Environment and climate protection

Our business activities generate greenhouse gas emissions. In particular, this includes the energy consumed by our production processes, heating and logistics. V-ZUG is taking action to avoid and reduce these emissions. We are investing in intelligent and efficient energy technology systems, optimizing our transportation flows and switching over almost exclusively to renewable energy. We are offsetting the remaining emissions. Environmental management at our Zug site is certified in accordance with ISO 14001.

Avoiding, reducing and offsetting

There is fundamentally only one conclusive approach to tackling climate change – avoiding, reducing and, where necessary, offsetting CO_2 emissions. Despite strenuous efforts, we have not yet succeeded in completely avoiding or reducing our emissions. So as to be carbon-neutral today nonetheless, we have since 2020 been fully offsetting our direct emissions and also some of our indirect emissions in collaboration with the Ripa Gar Foundation. All our offsetting contributions are going towards the V-Forest, a reforestation project in Scotland.

In doing so, V-ZUG is offsetting what the Greenhouse Gas Protocol (GHGP) refers to as Scope 1 emissions, which we directly cause by the fuel consumption of our vehicles or the natural gas or oil heating in the buildings in which we work. We are also offsetting indirect emissions that arise during the production of the energy we purchase (Scope 2) as well as the emissions we cause due to our business flights (Scope 3). However, the latter only represent a fraction of our Scope 3 emissions. To obtain a more holistic view of this emissions category, we conducted a screening exercise for the 15 categories of GHGs in the reporting year. Based on this exercise, we will draw up future targets for Scope 3 emissions. We want to reduce Scope 1 and 2 emissions by 80 percent by 2030.

V-Forest, Scotland

Internal levy for CO_2 emissions

We are also supporting sustainable business decisions with a voluntary internal CO_2 levy. V-ZUG and the companies within the Metall Zug Group pay CHF 120 into an internal company fund for every tonne of CO_2 emitted. We are using this fund to finance sustainable projects and measures, such as expanding the use of waste heat and covering the extra costs for vehicles with alternative transmission systems. The largest contribution from the fund, which amounts to a total of CHF 700,000, supports the promising project for producing and using hydrogen at the Zug site. V-ZUG has also signed a target agreement with the Swiss Confederation on reducing CO_2, which includes a fixed reduction schedule. In recent years, we have had to accept that we have not met the fixed reduction schedule at the Zug site because we have been investing in forward-looking energy supplies instead of short-term measures.

V-Forest, Scotland

Renewing infrastructure

V-ZUG is investing in socially, economically and also environmentally sustainable sites (see "Real estate projects", 2021 Annual Report, page 28ff). We are building ecologically and using innovative methods. In developing V-ZUG's main site into an innovation hub, we are setting new standards in terms of construction and energy supply, working in close collaboration with Tech Cluster Zug ("Planning and building for the future", page 65). The most sustainable innovation here is the Multi Energy Hub (MEH), which will supply the site and neighbouring area with renewable energy from photovoltaic systems, groundwater and lake water from the 2022/23 heating period onwards ("Smaller environmental footprint despite growth", page 57). At the new V-ZUG Kühltechnik AG building in Sulgen, we have also laid the foundations for an environmentally friendly energy supply ("Energy from the sun and the ground", page 56).

Life cycle assessments

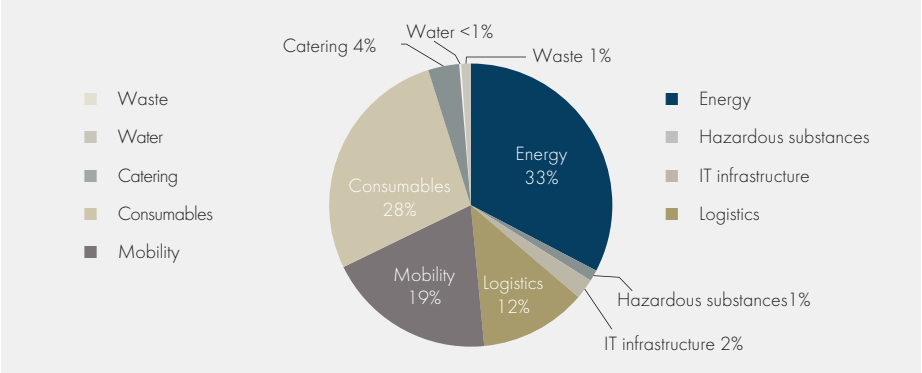
In the reporting year, we joined forces with Carbotech AG to produce an initial operational life cycle assessment for our three production sites at Zug, Arbon and Changzhou ("Transparent reporting", page 54). The aim was to find out more about the actual impact of the resources used in daily operations. Using the ecological scarcity method, we calculated our ecopoints (EP). On this basis, we will in future be able to track our target attainment in energy and resource efficiency more precisely.

