

Federal Environment Office sees this as a significant factor for implementing climate targets in Germany.

Environmental organisations, research institutes such as the Institut Wohnen und Umwelt (IWU) in Munich, the German Economic Institute (IW) in Cologne or the German Energy Agency (dena) also consider the renovation of a building to improve its energy efficiency as an important contribution to achieving climate targets. In politics too, voices are increasing in this direction: The Economics Minister for North Rhine-Westphalia, Prof Dr Andreas Pinkwart (FDP), called for tax incentives for renovation of property in a joint key issues paper with his counterpart from Bavaria, Hubert Aiwanger (CSU): “Renovating existing buildings is a major step towards reducing greenhouse gas emissions: 62 per cent of the building stock was erected before the first Thermal Insulation Ordinance in 1978”. And the building sector accounts for around 40 per cent of energy used in Germany. Such a tax incentive would not only improve the conditions for investment in energy-efficient building renovations, it would also provide a positive stimulus for the trade sector and the local economy, as well as contributing to achieving climate protection targets in the building sector”.



Photo: iStock



Photo: iStock

The German Economic Institute (IW) points out that the German federal government's 2010 energy plan aims to make the building stock in Germany virtually climate-neutral by 2050. Much has changed since then, including significantly lower energy prices, making homeowners less interested in upgrading the energy efficiency of their buildings (e.g. through thermal insulation or heating system modernisation). The consequence, continues the IW, is less investment in efficiency measures. "To achieve the climate targets, the rate of renovation must be considerably increased".

The IW also considers the inconsistencies in tax legislation to be one of the many hurdles to energy modernisation (others include complexity, uncertainty, subsidies, landlord/tenant issues, etc.). Two attempts have been made to create tax incentives for building renovations, however none have been implemented. The Bundestag (federal parliament) supported a subsidy in 2011, and in 2014 the National Action Plan for Energy Efficiency was agreed by the government coalition. On both occasions the projects failed in particular due to the financing. The current coalition agreement of the federal government once again provides for tax incentives for energy-efficient building renovations: 2 billion euros have been set aside for supporting owners during this parliamentary term. The building allowance for families with children has, however, exhausted this budget, meaning that the project is under threat for a third time. "This would be fatal from the point of view of climate protection, because one can assume that tax concessions might provide particularly strong and lasting incentives for the population", stresses the IW.

"The renovation of buildings to make them more energy efficient is one of the key factors in revolutionising the energy system", says Environmental Action Germany (DUH). The building sector alone in Germany is responsible for around 35 per cent of energy consumption and 30 per cent of energy-related CO₂ emissions. A particular focus of renovations to increase energy efficiency is on private residences, which make up almost two-thirds of the building stock. In Germany, there are about 14 million single and two-family houses and around four million apartment buildings.

In 2015, the proportion of private households in overall energy consumption was almost 26 per cent. By far the largest portion of energy consumption in residential buildings can be attributed to heat supply, i.e. room heating (69 per cent) and hot water supply (14 per cent). As hot water supply is largely still based on fossil fuels such as heating oil and gas, the potential to reduce greenhouse gases here is considerable. The goal must be to significantly reduce the use of resources such as oil and gas, which are harmful to the environment and also finite. This could be achieved by improving the building envelope and converting to renewable heating sources – these two factors go hand-in-hand, says the DUH.

While the efficiency level of new buildings is prescribed and has been continuously increased in the past, the existing building

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stock still represents a major challenge: About 70 per cent of the 18 million residential buildings in Germany were erected before 1979, i.e. at a time when there were minimal or no requirements for thermal insulation.

A study by the Institut Wohnen und Umwelt (IWU) found that 25 to 30 per cent of existing buildings have been modernised. This means that almost 9 million old buildings in Germany have not yet been upgraded in terms of energy efficiency, or only minimally. Therefore, every second residential building in Germany has inadequate thermal insulation, which is why the potential for energy and CO₂ savings in heating still remains high. This potential must be realised as soon as possible. "Therefore, the aim is to increase the renovation rate of existing buildings to at least two per cent each year. Currently it is less than one per cent", says the DUH.

The Germany Energy Agency (dena) estimates that about two-thirds of all buildings constructed by the end of the 1970s have no insulation in the external walls. Houses constructed in the 1980s and 1990s generally have an insulation layer that is only a few centimetres thick. The German Energy Agency dena calculates that insulating the façades of a typical single-family home from the 1970s pays for itself after only 14 years.

14

Experts repeatedly emphasise that measures such as installing modern heating systems only make sense if the house is well insulated. There is no substitute for good insulation in the building envelope. **E**



Preventing anchor marks with the STR method

Everyone has seen them – ugly patterns of light and dark spots on ETICS facades, also known as "anchor marks". A nuisance for the residents, but also for contractors and specifiers. For this reason, EJOT developed the STR method more than 15 years ago. Since then the number of marks has considerably decreased, but the subject remains current.

>>Text: Carina Grebe

Anchor marks are either temporary or permanent spots on a thermally insulated and rendered facade. The anchors form a thermal bridge that leads to different hygrothermal boundary conditions. The formation can have several causes, e.g. the location of the building, the orientation of the facade surface or the thermal bridge (chi value) of the anchor. Different heat storage capacities of the components used (insulation boards, anchors,

render) and incorrect setting positions of the anchors can also lead to the marks. The marks can appear as dark or bright spots on the facade.

The dark spots in the area of the anchor washers usually result from anchors that are set too deep. These areas are filled or rendered after installation. The resultant thicker render

above the anchors leads to slower drying of the facade in these areas, or rather it remains moist for a longer time, thus providing dirt, algae and fungi with a better chance of accumulation.

