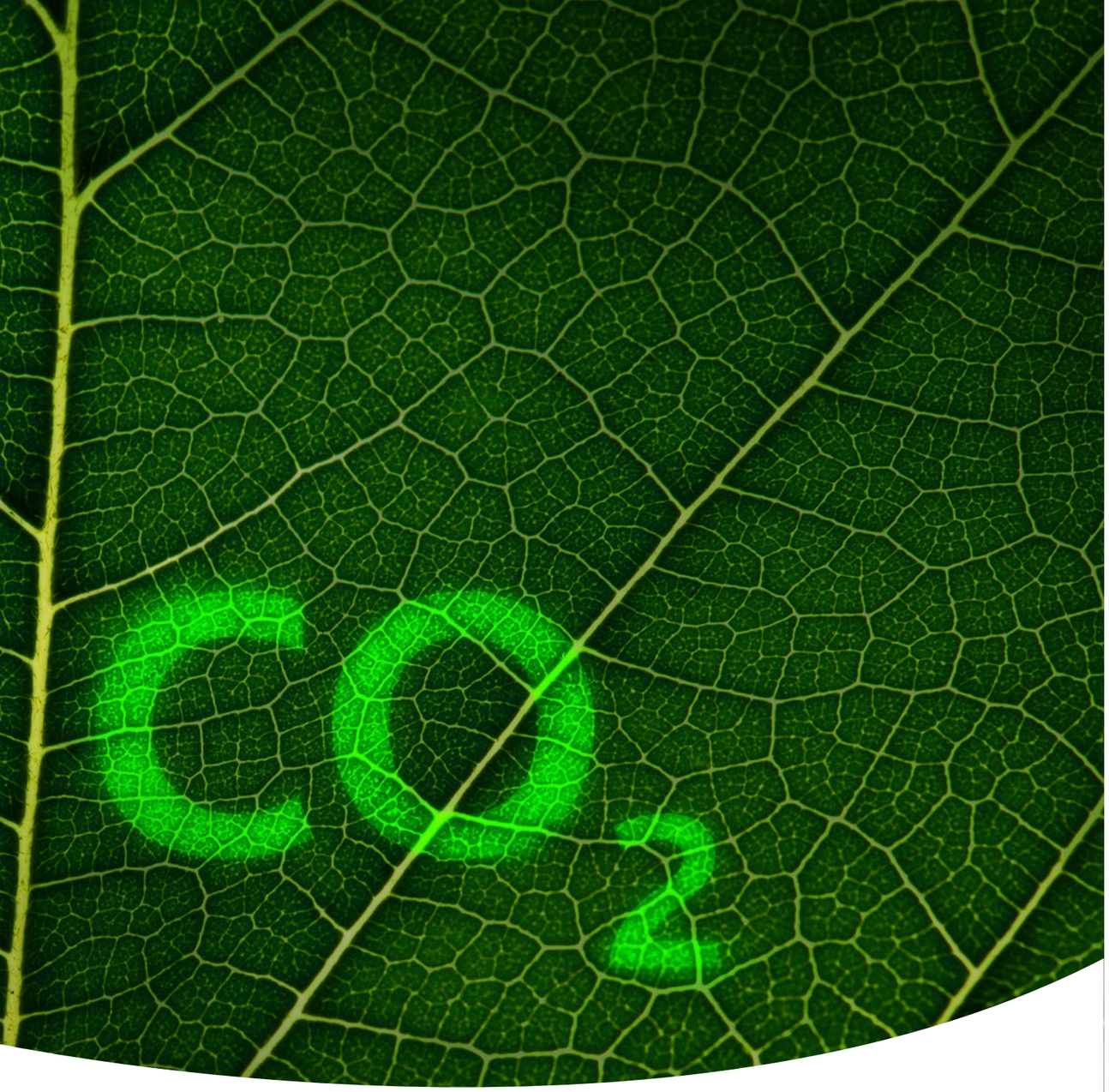

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SUSTAINABILITY –

FREUDENBERG SEALING TECHNOLOGIES IS GOING GREENER

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FREUDENBERG
INNOVATING TOGETHER

WHY SUSTAINABILITY MATTERS

We are all aware that the Earth is a finite environment, and must be nurtured and protected if it is to provide resources and support to future generations. Sustainability has become part of the global vernacular, a word discussed freely in governments, corporations, communities and between people.

Freudenberg Sealing Technologies has always been a proponent of change – in its products, processes, business strategies and innovations. We understand that the world we belong to is governed by change, that is, by activities and resources which evolve as people's needs transform. We have maintained a successful business outlook by embracing innovation and change in everything we do – it is, in fact, what leading organizations do. And now, more than ever, we are embracing the changes that sustainability has introduced to the world and to our factories.

We are looking at our sustainability with an eye to the future. This requires taking a comprehensive approach: eliminating waste; reducing energy consumption; using clean, renewable energy; developing sustainable materials; and using water more efficiently. We want to conserve resources ourselves – even as we develop products and solutions that help our customers achieve sustainability.

Of course, we need energy to manufacture our products. That is the very reason we have always tried to make our processes as energy efficient as possible. One of our priorities is to examine where we are still using fossil fuels and convert these applications to green electricity wherever possible. And here Freudenberg Sealing Technologies is in good standing. We have already converted most of our production processes to green electricity. Some of our plants, like our Berlin, Germany facility, already use green electricity to power 100 percent of all their energy needs.

We are tackling other areas as well. We are lowering scrap through processes and systems that eliminate it before it is produced. We are finding new ways to use "waste" heat to regulate the temperatures inside our buildings. We are using hungry microorganisms to help us strip CO_2 out of our emissions. And we are using alternate fuels like wood chips in place of heating oil.

But sustainability at Freudenberg Sealing Technologies is not just about our footprint – the processes and emissions we directly control. We also consider our handprint – how our products affect our customers and the emissions they produce. At the highest level, our products for e-mobility transportation and other alternate powertrain consumers will help lower global emissions. And we continue to move quickly and efficiently away from internal combustion technology as our customer's needs require. By providing innovative, high-quality materials and component to our customers, we are helping them produce clean systems designed to keep the world running emission free.

In 2020, we refocused our efforts on sustainable production by setting a goal of a 30 percent reduction in tons of CO_2 we produce per million euros sales by 2025 (using 2020 as the basis). We have also pledged to achieve complete carbon neutrality by 2045. By embedding our sustainability program into our successful lean and continuous improvement program, GROWTTH® (Get Rid Of Waste Through Team Harmony), we are well on our way to achieving these goals. GROWTTH® provides a remarkably robust framework for developing the processes and systems required to achieve long-term energy savings and lower emissions. The GROWTTH® toolkit of production methodologies for change has been part of Freudenberg Sealing Technologies' corporate culture for 30 years. It brings standardization, conformity, accountability, and veracity to our sustainability efforts.