Electrifying transport

Transport also causes emissions. We are decreasing distances and thereby transport routes by ensuring that the majority of our suppliers are located in Switzerland or nearby European countries (see section "Entrepreneurship for sustainable prosperity", page 59). We are also constantly improving our logistics processes. In the reporting year, we conducted pilot trials with battery-powered service vehicles. Based on this experience, we have budgeted for the first few electric vehicles in 2022. We aim to convert our entire fleet by 2030. We will also be taking delivery of an electric battery-powered post bus for internal logistics in 2022. Our use of alternative energy sources will be multi-faceted. V-ZUG sees great potential in hydrogen in particular. We want to manufacture hydrogen incrementally, fuel our truck fleet with it, and eventually heat our enamelling ovens with it.

Recycling waste

We ensure that as little waste as possible results from all our work processes; in other words, that the materials we use and process are largely recycled. Single-origin punching waste from manufacturing processes is automatically sorted into purpose-built containers and then recycled. As well as metal, our operations produce waste cardboard, paper and wood. Materials that we cannot recycle are disposed of appropriately. Around 80 percent of our waste, including returned appliances, goes to be recycled. In Switzerland, for example, the Swiss Recycling Foundation (SENS eRecycling) operates a nationwide return system for electrical appliances with a pre-paid recycling charge. This system ensures that all appliances that are taken out of circulation are recycled appropriately. We are continuously optimizing our waste management processes.



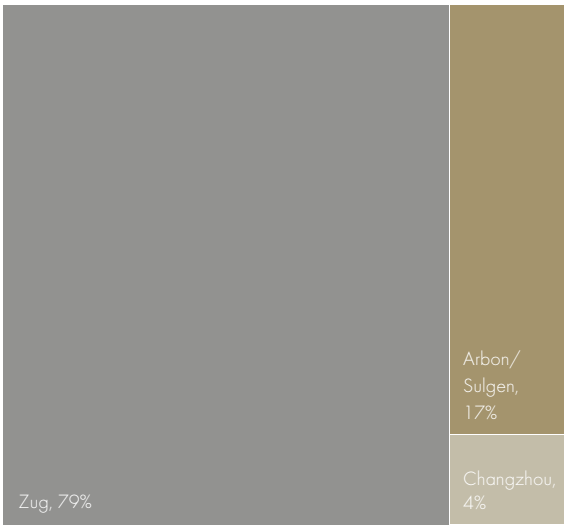


Fig. 15 Share of total environmental footprint per site (left) – percentage distribution of ecopoints (EP) overall per category (above)

Targets, facts and figures

Targets	Baseline and target years	2021 results	Status	Key figures
CO_2 emissions				
To be carbon-neutral at all production sites within scopes 1 & 2 (incl. offsetting)	Annual	The remaining emissions in the 2021 reporting year will once again be offset in collaboration with the Ripa Gar Foundation with high-quality reforestation in the V-Forest.	Achieved (since 2020)	Scope 1 and 2 emissions as per Greenhouse Gas Protocol
To reduce the remaining Scope 1 & 2 emissions incl. air travel by 80% (long-term ambition: 100%)	2020; 2030	2020: 4,518 tonnes CO_2 2021: 4,608 tonnes CO_2 Slight increase (+2%) compared with 2020 due to parallel operation of buildings and production processes (enamelling with natural gas at Zug / new refrigerator factory in Sulgen in parallel with old factory in Arbon with oil heating). Transformation-related effect. See GRI index for details	On track	Scope 1 and 2 emissions as per Greenhouse Gas Protocol
To have transparency regarding our Scope 3 emissions	-; 2021	Recorded for both the 2020 and 2021 financial years – 11 out of 15 categories are relevant for V-ZUG – two categories together account for around 90% of emissions: 3.11: Use of Sold Products / 3.1: Purchased Goods and Services – see GRI index for details	Achieved	Scope 3 emissions as per Greenhouse Gas Protocol
To reduce Scope 3 emissions by 2030 significantly (target definition 2022)	2020; 2030	Target to be defined in 2022, based on the Scope 3 survey in the 2021 financial year. We have already been reducing indirect emissions for years through constant increases in the energy efficiency of our products, a mobility strategy at our Zug headquarters, our geographical proximity to suppliers, the use of wood as a construction material for buildings, the professional disposal of waste, and the extensive return and recycling of household appliances at the end of their life cycle.	Initiated	Scope 3 emissions as per Greenhouse Gas Protocol, annual survey of main categories