The bright spots on the other hand are the result of different heat storage capacities or thermal conductivities of the components. The combination of anchor washer and render coating stores the heat longer than the undisturbed render surface. This area dries faster. The remaining surface of the facade stays moist longer and in turn collects dirt for a longer period; the area above the anchor washers stays bright.

The countersunk installation according to the EJOT STR principle and anchor washers covered with caps homogenise the surface. Reworking by over-rendering of anchors that are set too deep is no longer necessary; different render thicknesses are prevented. The recessed setting position displaces an imperfect anchor washer from the facade surface into the insulation material. The caps ensure almost trouble-free temperature differences on the insulation board surface. At the same time, the moisture exchange between the render and the insulation material is homogenized across the surface.

Only the STR method, which has been proven a million times, can prevent anchor marks in the long term. **E**

The STR method



Cutting thermal bridges with CROSSFIX®

Detecting thermal bridges is important for energy balance in buildings. Thermal bridges in the building envelope or façade are responsible for heat escaping from the inside to the outside. The consequences are higher energy consumption or damage caused by mould.

>>Text: Andreas Wolf

Thermal bridges are caused in curtain wall construction by through bolts or the fastening of substructures. In order to comply with the Energy-Saving Regulation (EnEV), the demands on these products are also increasing, as they should have the lowest possible thermal conductivity.

about these ambitious goals. The conventional basic material used for these structures, aluminium, was out of the question, as its manufacture requires a lot of energy. In addition, aluminium has a significantly higher thermal conductivity than, for example, stainless steel.

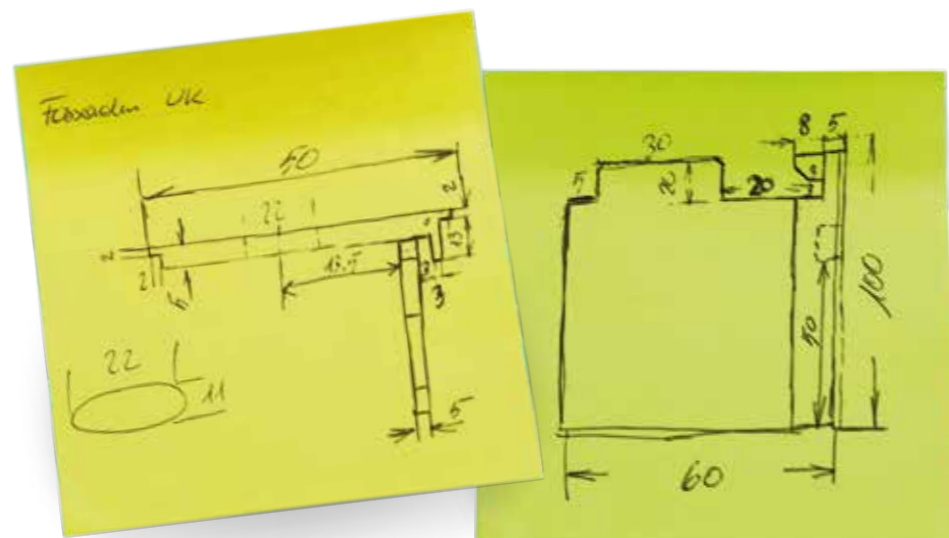
Ewald Lammer-Klupazek, Sales Manager for Roofing & Cladding for the Southeastern Europe region at the EJOT Austria subsidiary, is well aware of this. The 61-year-old has been working intensively for years on a substructure system for rear ventilated façades (VHF), and has played a key role in the development of the patented CROSSFIX system from EJOT, which has been certified by the independent Passive House Institute, based in Darmstadt. Products with the "Passive House suitable component" certificate are checked according to standard criteria; they are comparable in terms of their properties and of excellent energy relating quality.

Work continued on the optimal façade construction until the first drawing of the construction was produced. "On 3 April 2013, in a cafe somewhere, we got something down on paper", remembers Ewald Lammer-Klupazek with a laugh, because he can still remember the exact date. "The sketch was not yet complete, but we had a very good foundation". Within the next few months, more drawings were produced, including detailed calculations of the geometry. With the assistance of the "Joanneum" technical university in Graz, further extensive technical calculations followed and over time the production details were negotiated with the manufacturer.

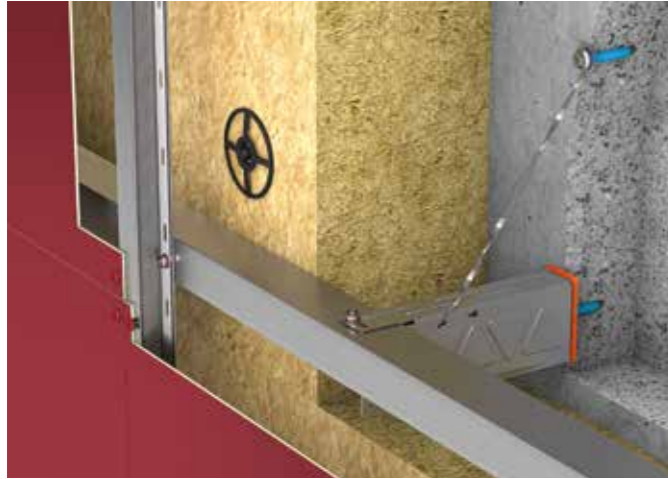
Ewald Lammer-Klupazek and his colleague Klaus Holesinsky started developing a complete, cross-system substructure back in 2010: "It had to be something completely new, particularly in terms of energy efficiency", says Ewald Lammer-Klupazek

What was the end result? CROSSFIX, the first stainless steel substructure system that can be used for horizontal and vertical support profiles, making it extremely flexible in its application. "We deliberately chose to use stainless steel, because this material is much more energy efficient than aluminium".