We are proud of the contributions we have already made and looking forward to even large sustainability achievements in the future. We are making good progress towards carbon neutrality. Like many companies, we emitted fewer tons of CO_2 in 2020 due to the lower sales and production demand the pandemic created. That was welcome news. Even better – in 2021, we again managed to emit fewer tons of carbon dioxide per million euros of revenue. The trend is heading in the right direction.

We must always keep in mind that innovation and change are intrinsically connected to entrepreneurship and responsibility. This is especially true when it comes to responsibility for the future of society, for environmental protection, and health and work standards. At the Freudenberg Group, we wholeheartedly stand behind this commitment to our future.

Dr. Matthias Sckuhr
Chief Operating Officer (COO)
and Chief Technology Officer (CTO)

The 8 KPIs of Sustainability at Freudenberg

t CO_2/M€ sales

Tons of carbon dioxide emissions generated from Scope 1 and 2 activities per million euro sales/M€ sales

t CO_2 abs./year

Total of the tons of carbon dioxide emissions generated from Scope 1 and 2 activities per year

kWh (indirect)

Total kilowatt hours of Scope 2 (greenhouse gas that result from the generation of purchased or acquired electricity, heating, cooling, and steam consumed by the organization)

kWh (direct)

Total kilowatt hours of Scope 1 (direct greenhouse gas emissions from sources that are owned or controlled by the company)

% kWh (green)

The percentage of renewable electricity by the total electricity consumed

kWh/€ sales

Kilowatt hours per euro sales

Waste t/M€ sales

Tons of waste per million euro sales

kWh abs./year

Total of kilowatt hours per year

INTRODUCTION TO SUSTAINABILITY AT FREUDENBERG SEALING TECHNOLOGIES

In our current ecosystem, "business as usual" no longer makes sense. As the need to safeguard the environment and our shared future becomes more pressing, companies are urged to drive positive change. More and more customers, employees and business partners are demanding corporate responsibility when it comes to economic, environmental, and social issues. Staying competitive no longer means focusing mainly on the bottom line; with growing consumer awareness, holistic approaches to our planet's resources play an increasingly crucial role in how a company performs in the marketplace.

In 2000, the United Nations launched its Global Compact to encourage companies worldwide to act with greater environmental and social responsibility on a non-binding basis. With 13,000 participating companies, the U.N. Global Compact (UNGC) is the largest corporate sustainability initiative in the world. Its recommended policies cover the areas of compliance, human rights and labor standards, sustainability, occupational health and safety, environmental protection, and social commitment. In encouraging businesses to participate, the Global Compact provides a framework for responsible action as part of an exemplary group with stakeholders around the globe.

By recognizing the importance of this framework and signing the UNGC in 2014, the Freudenberg Group has committed to aligning its business strategy and operations with the principles set forth in the pact. Membership in the initiative also requires companies to submit annual progress reports to improve transparency and accountability. For the Freudenberg Group – including Freudenberg Sealing Technologies – this kind of commitment is already a matter of course.

Why would a company take on additional work to ensure sustainable operations while striving to stay competitive? The answer is simple – it aligns with the core values of the Freudenberg Group. Many of the Group's stakeholders have indicated that they support the principles and goals of the UNGC. Joining other companies with the same economic, social, and environmental concerns builds momentum internally and externally, and reinforces the meaningful shift towards holistic action.

As climate change nears a tipping point, Freudenberg realizes that more can be achieved by pulling together on a global level. Everywhere around the world, companies are learning how to enact sustainable transformations and embed responsibility into the fabric of their business practices. Clearly, we can all learn from each other as we take these critical steps to ensure the future health of our planet.

The Freudenberg Group has its own Guiding Principles which prioritize its corporate sustainability. Since signing the UNGC in 2014, the organization has expanded its

measures to advance the Compact's core values. In 2020, the Group introduced the "Sustainability Drives Climate Action" initiative, responding to the increasing urgency for global action by intensifying its sustainability efforts.

This initiative also includes an updated footprint/handprint campaign. The "footprint" refers to the impact on the environment and resources resulting from the procurement and processing of raw materials and the delivery of finished products. The so-called "handprint" is the positive effect attained by customers when they use the products and dispose of them, by saving energy and reducing waste.

In addition, the Group stated its goal of further decreasing its CO_2 emissions in relation to million euros across all business groups by 2025, namely by another 25 percent compared to 2020. Freudenberg Sealing Technologies even raised this goal to 30 percent, redesigning its processes to lower its emissions and pursue carbon neutrality.

30 years, thousands of large and small GROWTTH® projects have saved the company nearly half a billion dollars by reducing engineered waste, reducing assembly line downtime, speeding up manufacturing operations, achieving outstanding component quality, saving energy, bringing engineering results to new levels and keeping the company's pipeline full of Black and Green Belt practitioners. GROWTTH® has evolved from a program into a culture at Freudenberg Sealing Technologies — one of excellence and value that is aggressively pursued at every level in the company.

By placing sustainability under the GROWTTH® umbrella, the company has jumpstarted its climate change initiatives. A network of Black and Green Belt experts were available to take on the first activities of the company's sustainability efforts — establishing a sustainability road map built upon the scoped actions of the Greenhouse Gas Protocol.

By reducing its footprint and enlarging customers' handprints, Freudenberg is contributing to greater sustainability worldwide.

Freudenberg Sealing Technologies' practice of "GROWTTH®" (Get Rid Of Waste Through Team Harmony) has already achieved excellent results and is being improved continuously. This helps balance out the Freudenberg Group's overall environmental impact as its practices transition to increasingly sustainable operations.

In fact, GROWTTH® is an industrial benchmark among continuous improvement programs, recognized and praised as much for its tools and resources as for its ability to internally train new experts to keep it vital and evolving.

When Freudenberg Sealing Technologies' senior management looked for ways to embed a sustainability culture into the company, GROWTTH® was a natural – and powerful – means for achieving success. During the past

Now the company has forged a 10-year energy plan that includes eliminating fossil fuels, increasing the use of green electricity, saving water, adopting more photovoltaics and wind power bringing us closer to achieving net zero CO_2 emissions by 2045. Black and Green Belt-trained employees are using the tools associated with the program to evaluate and implement the best, most value-added approaches to sustainability projects.

The outlook is positive – Freudenberg expects to meet its emission reduction targets and become carbon-neutral in the foreseeable future. While it remains a challenging process, all hands are on deck now – for the customers, the company, humanity, and the planet.