Targets	Baseline and target years	2021 results	Status	Key figures
Environment and waste				
To continuously reduce the amount of waste through targeted initiatives and by optimizing disposal methods. For years, we have not disposed of any waste in landfill sites, and maintain this approach.	-; 2030	Survey of waste and disposal methods: 2021: Recycling 79.6% / composting 0.3% / incineration: 19.5% / special waste: 0.6%, landfill: 0% (see GRI index for details) Targets defined in 2021, no specific actions initiated yet – focus for 2022: packaging and paper	Initiated	Waste amount and type in tonnes. Type of disposal
To reduce the relative impact on the environment (ecological efficiency) by 2030 by at least 40% (environmental impact, relative to net sales)	2020; 2030	The corporate life cycle assessment method was introduced and applied for the first time in the reporting year. Life cycle assessments were produced for the three production sites at Zug, Arbon and Changzhou for 2020 and 2021 2020: Environmental footprint: 18,723 million EP / net sales: CHF 569.4 million 2021: Environmental footprint: 19,725 million EP / net sales: CHF 623.7 million / increase in ecological efficiency: +4%	On track	Ecopoints (EP) (in accordance with the Swiss ecological scarcity method of life cycle assessment, version 2021), indexed net sales adjusted for currency effects, environmental impact relative to net sales

Possible statuses: Achieved, On track, Delayed, Not achieved (if new target: Initiated)

Table 5 Targets, results and status in relation to the focus topic "Environment and climate protection"

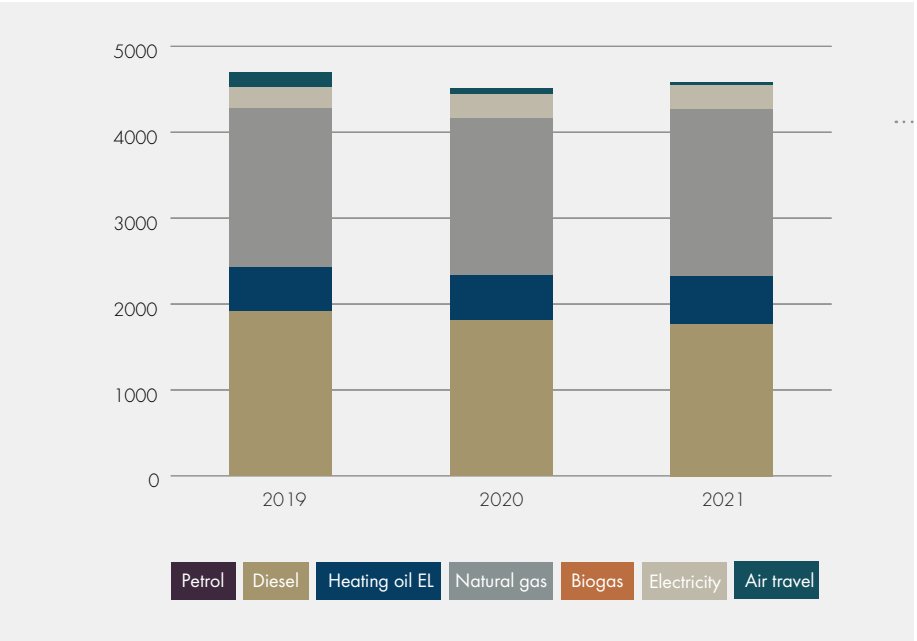


Fig. 16 CO_2 emissions (in tonnes of CO_2)

No substantial increase in CO_2 emissions despite parallel operation of buildings and processes

Direct and indirect CO_2 emissions amounted to around 4,600 tonnes in 2021, with CO_2 emissions therefore standing at around the same level as the previous year. The reason for the 2% increase compared with 2020 was the increased gas consumption in Zug (using the "Zephyr Hangar" as the new location for the coating technology system and test operations for the new equipment; parallel use of enamelling ovens and buildings). The phased commissioning of the Sulgen site, which was designed to be energy-efficient, with simultaneous production in Arbon, did not fundamentally influence the increase in CO_2 emissions. During the reporting year, screening of all Scope 3 emissions was carried out for the first time. The details of this screening are shown in «GRI index», page 70.