First ideas during the development of the new system



One of the international projects in which CROSSFIX® was used: the new buildings of the University of Valle d'Aosta (Aosta, Italy)



Above: The CROSSFIX® system when installed

Below: CROSSFIX® console made of stainless steel (pressure plate and thermostopp captive pre-assembled)

This not only translates into significantly reduced thermal losses in winter, it also applies to summer, too: Temperatures of around 70 degrees or more can occur on façade surfaces, which can have a positive effect on the energy balance thanks to the reduced conductivity of stainless steel. Stainless steel is not only safer, due to its higher static load-carrying capacity, it also offers increased fire protection.

“Customers have responded very positively to EJOT’s new substructure system”, says Ewald Lammer-Klupazek, 18 months after the market launch of CROSSFIX. Many aspects have to be considered in this complex system: Statics, safety, functionality, flexibility in application and, of course, energy savings. And at the end of the day, all of this must be affordable for customers, and even more importantly, the benefits must also pay off from a mathematical point of view. “With all this in mind, we have developed a very innovative product”. Currently, the Environmental Product Declaration (EPD) is also available for the substructure system CROSSFIX®. **E**

Stainless steel vs. Aluminium



Q&A

Three questions for Adrian Muskatewitz from the research team at the Passive House Institute (PHI) in Darmstadt.



The figure demonstrates the influence of the substructure on the heat transfer coefficient of the façade. An installation with aluminium anchors (1 sliding point and anchor point each/m²) doubles the U value of the façade. The limit values of the Energy-Saving Regulation are thus only achievable with very thick insulation, as the thermal bridge losses must be compensated for by thicker insulation. This is not efficient – in three aspects: Direct thermal losses due to the façade anchors, higher initial investments through compensating insulation and loss of usable space due to wider wall structures. Therefore, attention should be paid in the planning phase to designing the slimmest possible wall with the lowest possible heat loss. This is only possible if the thermal bridge correction coefficient is low.

(Source: Muskatewitz/PHI/Making curtain walls and rear ventilated facades work – NAPHN, New York)

Thermal bridges in façade fasteners are an important topic because the demand for products without thermal bridges is increasing due to the requirements of the Energy-Saving Regulation. Why is it not just the insulation thickness that influences the heat losses via the façade?

The heating requirement for a building is made up of the losses through ventilation, infiltration and transmission, as well as internal (e.g. through personal heat) and solar gains through transparent components. In addition to high airtightness, a compact design, the use of heat recovery and a solar aperture that enables high solar gains during the heating period, the thermal quality of the envelope surface is extremely important for the heating demand. As a result, the lowest possible heat transfer coefficient (U value in W/m²K) should be targeted. Rear ventilated façades are especially susceptible to thermal bridge effects, which can easily lead to a doubling of the regular U value. This difference is defined as a thermal bridge correction coefficient ΔU [W/m²K], and is the sum of the point and linear thermal bridge loss coefficients due to the façade anchors and support elements.

The Passive House Institute certifies façade fasteners that are used in rear ventilated façades. What exactly do you investigate and to what end?

We determine the thermal bridge loss coefficients of the substructure using a three-dimensional FEM heat flow simulation. At the same time, installation plans for a reference building are drawn up by the manufacturer, as well as the static verifications. Climate-dependent limit values are defined depending on the dead load of the façade, and are required for use in passive houses, taking into account the requirements of efficiency, thermal comfort and hygiene, and freedom from structural damage. Put more simply, the thermal bridges must be able to be compensated in terms of energy, without any impairment of the thermal comfort. Passive House-certified components have permissible thermal bridge correction coefficients of 0.00 (mostly non-metallic materials) – approx. 0.03 W/m²K (high load-bearing capacity).

Different materials are used for façade substructures, ranging from aluminium, plastic and stainless steel to glass fibres. Could you please explain the advantages and disadvantages of each material from your experience – especially with regard to the energy balance?

Each material has different properties, also in regard to initial investment, processability, fire protection and load-bearing

capacity. Over the past few years, hybrid solutions have become increasingly established on the market, as has the use of thermal separators in aluminium and sheet steel supports. The thermal conductivity of aluminium is approximately 160 to 250 W/mK, whereas stainless steel is approximately 13 – 17 W/mK. This means that even the choice of material alone leads to significant differences. Generally speaking, elements with low thermal conductivity, low spatial requirements and high load-bearing capacity achieve the best results, because a reduction in the number of anchors also increases efficiency.

Prefabricating the insulation material on the substructure is also important; air entrapments and defects must be avoided. Angle profiles and rod systems facilitate the creation of windproof thermal envelope surfaces.



Adrian Muskatewitz
(Master of Engineering)

has worked in the research team at the Passive House Institute (PHI) in Darmstadt since 2012.

As a construction engineer, he develops and certifies suitable passive house components and advises on the thermal envelope.

First in the industry

The EJOT Group is the first manufacturer of fastening materials that can provide an environmental product declaration for its whole product range.

EPDs have existed for applications in flat roofs, rear ventilated façades (VHF) and External Thermal Insulation Composite Systems (ETICS) for some time now. EJOT has been the forerunner in the fields of Industrial Lightweight Construction (ILB) and the steel, stainless steel and bimetal screw product ranges respectively.

For the first time, customers have the option of creating a systematic and standardised data basis for the assessment of their building by means of an environmental audit. It is composed in a modular system from the declarations of the individual building products as well as subsequent ecological assessments. The life cycle analysis considers the whole life time of the building, the construction phase, the utility phase as well as deconstruction and disposal. It can show the contribution of the different building products to the energy efficiency or to further aspects of sustainable building management.