SUSTAINABLE DEVELOPMENT GOALS

Recognizing an urgent need for global change in order to save the planet for future generations, the United Nations (UN) created a framework program in 2000 with specific guidelines for companies to follow. It defines Ten Principles on human rights, labor, environment and anti-corruption, with an emphasis on positive societal change and ecological responsibility. Since then, this UN Global Compact, or UNGC, has been joined voluntarily by about 13.000 companies in 170 countries.

In 2015, all member states of the United Nations adopted the "2030 Agenda for Sustainable Development". This blueprint is intended for companies and institutions to rein in the accelerating climate change and lists 17 Sustainable Development Goals (SDGs). Among other things, they include the promotion of specific climate action, clean energy, sustainable industrialization and innovation.

"WE HAVE ACHIEVED EXCEPTIONAL RESULTS BY ADOPTING A CORPORATE CULTURE OF LEAN AND CONTINUOUS IMPROVEMENT."

DR. MATTHIAS SCKUHR, COO AND CTO

As a corporation with a long tradition of environmental and social responsibility, the Freudenberg Group not only signed the UN Global Compact but launched its own Guiding Principles to define its policies regarding sustainability. In 2020, the Group intensified its efforts by launching the "Sustainability Drives Climate Action" initiative. This includes not only an updated footprint-handprint campaign but the specific goal of a 25 percent reduction of CO_2 emissions in relation to sales of million euros across all business groups by 2025 compared to 2020.

Since some companies in the Freudenberg Group run very energy-intensive operations, Freudenberg Sealing Technologies, the corporation's largest business group, has stepped up to increase its own efforts. By raising the target of CO_2 emissions from 25 percent to 30 percent, it will help balance out the Group's overall results.

Dr. Matthias Sckuhr, COO and CTO of Freudenberg Sealing Technologies is in charge of the company's environmental initiatives, among other responsibilities, and is confident that the company is in a good position to attain this higher goal. "We have achieved exceptional results by adopting a corporate culture of lean and continuous improvement," he says. "We can leverage a powerful network of Black Belt and Green Belt experts who know how to apply proven lean processes and best practices to reach long-term sustainability results."

The specific programs and action steps are overseen by Vicky Jandreau, Senior Vice President of President of Lean, GROWTTH® and Sustainability for Freudenberg Sealing Technologies. Jandreau is focusing on results-driven, measurable improvements and has established a cross-functional team of associates to oversee the programs introduction and progress. This team will help define environmental priorities to meet the target of a 30 percent reduction of CO_2 per million euros sales by 2025.

Sustainable Development Goals: Freudenberg Sealing Technologies focuses on eight of the 17 goals.

In this process, the company has identified several top-tier goals, which include reducing the company's use of fossil fuels, minimizing high energy consumers and finding new ways to decrease or eliminate waste.

Jandreau and her team have already defined 200 large-scale projects to implement within Freudenberg Sealing Technologies and aim to align the company's actions with the sustainability scopes of the GHG (Greenhouse Gas) protocol, which is used by many businesses to assess the impact of their emissions on the planet. These projects are on track to be completed within the next three years, helping the company meet its CO_2 reduction target and making a major contribution to reaching climate neutrality.

THE CULTURE OF CONTINUOUS SUSTAINABILITY IMPROVEMENTS

When it comes to sustainability, Freudenberg Sealing Technologies has ambitious plans, including:

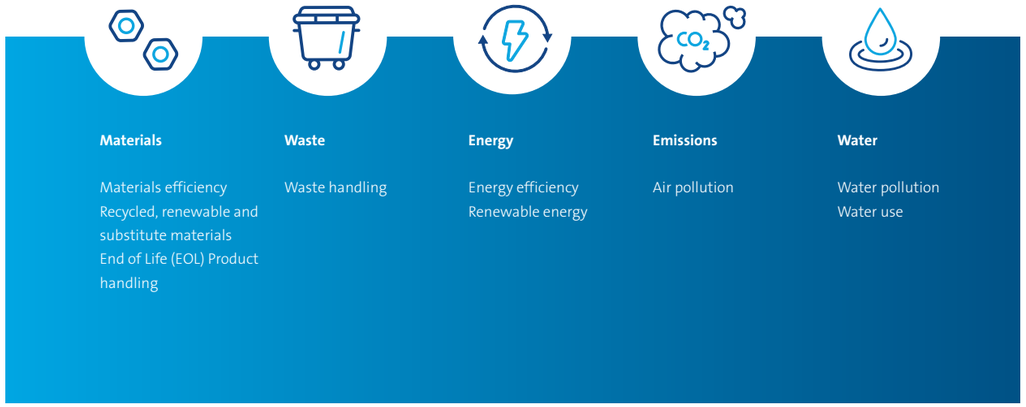
- **a 30 percent reduction in tons of CO_2 we produce per million euros sales by 2025 (using 2020 as the benchmark).**
- **carbon neutrality by 2045**
- **minimizing the use fossil fuels**
- **reducing overall energy consumption**
- **generating less waste**

To meet these goals, the company weis focusing on programs in five different areas: **energy, waste, materials, water and emissions.**

These key areas are covered by numerous campaigns and initiatives. Working closely with the Technology & Innovation teams, Freudenberg Sealing Technologies is ensuring that all existing and future products and processes are optimized to keep the company's CO_2 footprint as small as possible, while also helping customers to become more sustainable. Production processes and technologies are being upgraded to prevent high-cost raw materials from ending up as waste. This also applies to packaging materials and chemicals.

To reduce the use of fossil fuels, the company has started to convert existing installations which use oil or natural gas for heating and in manufacturing, for example, into systems using electricity. The various sites are increasingly buying green energy generated by renewable and clean technologies, such as hydropower, wind and solar systems. Freudenberg's "Be Energy Efficient" (BEE) initiative helps boost efficiency in manufacturing, warehousing and other areas. At the same time, waste reduction is leading to greater efficiency in operations and administration, which in turn helps decrease the CO_2 footprint. Preventing contaminated water and using less water overall are other environmental goals.

By now, 85 percent of Freudenberg Sealing Technologies' facilities and operations have already been electrified and are lined up to receive green energy. Waste has been reduced considerably, and the overall agenda is on track. But the company's achievements and plans for future improvements depend on more than just material performances, of course. Before major changes can be made in any business, an organizational framework must be developed to assess the transformations and implement target-oriented programs.



This is where Vicky Jandreau comes in. Jandreau has been in charge of sustainability efforts since September 2021 and is Freudenberg Sealing Technologies' Senior Vice President of Lean GROWTTH® and Sustainability, which stands for "Get Rid of Waste Through Team Harmony". GROWTTH® is the company's lean method of continuous improvement, comprising a set of tools and approaches to optimize sustainability and reduce the waste of resources. Launched in 1992, the program was initially directed towards manufacturing and later broadened to include administrative processes – the main focus of Jandreau's expertise. She oversees the evolving structure and organization of this constant change towards becoming more sustainable. This involves creating a vision, developing policies, and organizing the team-oriented implementation of the company's lean agenda.