100% hydropower has been purchased for the production site at Zug for many years, in order to facilitate the expansion of renewable energy. The CO_2 emissions are declared accordingly by certified source (market-based, in accordance with the reporting regulations of the Greenhouse Gas Protocol). The emissions factor used is composed of the direct (Scope 2) and indirect (Scope 3) emissions. For reasons of comparability, the emissions of the power used (location-based) are also shown, based on a calculation method developed by the University of Geneva. This is based on a model that uses actual Swiss market data and an aggregated hourly load profile at the Zug site. This comparison is helpful in discussions regarding the known discrepancy between the power that is purchased and that which is actually used.

Absolute energy consumption only slightly increased despite growth and transformation

In 2021, V-ZUG's absolute energy consumption was 117.4 terajoules. This is broken down as follows: electricity (43.3%), natural gas (29.7%), biogas (0.03%) and heating oil (6.5%), plus the diesel (20.5%) and petrol (0.02%) used by our fleet of vehicles. Compared with 2020, energy consumption increased slightly (+3.7%) for the reasons mentioned above – not least due to parallel operations at Arbon and Sulgen.

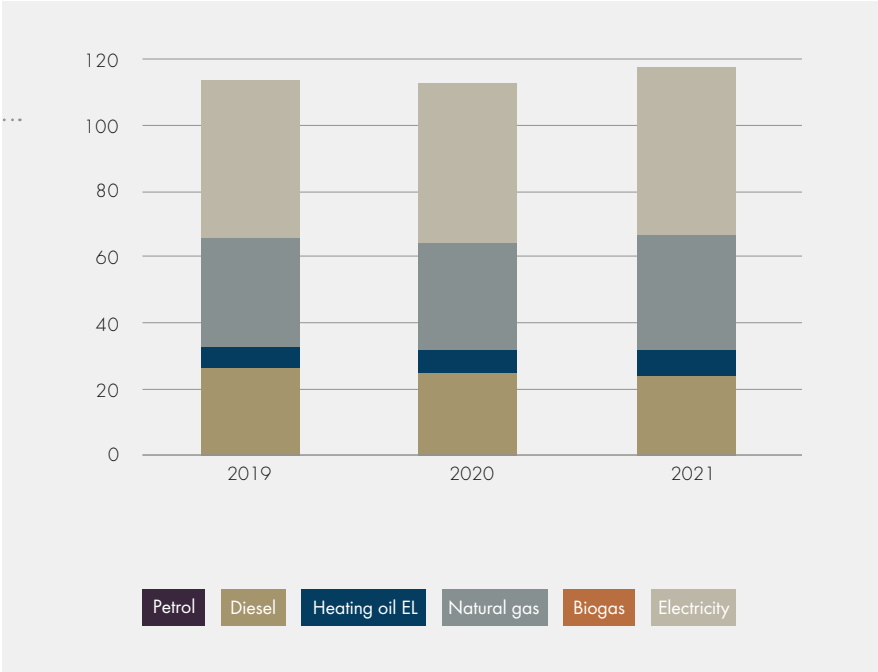


Fig. 17 Energy consumption at V-ZUG by energy source (in terajoules)

Transparent reporting

In 2021, V-ZUG compiled operational life cycle assessments at Zug, Arbon and Changzhou for the first time. "Now we know the impact our production operations are having on the environment," explains Operations Project Manager Marta Bribian. The new life cycle assessments are based on consumption figures from 2020 and 2021. Together with the product life cycle assessments, we will in future be quantifying all the environmental impacts that our production processes, products and services cause throughout their entire life cycle. "We are using an integrated method for this, in order to be more resource-efficient," says Environmental Manager Manuela Schneider-Hirth.