An Environmental Product Declaration (EPD) provides quantifiable and environmentally related information about the biography of a product or service, in order to allow comparison between products and services of the same function. An EPD is based on independently controlled data from environmental audits, life cycle inventory analysis or information modules in accordance to the series of standards ISO 14040.

Environmental product declarations form the data basis for the ecologic building assessment according to DIN EN 15978 (Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method). They are based on international standards (ISO 14025, ISO 14040 ff) as well as on the European DIN EN 15804 and are therefore internationally agreed upon. They are suitable as proof for environmental demands in public procurement. Environmental product declarations offer the relevant data basis to show the environmental properties of a product. ■





Sustainability versus growth – a challenge for politics and business

Economic growth, measured in terms of gross domestic product, has long been an important measure of the economic success of nations. Likewise, in today's businesses, revenue growth is still considered one of the most important criteria for economic success. Here it is obvious that an increase of production and services causes additional use of resources under otherwise unchanged external conditions.

>>Text: Dr. Stefan Beyer

As early as 1972, the Club of Rome published its widely acclaimed study *The Limits of Growth* which dramatically showed, that maintaining pure quantitative growth will sooner or later lead to a global ecological collapse for humanity. Recent studies by the Global Footprint Network show that in the current year 2019, mankind has been using natural resources since the beginning of August, which will not regrow in the course of the year. According to this information, the high CO₂

emissions in the areas of electricity, traffic and industrial agriculture as well as the large demand for living space contribute to the earth's overload.

This awareness is increasingly coming into the public focus today. The visible and palpable signs of climate change and its consequences for humanity and the environment are now showing the limits of unchecked growth unadorned and are setting

in motion at least small change processes in politics and the economy. However, these are far from sufficient to effectively combat the negative effects on the climate and the environment in the long term. The measures adopted in global climate conferences on a significant limitation of climate change are not yet tackled everywhere with equal rigor, let alone implemented. Today, however, a young generation of people is growing up, self-confidently rebelling against this dramatic development and fighting for an environment that is still worth living in for generations to come. Bewegungen wie Fridays for Future werden langfristig auch seitens der Politik und der Wirtschaft nicht unbeachtet bleiben können. The dramatic loss of importance of the established parties and the vigorous growth of the "Green Movement" are also an alarming wake-up call for politics and the economy and a clear demand to abandon unrestrained quantitative growth. Instead, the demand is to replace quantitative with qualitative growth.

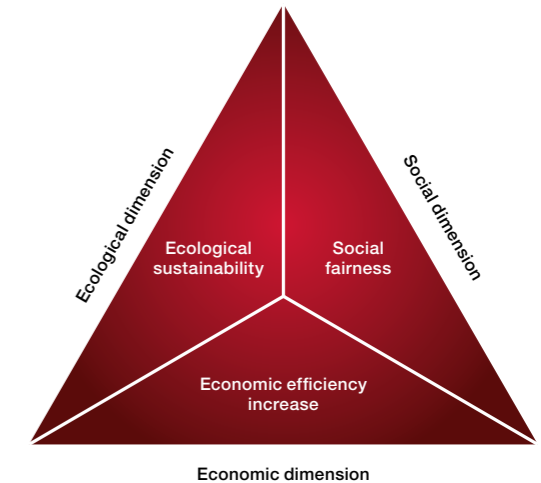
In this context, a term has become the focus of the public in recent years which has also entered the corporate world more than any other concept: sustainability. Many companies now regard a swift orientation towards sustainable development as a clear competitive advantage and necessary guarantor of success for their future. In so-called codes of conduct, they voluntarily commit themselves to sustainable action and also demand this from their suppliers. Self-assessments based on pre-defined questionnaires and on-site sustainability audits integrate the entire supply chain into the sustainability strategy. In addition to the annual report, a sustainability report is often already an important component of a companies' information policy. It is also an instrument of sustainability management and an element of marketing. Many large companies of all industries publish such reports every year. Medium-sized companies are also increasingly required to produce professional sustainability reports. In particular, companies of the supplier industries, especially for OEM, are demanding compliance and documentation of social and ecological standards. But what exactly is sustainability?

Origin of the concept of sustainability and today's perspective

The roots of sustainability go far back in time. The Freiburger chief miner Hans Carl von Carlowitz (1645–1714) is often considered to be the "father" of sustainability as he transferred the idea of sustainability to forestry. In order to implement sustainable action, according to Carlowitz, only as much wood should be cut down in a forest as the forest can naturally regenerate in the foreseeable future. The principle of sustainability should thus ensure that a natural system in its essential properties is maintained over the long term. This approach laid the foundation for sustainable thinking and action, which today increasingly serves as a model for political, economic and ecological action. The definition of sustainability in the 1987 United Nations Brundtland Report states: "Sustainable development is development that meets the needs of the present without risking future generations to meet their own needs."

The Agenda 21 guidelines in Rio de Janeiro from 1992 have defined three dimensions of sustainability that are mutually influen-

tial and must be treated equally: economic, environmental and social sustainability.



Triangle of sustainability (changed according to Seyboldt)
Source: Education for Sustainable Development

Applied to businesses, these dimensions can mean the following:

Economic sustainability: The company operates in such a way, that it stays successful in the future. The guarantee of always sufficient liquidity of the enterprise and lasting above-average yield for the owners are basic requirements for this. In addition to high customer satisfaction, the use of renewable raw materials (for example in packaging) and / or the recyclability of products or goods as well as forward-looking investments, appropriate research and development as well as a functioning and transparent corporate communication are characteristics of economically sustainable companies.