One of the principles of GROWTTH® is to ensure that Freudenberg Sealing Technologies is a learning organization that involves every employee. This refers not only to professional development but also, among other things, to systems that help innovate, analyze and track changes. According to Jandreau, "if you can measure something, you can improve it." In other words, this lean approach requires the definition of specific targets and methodologies to assess progress towards them, along with the use of state-of-the-art tools. One example is the installation of measuring and monitoring systems at every company manufacturing site. The systems allow Freudenberg Sealing Technologies to track energy useage in each facility down to the level of an individual machine. Importantly, this project has brought standardization and transparency to the company's energy reporting. Nearly 200 projects, including large-scale campaigns, have been identified for future improvement.

> **"IF YOU CAN MEASURE SOMETHING, YOU CAN IMPROVE IT."**
>
> VICKY JANDREAU | SENIOR VICE PRESIDENT LEAN, GROWTTH® AND SUSTAINABILITY

While acknowledging that the pace required for effective changes is aggressive, Jandreau considers the goals within reach for her company and the team. "We have an established foundation for our sustainability projects in our GROWTTH® program. This is allowing us to move quickly and with clarity on implementation of projects that will lower our CO_2 emissions and increase our sustainability over the long-term. This in perfect keeping with our company's business principles."

FOUR PLEDGES

INTEGRITY, SAFETY, WELL-BEING, RESPECT: THE OTHER SIDE OF SUSTAINABILITY AT FREUDENBERG SEALING TECHNOLOGIES

The Freudenberg Group's Guiding Principles capture how a successful business should operate in a changing world. They form the basis of how Freudenberg Sealing Technologies pursues an ethical, safe, legal, and diverse work environments for its employees. Elements including Ethics, Human Rights, Working Conditions and Healthy, Safety and Environment are among the 17 elements the United Nations uses to define sustainability.

Ethics

Freudenberg Sealing Technologies abides by the Freudenberg Group's definition of business ethics as defined in its Code of Conduct. This document covers standards of conduct that are valid worldwide and is designed to ensure that ethical, law-abiding, and responsible behavior remains the cornerstone of business conduct. The Code of Conduct is available to employees worldwide in 26 languages. It has been communicated and explained to all company employees and at all levels of the company. To ensure easy accessibility, Freudenberg has developed a standardized e-learning tool on the Freudenberg Code of Conduct that can be accessed by clicking here.

The Code of Conduct was revised in 2022 to adequately reflect changes in legislation and significant developments regarding compliance standards. An updated e-learning tool that incorporates these latest changes is anticipated to be available in 2023.

Should there be question of a potential ethical violation, Freudenberg's Ethics Offices serve as a confidential point of contact for all employees and third parties to report actual or potential infringement of laws of Freudenberg's Business Principles or Guiding Principles. The option to report compliance violations via a channel that guarantees confidentiality, or to give warning of imminent offenses, is designed to foster the culture of trust and protect Freudenberg's values and principles even more effectively. Importantly, the company protects those who, in good faith, report violations.

Human Rights

Freudenberg Sealing Technologies knows that diverse teams drive innovation. A multicultural environment where employees work together in worldwide teams to enrich culture and innovation takes precedence at the company. It is devoted to the well-being of all employees, showing understanding and respect in all its dealings.

Ina alignment with the Freudenberg Group, Freudenberg Sealing Technologies upholds this social commitment by recognizing regional and country customs, laws, practices, needs and opportunities as the guides of its efforts. Discrimination and exploitation of vulnerable people is explicitly prohibited anywhere.

A particular focus for Freudenberg Sealing Technologies is balanced gender distribution, where special attention is paid to the hiring process, the early identification of female talent, the targeted career promotion of women into top leadership positions, and the targeted networking of women within the company. The company has also defined several racial diversity measures, such as support for various institutions and programs that are especially devoted to the advancement of minorities.

Health, Safety and Environment

As a global corporation, Freudenberg Sealing Technologies is committed to the health and safety of its employees. This commitment not only encompasses, clean, safe facilities but access to training and information as well. The company relies upon a vigorous culture of lean and continuous improvement that ensures changes occur through standardized and documented channels.

Safety in the workplace is a priority, supported by training, an annual safety week and company recognition and capture of best safety practices. Ergonomic equipment and automated processes are used, where feasible, to further enhance the workplace and working experience of company employees. Health programs an integral part of plant employment focusing on everything from weight loss and smoking cessation to heart health, emotional and mental health assistance, social activities such as walking programs and preventative care.

Freudenberg Sealing Technologies also embraces environmental efforts to keep plants clean, well-organize, climate controlled and well-marked for safety purposes. Personal protective gear is always mandatory on the shop floor and aisles are marked to separate forklifts and other moving equipment from employees.

Working Conditions

When it comes to workforce development and creating healthy, positive working conditions, Freudenberg' Sealing Technologies is focused on talent acquisition and helping targeted groups of employees feel welcome and productive in their working environment. A competitive pay and benefits package is only part of the value Freudenberg Sealing Technologies can offer individual employees.

In alignment with the Freudenberg Group, Freudenberg Sealing Technologies takes part in the Group's talent management program. Company employees are offered numerous vocational trainings, advanced training, and professional development programs at all experience levels.

Training options range from two-year technical programs to commercial courses and dual studies at cooperative universities. In recent years, the Freudenberg Training Center has specialized in digitalization topics and is an acknowledged learning hotspot for both vocational training and continuing education. Freudenberg's talent management process also focuses on identification and advancement of high potentials.

GREEN HEAT FROM LOCAL WOODCHIPS

THE FACILITY AT OBERWIHL IN SOUTHERN GERMANY HAS TURNED INTO A PIONEERING ENERGY SAVER THAT WILL USE WOODCHIPS TO REPLACE HEATING OIL

When you are surrounded by trees, it makes sense to heat with wood. Located in Germany's southern Black Forest, the Oberwihl site is where Freudenberg Sealing Technologies produces more than a billion O-rings for everything from electric toothbrushes to luxury watches. Now the plant is amping up its energy efficiency by using a local resource – wood.

Already known as a facility with leading-edge energy management, it is investing about 1.2 million euros in a green heating system that uses woodchips and a combined heating and power unit. With these most recent efforts towards sustainability, the site is on track to save nearly 600 tons of CO_2 a year, in a step that is welcomed by the management. Hans Bruno Haenle, CFO of the O-Ring Division, emphasizes the importance of investing in climate protection measures: "We are noticing that more and more of our customers want to sell climate-neutral products, so we have to move forward, but in a way that we are working sustainably in an economic sense."