Categories and sub-categories	Ecopoints (millions)	Sub-category percentage
Energy	**3527 (23%)**	
Electricity		23%
Heat		77%
Hazardous substances	**119 (1%)**	
All hazardous substances		100%
IT infrastructure	**447 (3%)**	
Desktops		64%
Laptops		17%
Monitors		18%
Logistics	**2410 (15%)**	
Internal trucks		100%
Mobility	**3778 (24%)**	
Business travel		6%
Service		94%
Consumables	**4450 (29%)**	
Paper		9%
Toner		0%
Packaging		91%
Catering	**659 (4%)**	
Food		59%
Drinks		41%
Water	**35 (0%)**	
Fresh water		100%
Waste	**186 (1%)**	
Waste water		9%
Composted		1%
Recycled		0%
Special waste / general chemicals		67%
Incinerated		23%
Total	**15 611**	

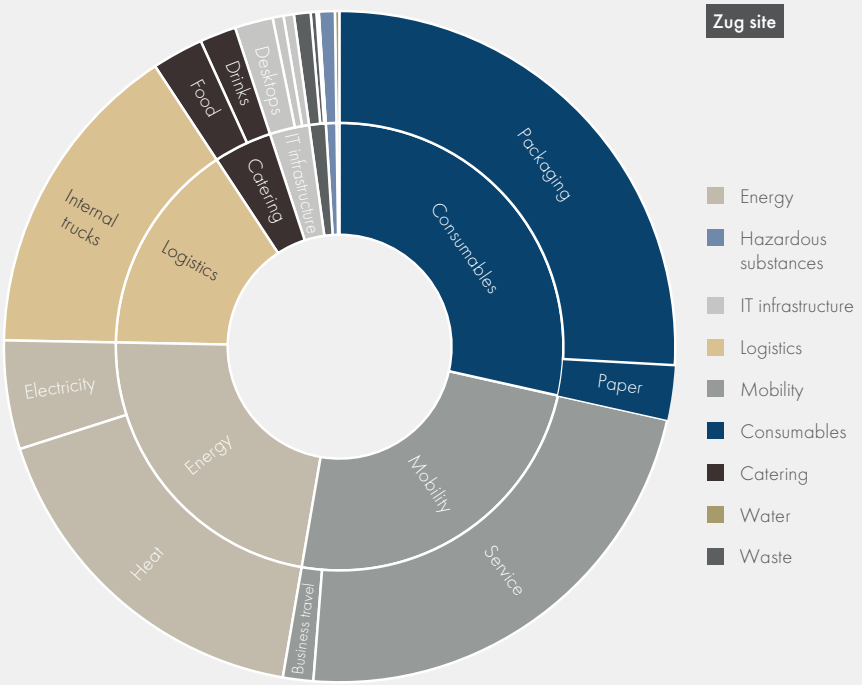


Fig. 18 Operational life cycle assessment for Zug site (headquarters), 2021

The key objective of environmental reporting is transparency. "For instance, we were very surprised at the resource consumption of packaging material," recounts Jason Zhou, General Manager at V-ZUG Special Components. Because the material used is classed as packaging at one location but as waste at another, possible improvements will carry twice as much weight. With the help of the operational life cycle assessments, we can illustrate the effect of environmental measures across all categories, such as energy, mobility and logistics, in a fact-based manner. The software used for environmental reporting can also evaluate the use of alternative materials, which will benefit sustainable decision-making. "In 2021, we drew up binding sustainability targets. In our strategies, projects and measures, we will in future focus even more closely on reducing our environmental footprint, ideally decoupled from operational growth," asserts Marcel Niederberger, Head of Sustainability at V-ZUG.

"With product and operational life cycle assessments, we are delighted to be able to provide V-ZUG with a new tool. We are convinced that V-ZUG will successfully incorporate the knowledge gained into the decision-making process, thereby optimizing its development and production processes."

Mischa Zschokke, Senior Partner, Carbotech AG

Energy from the sun and the ground

For V-ZUG Kühltechnik AG, it was time to pack their boxes in 2021. In the reporting year, we progressively moved into the new Buran building in Sulgen, which was completed in 2020. Moving into a production facility is rather more complex than moving house: "We couldn't just finish production in Arbon and resume it in Sulgen from one day to the next," explains Andreas Albrecht, CEO of V-ZUG Kühltechnik AG. Instead, it was a case of a parallel shut down and start up over several months.

But what's different about the new site? "Our main focus was on temperature regulation," explains Björn Weiss, project manager for the new building in Sulgen. The centrepiece is a groundwater well. Using a highly efficient heat pump, we can cover more than 95 percent of our heating requirements carbon-neutrally. We only have to use gas heating to tide us over in longer periods of cold weather with freezing temperatures. And what happens if it gets too hot around the fridges? "Instead of using air conditioning, we use cooling," stresses Weiss. "So in summer we use the groundwater directly and feed it into the radiators". That way, we cool down the production facilities and offices on hot days without consuming any additional energy. Under optimal conditions, we can meet our energy requirements for heating and lighting using the 537 kWp photovoltaic system on the roof.