Ecological sustainability: The objective is to protect the environment. Resources should be used efficiently. That means specifically:

- The consumption of renewable resources must not exceed their regeneration rate
- Emissions must not be higher than the capacity of a corresponding emission reduction
- The consumption of non-renewable resources must be compensated by a corresponding increase in the use of renewable resources

A widespread ecological sustainability measure of many industrial companies is the energy consumption as an indicator of the absolute extent of environmental pollution. Other frequently used effectiveness measures are the material and water consumption as well as the amount of waste and wastewater.

Since 1993, the European Union has provided a framework for the development of corporate environmental protection (EU Eco-Audit Regulation). The objectives of the ordinance are the documentation of the state of the operational environmental protection and a continuous improvement of the environmental management. The environmental audit documents the current situation with regard to energy management, use of raw materials, recycling and disposal activities, noise pollution,



production processes used, environmental aspects in product planning, etc., e.g. with the help of an ecological balance sheet, as well as a weak point analysis derived from it. With the further development of an environmental program and an environmental management system, concrete measures for achieving the goals are defined and organizational structures are created within which the measures can be implemented. The implementation is controlled in an internal environmental audit. The demands increase steadily because the self-imposed goals and planned improvement measures have to be implemented at the next environmental assessment.

Since 2015, all companies which are not SMEs, i.e. all companies with more than 250 employees or an annual turnover of more than € 50 million, are obliged to check their energy consumption in the form of an energy audit in accordance with DIN EN 16247-1, which must be repeated every four years. Alternatively, companies can also introduce more complex energy and environmental management systems. The goals are the identification of potential savings, the definition of appropriate measures and the implementation of savings potential. More and more SMEs are now voluntarily determining their energy consumption in order to develop and implement savings potentials as well.

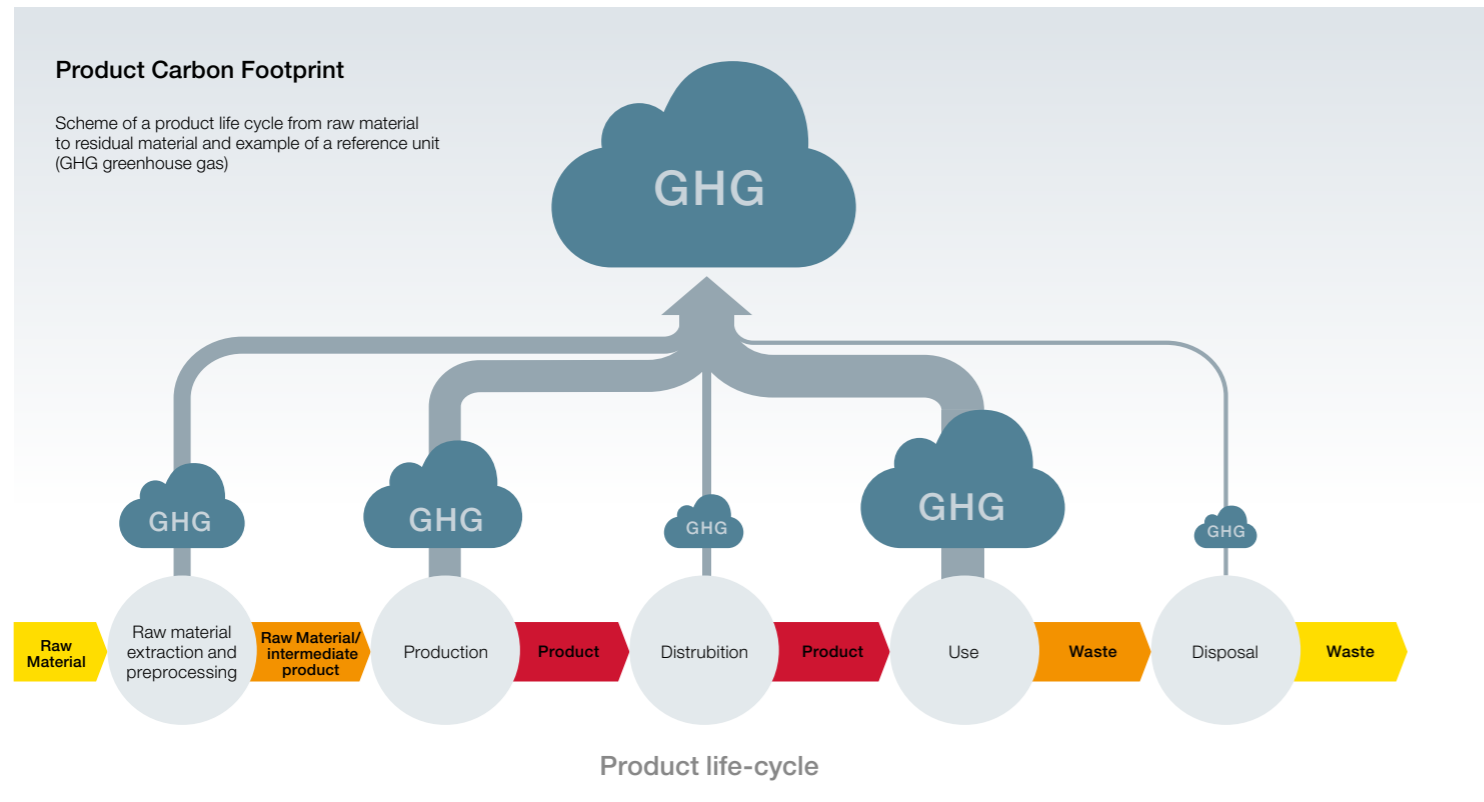
The CO₂ emissions have demonstrably one of the largest environmental impacts and are therefore in the special focus of the ecological sustainability considerations. In this context, the so-called carbon footprint has become increasingly important in recent years. Here, CO₂ stands not only for carbon dioxide,

but for all greenhouse gas (GHG) emissions that contribute to global warming. The so-called Product Carbon Footprint (PCF) describes the balance of GHG emissions and withdrawals along the entire life cycle of a product or service (see fig.). By contrast, all direct and indirect GHG emissions at the corporate level are accounted for in the Corporate Carbon Footprint (CCF). Only by defining a reference unit (for example, semi-finished product input up to product output) are such balance sheets meaningful and comparable.