The overall reorganization of the site's energy management was already underway before the coronavirus pandemic temporarily slowed it down. Three priorities for optimization were identified: One, to continue enhancing energy efficiency; two, to reduce the consumption of fossil fuel heating oil as much as possible in heating the entire plant; and three, to utilize decentralized systems to generate as much green energy as economically feasible.

A factory expansion in 2015 already resulted in significant improvements at the site. The new developments included systems to recapture heat in the building's climate control unit and the installation of an energy monitoring system to track the energy consumption of individual manufacturing areas. The smart electric meters spread throughout the production areas provide data on the current consumption at 15-minute intervals. This has made it possible to implement demand-side electricity management where certain machines can be temporarily paused to avoid exceeding limits.

The upgrades did not stop there. Instead of continuing to use fossil fuel oil to heat the plant, it was time to rethink the entire heating process and utilize its regional advantages – in the form of woodchips produced by the Black Forest timber industry.

The invested funds are going towards two furnaces that will be equipped with an automatic filling system and jointly produce more than 600 kilowatts of heat from biomass. There will also be a cogeneration unit to burn the woodchips. Together, the new systems will cover the basic heating load over an entire year. And this development does more than just create heat. It also generates 20 kilowatts of electricity that will be fed into the facility's operating network.

"By converting the heating technology from oil to biomass, that is, with wood as a fuel, we avoid about 425 tons of CO_2 per year, while saving money on energy costs," Haenle says. "The payback period is projected to be somewhat longer than usual. But we accept this because it is an investment in sustainability."

Once the new heating system is up and running, a small, combined heat and power plant could be added to the site to increase heating from woodchips even further. This would diminish the heating oil consumption by up to 96 percent compared to its previous levels.

It is no wonder that when the Freudenberg Group selected two plants to demonstrate its climate neutrality in 2019, Oberwihl was a top contender. While it continues its output of O-rings, the plant's proactive elimination of fossil fuels is proceeding at a rapid pace.

Energy

Emissions

7 AFFORDABLE AND CLEAN ENERGY

We plan to secure access to reliable, modern and affordable energy for all our locations. Around the world, completely different conditions prevail for procuring clean energy. Where possible, we are concluding long-term contracts that guarantee a supply of clean energy.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

The value of a robust infrastructure to an industrial company is obvious. We practice sustainable industrialization with ongoing investments in existing and new plants. Our products are used in large industrial projects.

SUSTAINABILITY CONTRIBUTION

BIG IMPACT THROUGH SMALL CHANGES

WITH THOUGHTFUL FIXES AND UPGRADES, THE NORTH SHIELDS SITE IN THE UK IS ON TRACK TO STEADILY LOWER THE CARBON FOOTPRINT IN ITS PLANT

Small steps for a big win – the North Shields facility of in England has succeeded in lowering its energy consumption and thus its CO_2 footprint. By taking a closer look at energy use around the plant and making relatively minor changes, this Freudenberg Sealing Technologies site has become significantly greener.

One major issue, especially in colder climates like that in the UK, is how to heat factory halls with high ceilings. Hot air rises, which means heat that is generated with a high output of energy ends up being wasted as it sits below the ceiling. At the facilities in North Shields, this problem was solved with destratification fans, which have two functions: They direct air away from the roof to prevent heat loss upward and equalize the temperature by moving air down into the work area. The conserved heat far outweighs the energy consumed by the fans and leads to a reduction in CO_2. The "air mixers" are used even in the summer. Hot air is drawn off through efficient roof ventilators, reducing the need to cool the halls with air conditioners.

Improving the air movement to control temperature is just one example of the upgrades at the plant. Energy-consuming equipment was tested for efficiency and either optimized or replaced with higher-performing technologies. Heating is now provided by modern condensation boilers. High energy-consuming floodlights and fluorescent bulbs have been replaced with more environmentally friendly lighting technology or, in some cases, eliminated altogether. Modern sensors ensure that lights are only switched on when they are actually needed.

The North Shields site has also set up an energy monitoring system to ensure that these upgrades have a maximum impact. This system enables the staff to detect waste and optimize equipment settings as well.

In addition to conserving energy, North Shields is making strides in optimizing the efficiency of its workforce. It is using two AMRs, Autonomous Mobile Robots, as driverless transport systems to move materials between the manufacturing area and warehouse racks. The autonomous units collect individual items and deliver them to specific stations, using technology that is still in its development stages. They even communicate with production machinery, which can autonomously call the robots if they need more components. "Before the introduction, employees had to do that. It took ten minutes per machine and per shift," says Martin Sims, Process Development Engineer at North Shields. In total, this came to more than an hour and a half of work per person, which can now be directed towards value-creating activities. The savings in terms of time and resources result in higher production efficiency – another step towards improving sustainability.

For the future, this Freudenberg Sealing Technologies site is considering further optimizations, such as using heat pumps. Instead of generating warm air from natural gas, a fossil fuel, the pumps extract the heat from the environment to keep the work areas comfortable and heat water. Other options under consideration are to heat the spaces by using hot exhaust air from compressors and replacing its thermal oxidation technology with a biological approach. The facility also plans to generate heat through photovoltaics and buy "green" electricity in the future.

So far, the measures at the North Shields plant have already added up to significant changes. As measured in kilowatts hours per manufactured part, the site's energy consumption was significantly lower in 2021 than during previous years and actually below the target levels. Natural gas use for heating was reduced by almost two-thirds in the last seven years and electricity consumption declined more than half during the same time. And it only took three years to cut the water consumption in half. With this momentum, there is every indication that the facility's carbon footprint will continue to shrink.

13 CLIMATE ACTION

The industrial sector accounts for a high proportion of greenhouse gas emissions. Freudenberg is reducing its CO_2 emissions relative to sales by 25 percent by 2025. By 2045 at the latest, we want to be climate-neutral in terms of Scope 1 and 2, and we are adopting crucial measures to do this: first, maximizing energy efficiency and reducing our energy consumption; second, electrifying our energy supply; third, using green electricity, and fourth, offsetting the CO_2 emissions that are still unavoidable.

SUSTAINABILITY CONTRIBUTION

TILLSONBURG SAVVY: HOW CHANGES TODAY CAN IMPACT TOMORROW

FREUDENBERG SEALING TECHNOLOGIES' TILLSONBURG PLANT IN CANADA IS LOCATED IN A REGION OF ABUNDANT CLEAN ENERGY. BUT THE PLANT IS STILL MAKING STRIDES TO REDUCE ITS ENERGY CONSUMPTION.