But changes are evident inside the unusually light building as well. Because we are now only operating in a single hall, our flow of materials is completely linear. That means that the fridges move from one side of the hall to the other, and travel virtually no distance at all between the individual stages of production. So we no longer need to use forklift trucks inside the building. At the end of March 2022, the plant at Sulgen will be fully operational, "then we can finally bring the entire building to life," declares Weiss delightedly.

Björn Weiss, Project Manager for the new building at Sulgen, on the roof of the production facility

Smaller environmental footprint despite growth

"I don't use the term 'flagship project' lightly," says Tobias Frei, Project Manager for the multi-energy hub (MEH) at Tech Cluster Zug, "but a site development with an integrated energy solution of this magnitude is, in my opinion, unique in Switzerland." From 2022 onwards, the MEH will supply Tech Cluster Zug with heating, cooling and renewable energy, by intelligently linking the different energy sources. The MEH will be operated by a joint venture between WWZ AG and Tech Cluster Zug AG (Metall Zug Group).

We installed the MEH energy hub in autumn 2021 in the existing ZUGgate warehouse building. In future, two heat pumps there will control the energy flows from internal waste heat, the cooling and heating requirements of processes and buildings, and the Circulago lake water consortium. They will also store excess energy in the groundwater. Once it is connected to the site network, the new energy supply system will enable us to decouple operational growth from our environmental footprint. A comparison of the ecological assessments for 2020 and 2033 has shown that growth-related energy consumption will increase by 60 percent, while the environmental footprint will be reduced by 27 percent.

In this forecast, we replaced the environmental impact of our current energy sources by those of the MEH. "So we can quantify the different environmental impacts of the future heat pumps and today's natural gas heating, for example," explains Carina Heuberger, Coordinator for Lean Management and Strategic Projects.

Environmental impact of energy usage 2020-2033

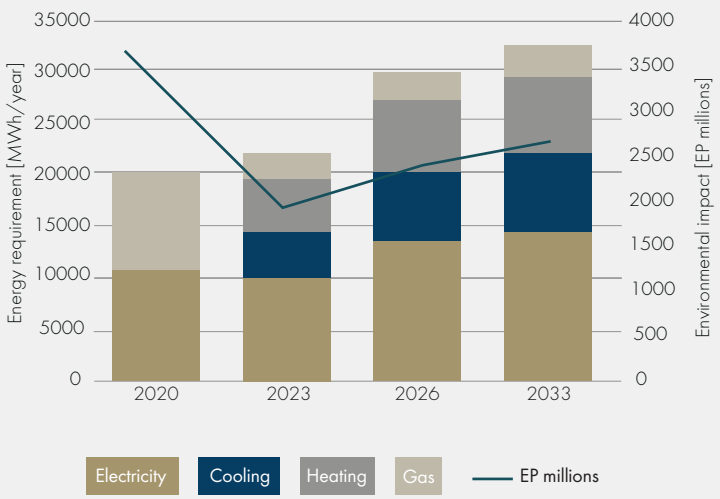


Fig. 19 Increasing energy requirement due to growth, decoupled from environmental footprint (measured in ecopoints (EP))

Installation of power facilities for the Multi Energy Hub in the existing "ZUGgate" warehouse building

Contribution to SDGs 7, 9, 12 and 13

Climate change, environmental pollution and loss of biodiversity are global problems that affect us all. For the Tech Cluster Zug, V-ZUG is quite literally turning production upside down and reducing its ground footprint. The use of ecological construction solutions is creating innovative, sustainable workplaces. With pioneering projects such as the MEH, we want to send out a strong signal and make an impact. In Zug and in Sulgen, we are increasingly using renewable energy. At the same time, we are optimizing our processes and machinery, in order to manufacture V-ZUG appliances energy-efficiently and resource-efficiently. An internal CO_2 levy provides specific incentives for this. We are offsetting our remaining CO_2 emissions, and the offsetting contributions are helping to plant trees as part of V-Forest, our own forestry project. This growing forest is removing CO_2 from the atmosphere and sequestering it long term. At the same time, it is helping to restore and boost biodiversity in the long term in a region that has been badly affected by deforestation.