A PCF states which climate-relevant contribution the individual life-cycle phases of a product have and which process step within the value-added chain has the greatest leverage to reduce product-related greenhouse gas emissions. It enables a company to analyze its own processes and derive room for improvement.

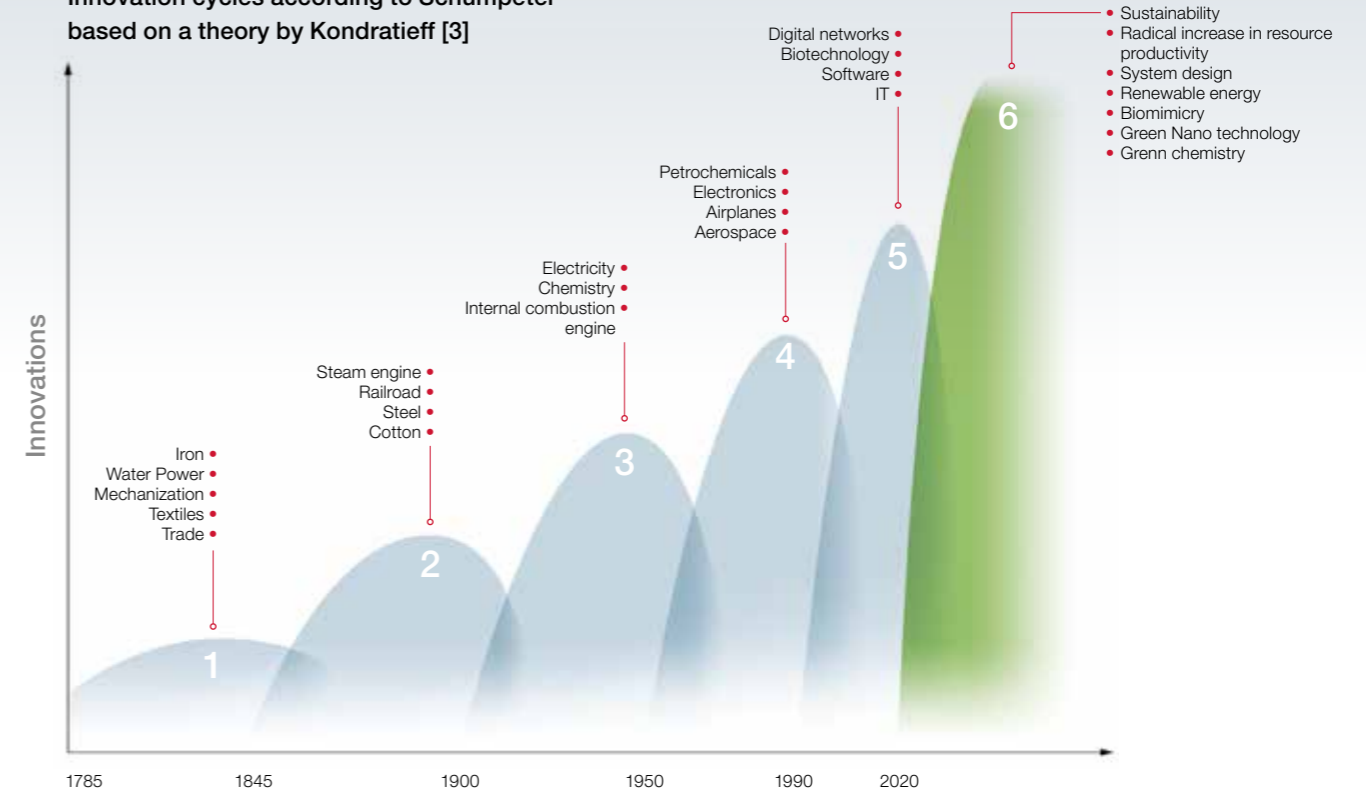
Social sustainability: This includes the concern for social justice between employees within the company, the creation of good working conditions and contributions to safeguarding the health of the workforce. The prevention of corruption is also an important aspect of social justice.

In contrast to the economic and ecological aspects of sustainability, the importance of the third dimension, the social aspect, is still poorly understood in many companies. Assessment criteria have thus far mostly been developed by consumer protection or human rights organizations. Companies depend on people who are well-educated and motivated and blatant social injustices will lead to long-term wear of human resources. On the other hand, training at company level, also



Source: Hottenroth, Heidi; Joa, Bettina; Schmidt, Mario: Carbon Footprints für Produkte. Handbuch für die betriebliche Praxis kleiner und mittlerer Unternehmen. Hochschule Pforzheim, Institut für Industrial Ecology 2013

Innovation cycles according to Schumpeter based on a theory by Kondratieff [3]



in environmental matters, increases motivation, reduces fluctuation and ensures continuity through knowledge transfer. These are factors that have a clear positive business effect. After all, a company's social and ethical values directly contribute to the economic value of a company if it succeeds in using these factors communicatively.*)

Importance of sustainability for the future

Following a theory by Nikolai Kondratieff, according to which so-called innovation waves follow each other more and more closely over time (so-called Kondratieff cycles), Joseph Schumpeter presented these cycles graphically (see fig. above). Now, after 5 waves of innovation, it is assumed that the next wave of innovation will be dominated by sustained developments, as especially companies will have to reduce a large part of the costs incurred for raw materials, energy, water and transport.