As the most populous and manufacturing-heavy province in Canada, Ontario is also home to an abundance of natural resources. The combination of these factors has resulted in the provincial government adopting several sustainability goals to help keep the region thriving in a responsible way. Among those goals: achieving CO_2 neutrality before 2035 and Net Zero emissions by 2040.

Currently, the energy that powers Ontario is derived from a trio of renewables, including zero-emission nuclear power (51%), hydroelectric power (39%) and renewable resources such as wind and solar (10%). The Tillsonburg facility is automatically powered via this combination of energy resources under the umbrella of the province's sustainable energy initiatives. But even in this eco-aware environment, the plant is focused on taking active strides to improve its emissions and energy consumption numbers.

According to Terry Chute, Tillsonburg's Health and Safety Manager, the facility is dedicated to maximizing its existing sustainable operational measures while actively pursuing new ways to further improve. "Based on Ontario's energy mix, we come out pretty good on CO_2 emissions as a whole," Chute said. "But we are still being encouraged by the province to decrease the amount of electricity we use."

According to Chute, the team at Tillsonburg has undergone multiple efforts to reduce energy usage, starting with the combination of the plant's two cooling units into one.

Previously, the plant had a cooling system for its Liquid Silicone Rubber (LSR) molding cell and a system for the rest of the plant. This two-set chiller arrangement doubled the cost of maintenance and increased the plant's overall energy costs. By removing the LSR cell-dedicated chiller and connecting the other chiller to the main HVAC system, the plant reduced maintenance costs, reduced the amount of glycol it was purchasing, and was able to reconfigure the entire system to capture waste heat from the chiller to use as plant heat in the coldest months of the year.

Tillsonburg also saw opportunities for efficiency and savings by reducing the number of variable speed pumps from four to two. The facility's original pumps ran at 10HP and operated in a constant-on state no matter the amount of demand. The two new pumps can run at a variable frequency based on demand specifics at 7.5HP.

Chute and his team also removed the liquid-cooled compressor that had served as the backup unit for the plant's main air compressor and upgraded it to GA22VSP variable speed air compressor. This upgraded setup allows heat flowing out of the compressors to be collected and used to help heat the adjoining tool shop. Electrical and heating costs have dropped as a result. The team also created a maintenance plan for the compressors to prevent air leaks and keep the entire system running efficiently.

"Initiating these types of changes is an important step but without proper maintenance and oversight, you won't get the results you're aiming for," said Chute. "Looking at these improvements from a full lifecycle perspective is key, not just from the initial implementation perspective."

Tillsonburg implemented other sustainability activities, as well. By replacing all the existing lights in the facility with LED lighting that included automatic off/on sensors, the plant cut its electricity usage by more than 259,000 kWh and is now realizing a $40,000 cost savings annually. "While the initial investment in LED lighting does come with a cost, it more than pays for itself when used correctly in less than two years' time," said Chute.

Installation of a smaller steam autoclave, which requires less steam to fill and maintain pressure during operation, and replacement of fabric hand cutters with an automated cutting machine that reduces engineered waste by nearly 20%, are also helping Tillsonburg save energy and other costs. Even with all these improvements, Chute says that Tillsonburg is still thinking ahead to the next series of improvements it can make to help lower emissions.

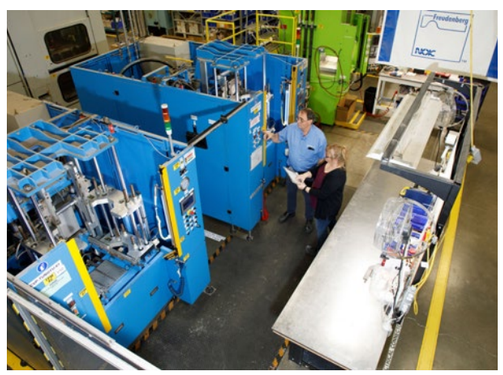
"We've got more plans in process to further improve our HVAC, curing oven and boiler operations," said Chute. "It's important for us to look for ways to reduce across all areas of our facility. "When you calculate the collective savings these efforts represent, it's easy to see how small changes can quickly add up," he concluded.

SUSTAINABILITY CONTRIBUTION

13 CLIMATE ACTION

13 CLIMATE ACTION

The industrial sector accounts for a high proportion of greenhouse gas emissions. Freudenberg is reducing its CO_2 emissions relative to sales by 25 percent by 2025. By 2045 at the latest, we would like to be climate-neutral in terms of Scope 1 and 2, and we are adopting crucial measures to do this: first, maximizing energy efficiency and reducing our energy consumption; second, electrifying our energy supply; third, using green electricity, and fourth, offsetting the CO_2 emissions that are still unavoidable.



OPPOSITE APPROACHES TO WAREHOUSE WASTE WINS

TWO FREUDENBERG DIVISIONS HAVE TAKEN EXCESS PACKAGING TO HEART AND HAVE REDUCED THEIR USE OF CARDBOARD AND PLASTIC IN SHIPPING. THE EFFORT ELIMINATES TONS OF CO_2 FROM THEIR FOOTPRINTS.

When it comes to waste, Freudenberg Sealing Technologies takes a comprehensive approach. From engineered waste to plastic drinking bottles, facilities across the company have implemented programs to eliminate waste before it is generated and reuse or recycl materials after they have been produced.

Reducing packaging is scope 3 and has no effect on Scope 1 and 2 target. Recently, though, two company divisions – the Industrial Services Division and Corteco – have taken waste reduction to a new level by reducing the amount of plastic and cardboard used in their warehouse operations. Although they have taken different paths, the results are equally impressive.

Employees at the Industrial Service Division's Hamburg, Germany site began analyzing their warehousing and shipping activities to see where they could contribute to the company's CO_2 reduction activities. What they found was a tremendous potential for savings.

Despite a trend towards smaller-scale shipments, plant workers found that even the smallest shipping boxes being used were too big. "Along with our products, we are sending our customers a lot of air,"' said ISD Manager Kristof Kurth. Furthermore, the boxes were filled with bubble wrap to prevent shipping damage.

The solution was as simple: For small orders, Kurth and his colleagues replaced the boxes with environmentally friendly mailers. Small orders account for about 30 percent of the 80,000 shipments from the Hamburg distribution center each year. They now use just 25 % of their old shipping volume – a whopping 75 % reduction.

The remaining 25 % are now packed using plastic-free boxes. Instead of bubble wrap, employees are now using recycled paper to protect items.and They are using paper adhesive tape, which is more sustainable, and plastic-free document sleeves on the mailers.

"Taken together, the changes mean less waste, no plastic trash, lower costs for transport and for shipping material, and CO_2 reductions of about 3 tons per year," said Vice President RBU & Export, Jan Witte. Even better, Hamburg's success is encouraging other sites and Divisions to follow its lead. The company's Opatovice, Czechia Simmerring facility, for example, has launched a similar effort to cut its use of cardboard and plastic bags.