Sustainability in the fastener industry

One of the biggest challenges for a manufacturing company is to make sustainability measurable through appropriate indicators. This is not an easy task for the companies in the fastener industry for the entire process chain from pre-material processing to the delivery of fasteners to the customers.

The following examples, without any claim to completeness, give impulses for the fastener industry for the three aforementioned dimensions of economic, ecological and social sustainability.

*Source: Schönborn, G./Steinert, A. (Hg.): Sustainability Agenda. Nachhaltigkeitskommunikation für Unternehmen und Institutionen. Neuwied: Luchterhand 2000



Dr. Stefan Beyer

Stefan Beyer is Managing Director of the German Screw Association (DSV). The purpose of the association, which currently has 50 full and 70 associated member companies, is to promote the common economic, technical and scientific interests of its members.

Stefan Beyer is 63 years old. After studying general mechanical engineering and conferral of a doctorate at TU Darmstadt, he was responsible for research and development at a well-known German screw manufacturer from 1995 to 2010. In March 2010 he took over the management of the DSV. He is also deputy managing director of the German Cold Forging Group (GCFG), an association between the Industrial Association for Massive Forming e.V. (IMU) and the DSV in joint technical and scientific issues. Stefan Beyer is Managing Director of the Executive Committee at the European Industrial Fasteners Institute (EIFI).


In addition, Stefan Beyer is actively involved in national and international standardization, currently as chairman of the ISO / TC 2 Fastener. He also maintains a close contact with the German automotive industry, where he has headed the working group VDA Mechanical Fasteners for many years and is involved in several other bodies of the VDA, such as the Metals Working Group and the Working Group Surface Technology.

Economic sustainability

	Possible measure	Expected effect on sustainability
Product	Smaller screw size of higher strength	Material savings, weight reduction of fasteners and connected components and assemblies; cost reduction → saving resources
	Weight reduction at non-functional parts, e.g. cups on screw heads and threaded ends	Material- and weight savings; cost reduction → saving resources
	Use of thin-shaft or full-thread screws instead of full-size screws	Material and weight savings, improvement of functional properties; cost reduction → saving resources
	Use of thermomechanical end-dimensional rolled wire rod instead of annealed wire rod, if necessary in combination with adapted chemical analysis of the material	Elimination of the annealing, possibly also of the final drawing; cost reduction → saving resources
	Use of microalloyed steel	Elimination of the heat treatment and possibly a straightening operation, no scaling → energy savings
	For high quantities cold forming instead of machining/finishing	Material savings, often improved mechanical and functional properties; cost reduction → saving resources
	Phosphate-free coating for cold forming	Omit dephosphating before heat treatment, reduction of environmentally harmful waste products → Protection of the environment
Process / Recycling	Fastening instead of welding, soldering, glueing	Screws are basically recyclable; connected components can be dismantled and thus also recycled → saving resources, protecting the environment
	Reconditioning / reusing of used tools	Cost reduction → conservation of resources
	Recycling of oils (e.g., heading and milling oils); Processing of the used oil to fresh oil quality	Reduction of substance consumption; Reducing the disposal of environmentally harmful substances; Cost reduction → protection of the environment
	Scrap separation, e.g. steel and stainless steel	→ Resource conservation; through recycling → high energy savings (every ton of steel and iron scrap saves 1.5 tonnes of mined iron ore)
	Container cycle / packaging material: Reducing the consumption of disposable packaging; Packaging made from renewable raw materials; smaller quantities and/or optimized packaging sizes	→ conservation of resources
	RFID in logistics	Dispensing with barcodes, flexible data management, simplified process optimization, faster processes → resource conservation
R&D	Research and development with regard to resource conservation and energy saving	Implementation of previously unused potential for → energy saving and → resource conservation → Long-term cost reduction

Ecological sustainability

	Possible measure	Expected effect on sustainability
Manufacturing processes	Heat recovery of process heat, e.g. from the heat treatment	→ energy savings
	Ionization of room air	Improvement of air quality and germ-free ventilation, reduction of regular replacement of filters, reduction of required air, no waste air treatment required → energy saving
	Increase in the share of renewable energies	→ Reducing the consumption of fossil fuels
	Determination of energy consumption per manufactured product and identification of measures to reduce it	Increase of production efficiency; Cost reduction → Reduction of energy consumption

	Identification of discharges of harmful substances into soil, water and air and identification of measures to reduce them	→ Reducing the environmental impact
	Use of water-based instead of solvent-based coating systems	Avoidance of expensive post-combustion plants; Improvement of exhaust air quality → energy saving
	Use of energy-efficient lighting and intelligent use	Cost reduction → energy saving
In-house processes	Green electricity, reduce electricity and water consumption: Energy-efficient and economical appliances and machines	→ energy saving and → resource conservation
	Avoiding paper printouts; paperless office	→ conservation of resources
	Sensible reduction of business travel in favor of videoconferencing	Cost reduction → Reduction of CO ₂ emissions
	Redesign of company car fleets: use of resource-saving vehicles	→ Reduction of CO ₂ emissions

Social sustainability

	Possible measure	Expected effect on sustainability
Social indicators	Determination of employee satisfaction and measures to increase it	Motivation, employee retention
	Provide and maintain qualification and professional competence (e.g. Schraubfachausbildung (DSV) [®])	Motivation, continuity, competitiveness, identification with the company
	Knowledge management	Retain competence and expertise even with generational changes, motivation
	Employee interests: health care, part-time work, flexible working hours, home office	Motivation, reduction of sick leave, employee loyalty, identification with the company
	Working time: laws on working time regulations must be complied with; Weekly working hours max. 48 hours, max. 12 hours overtime per week, at least one day per week off	Reduction of sick leave, social responsibility internally and externally
	Payment: compliance with minimum legal requirements; sufficient to satisfy the basic needs	Social responsibility internally and externally, motivation
	No discrimination: no ostracism on grounds of race, nationality, religion, disability, gender, political opinion.	Social responsibility internally and externally
	Help with serious private problems	Motivation, employee retention
	Apprenticeships	Motivation, employee retention
	Promotion of women: dealing with parental leave, measures against sexual harassment	Social responsibility internally and externally, motivation
	Interests of disabled persons: Fulfilling the employment rate, handicapped accessible building measures	Social responsibility internally and externally, motivation
	Donations, foundations, sponsoring, integration of foreign workers etc.	Motivation, social responsibility internally and externally, identification with the company

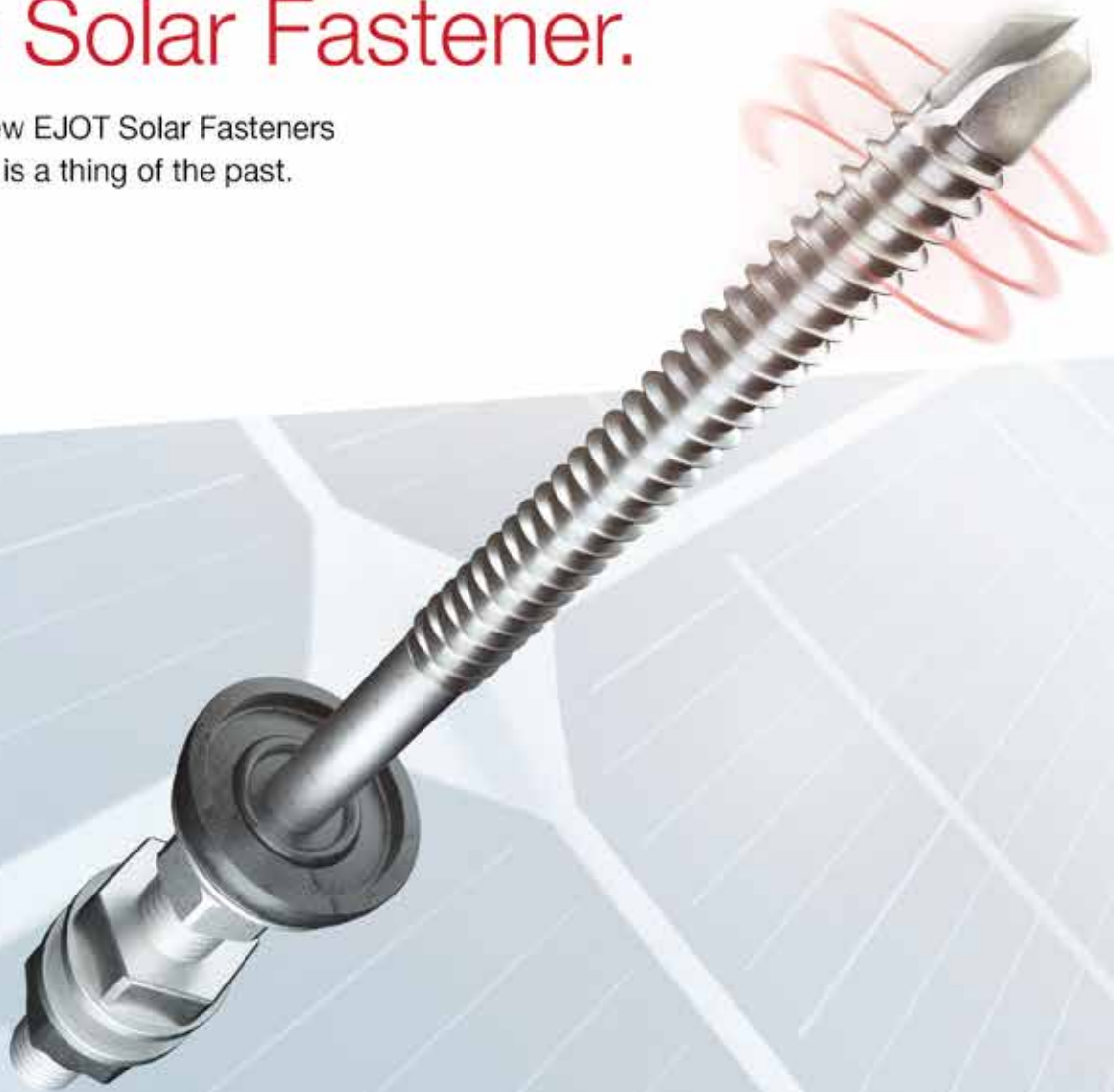
Sustainable companies are ahead of the game

For companies, sustainable business brings numerous economic benefits. It can minimize liability and reputational risks, improve resource and thus process and cost efficiency, and promote product innovation. In addition, sustainability strengthens a company's brand image and reputation, helping them to enter new markets and customer groups, retain existing customers and better enforce prices. Finally, employer attractiveness can also be noticeably increased through sustained commitment.

The goal must be to make sustainability a self-evident factor in corporate culture and to become an integral part of all company divisions and products identified as relevant. Only then will it find internal acceptance and it will be an effective instrument for the future. **E**

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