Waste

Material

The company's Corteco Division is also making a huge dent in the elimination of plastic from its shipments. Corteco is one of the world's leading providers of components for the independent automotive aftermarket. It distributes more than 26,000 types of OEM-quality products across 15 countries. In line with the sustainability efforts of Freudenberg Sealing Technologies, its main distribution center in Hirschberg, Germany, initiated pioneering changes to reduce the company's carbon footprint.

Until recently, the site was using 400,000 plastic bags annually to separate and package small quantities of its products. Although the items were already encased in packaging on the shelves, the extra bags were used to help customers simplify the separation of components in orders that might include hundreds of products. Elimination of the extra bags was the goal.

The solution lay in organizing the warehouse according to product categories and picking items accordingly. The site now fills every order using a prescribed route. The heaviest items go on the bottom of the box Then the lightweight components are added.As a result, all items in a single product group are automatically packed together in a large shipping carton, making it easy for customers to locate and sort their orders. The new organization and packing process eliminates the use of extra plastic bags. It's a win-win – especially for the environment.

Corteco has greened its work in other areas as well.Its sustainability initiative has recently focused on its entire transport chains. To deliver products from Hirschberg to Pinerolo, Italy, the supplier has switched from road to rail, which prevents the emission of nearly20,000 tons of CO_2 annually.

7 AFFORDABLE AND CLEAN ENERGY

We plan to secure access to reliable, modern and affordable energy for all our locations. Around the world, completely different conditions prevail for procuring clean energy. Where possible, we are concluding long-term contracts that guarantee a supply of clean energy.

13 CLIMATE ACTION

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SUSTAINABILITY CONTRIBUTION

A CREATIVE SOLUTION TO A GLOBAL PROBLEM

FREUDENBERG SEALING TECHNOLOGIES' PLANT IN KUFSTEIN, AUSTRIA, HAS ADDRESSED AN IMMINENT TALENT CRUNCH BY ESTABLISHING A BRAND-NEW OCCUPATION WITH SPECIALIZED TRAINING

The year 2030 is coming up fast – and with it, a shifting economic power balance caused by the shortage of highly trained workers, unless this trend is counteracted at full speed. According to a study by the consulting firm Korn Ferry, that is the year in which the demand for specialized employees will exceed supply by more than 85 million workers, with dramatic results for the global economy.

Skilled workers in the business, technology and manufacturing sectors are essential drivers of global economic growth. Even now, countries with thriving manufacturing sectors are increasingly turning to automation to compensate for the lack of highly trained employees. While this imminent talent shortage is currently being addressed by businesses worldwide, many remedial programs are still in the experimental stages. Freudenberg Sealing Technologies' facility in Kufstein, Austria, however, has already made great strides.

The plant has been dedicated to the development of its workforce and its social commitment for years. For example, it received Freudenberg's "We all take care" award in 2015, after employees launched their "Embrace" initiative to assist young refugees with their integration into Austrian society. The facility's employee training efforts have been particularly innovative – to the point of creating an entirely new occupation.

The projected global talent crunch affects not only the currently practiced professions. Even more urgently, companies need to prepare for future staffing needs caused by snowballing innovations, discoveries and expansions in technology, engineering and other sectors. Manufacturing is one of the areas where developments to improve sustainability and efficiency are increasing exponentially, branching into robotics, AI and other future-oriented fields. This in turn creates highly specialized jobs not just in production but also administration, logistics and measuring. Without people to fill these jobs, the company's growth is impeded.

Recognizing this urgent need, Freudenberg Sealing Technologies' Kufstein facility found an extraordinary solution. The company developed a high-skill occupation in its area for measurement and testing: manufacturing metrology technician. And this is not just a single specialized position at one plant – Freudenberg went so far as to initiate an official job category and training program for Austria.

Daniel Stocker, Team Leader at Measurement and Testing Technology at the plant, came up with the idea after considering the reality of the impending talent crunch. "At our site, the average seniority is thirteen years. Our long-time employees have continued to build up their skills over the years to meet growing requirements," he says. "But if they resign or retire, it is hard for us to fill in the gap. The few applicants with the right training and practical experience are also being pursued by other companies."

As a solution, Stocker invented an occupation that would closely align the training with real-life procedures at the company while also adding skills for automation and other future technologies. He focused on industrial metrology, an essential component in providing data on product quality and the foundation for many successful production processes. Thus, the job of "manufacturing metrology technician" was born. "There is a need for well-trained employees who can properly and efficiently measure the increasingly complex technical drawings with increasingly complex measuring devices," Stocker explained. "Hopefully, the training as a manufacturing metrology technician is the beginning of a change that also includes a better understanding of the value of this profession."

Tanja Hofer, the trainee coach in Kufstein, presented the initiative to the Vienna Chamber of Commerce, where the proposal was surveyed, unanimously welcomed and approved. Hofer and Stocker then collaborated with representatives from other laboratories and companies to define the job parameters and training content. As the final step, the Chamber of Commerce submitted the proposal to the Austrian ministry for approval. In July 2020, Austria's new high-skill occupation with a four-year training program became official.

In October 2020, Freudenberg employeed its first trainee as a manufacturing metrology technician, Cara Mia Pesta. With her pioneering work in this field, Pesta is quickly contributing to the facility's productivity – in a job that did not even exist a few years ago.

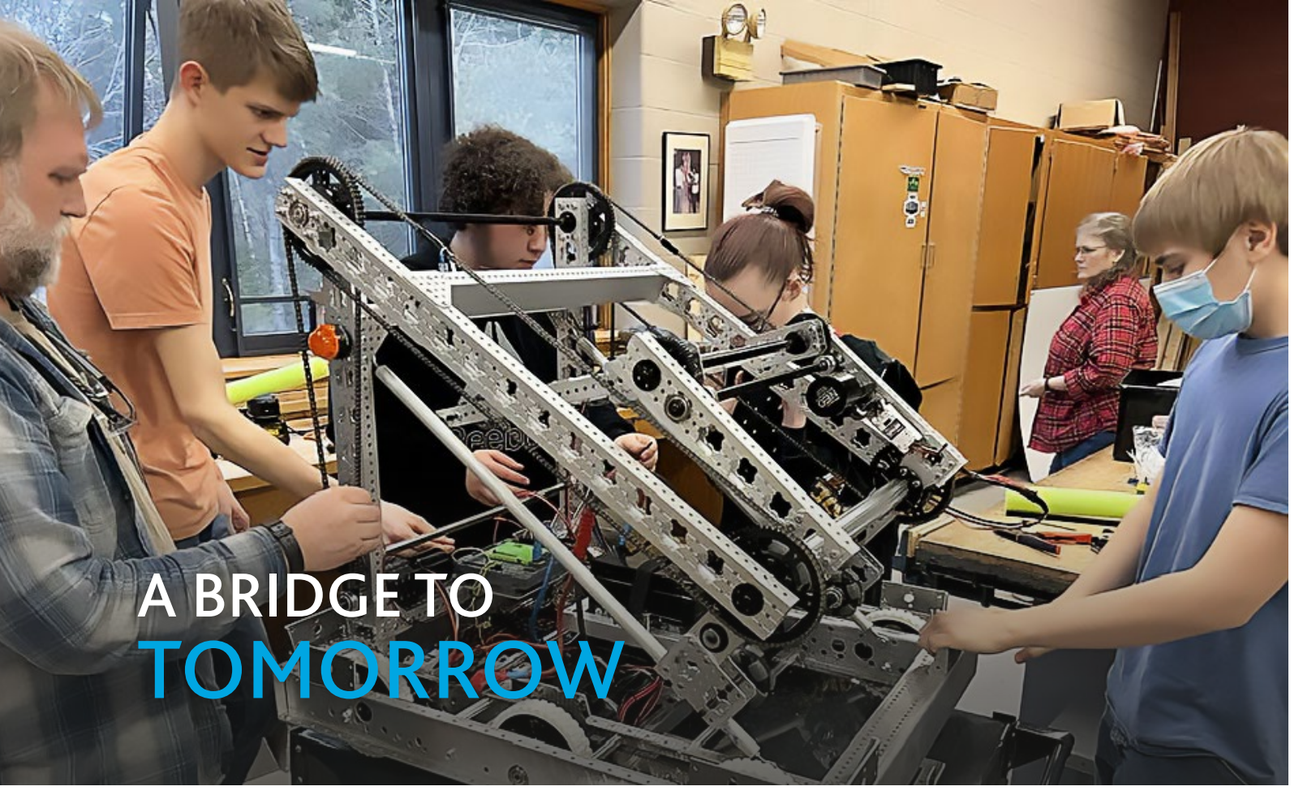
4 QUALITY EDUCATION

Demographic changes in Europe will make shortages of skilled employees likely in the future. Other continents have overwhelmingly young populations. In either situation, we rely on robust training courses. We promote lifelong learning for our employees with many training and continuing education courses.

10 REDUCED INEQUALITIES

Diversity is anchored in the Group's Values and Principles. With a range of initiatives, Freudenberg supports a work environment where everyone is valued, respected and heard. Special attention is paid to a balanced gender distribution in which women can strive for targeted career development leading to top leadership positions.

SUSTAINABILITY CONTRIBUTION



A BRIDGE TO TOMORROW

FREUDENBERG SEALING TECHNOLOGIES INVESTS IN PROGRAMS THAT HELP STUDENTS DEVELOP CURIOUS MINDS AND COMPANY AWARENESS AS PART OF A FUTURE WORKFORCE.

There are many sides to Freudenberg Sealing Technologies' commitment to investing in the future of young people. Education and continuous learning are one of the United Nations' 17 Sustainable development Goals. And coming on the heels of a global pandemic, which isolated children, shuttered schools and eliminated hands-on learning opportunities for students around the world, education and continuous learning are more important than ever before.

In alignment with the Freudenberg Group, which has been a strong proponent of training and education initiatives for decades, Freudenberg Sealing Technologies has undertaken a wide variety of programs that provide scholarships and funding, paid engineering internships, equipment donations and even, on occasion, student housing. At the company's Santa Ana manufacturing facility in California, for example, efforts to keep the talent pipeline full have been in place for nearly a decade and involve career planning and training in fields such as Maintenance and Process Technology.

In every educational initiative supported, the company is building a relationship – a potential bridge to a more exciting future through manufacturing. The company supports Freudenberg Group initiatives such as e2, a program that allows employees to nominate educational and environmental nonprofits for funding and support. Career days, recruiting fairs and plant tours are also in the mix when it comes to making connections.

While the culture of innovation practiced at the company is a natural draw for curious students with technical affinities, the offer of funding, equipment, and hands-on experience is crucial to making the natural draw grow. In many cases, robotics has been a connecting point. When the company's site in Cleveland, Georgia, donated robots to students in the STEM Club of a local elementary school, it became one of the factors leading to the facility being awarded a Georgia Emerging Automotive Recognition (GEAR) Award for Citizenship in 2020. And at the Freudenberg Sealing Technologies' Ashland, NH, facility, lending support at robotics competitions for high school students has been a game changer.

Finding students to participate in apprenticeships doesn't always require an intermediary or red tape. In Ashland, the company financially supports the robotics team at Newfound High School – which is also the alma mater of two employees, Benjamin Learned, Human Resources Manager and Dillon Therrien, Lean/Digitalization Manager. In this close-knit community, the interactions between students and company representatives are informal, fun, and designed for the long term. Therrien, who himself started at the company as an intern and is now part of the plant's management team, often visits the high school, helps build robots and attends competitions with the team. The students in turn come for site visits and to get firsthand experience at the plant.

"A lot of companies have the ability to provide financial support," says Learned, "but what's cool is that we're also there in person, helping. Not only are we very generous in terms of the actual dollar amount, it's also about the contact that our team has with the students." And this clearly pays off: In March 2023, the robotics team supported by Therrien won the UNH District Event award at the FIRST Robotics Competition hosted by the University of New Hampshire. "That was really exciting for the students," Therrien says.

Is it possible for initiatives conducted at a close community level to make to make a deep impact? No doubt, according to Learned and Therrien. "We feel that exposure to the diverse types of careers within manufacturing boosts our ability to attract talent, and also positively impacts the likelihood of skilled labor planting their roots in New Hampshire," Learned says. "Developing those relationships early on helps us out tremendously in the long term."

Other Human Resources Managers agree. "The company benefits when the students are encouraged to look at the company a whole and seek opportunities that might fit them, even if these positions are not located in Cleveland," noted Tiffany Carson, Human Resources Manager in Cleveland.

In Shelbyville, Ind., where the company recruits from three major universities to fill positions in Manufacturing Engineering, Product Design Engineering and Lean Manufacturing, the benefits of these efforts extend beyond the local site, agrees Heather McMullen, Human Resources Manager at the plant. "We are helping to fill the skills gap left by the last generation that pursued higher education rather than enroll in technical or trade schools," she said. "The community at large benefits as we create a more positive and relatable view of manufacturing for entry level positions."

SUSTAINABILITY CONTRIBUTION

4 QUALITY EDUCATION

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BY THE NUMBERS

Companies have relied on metrics to track their performance and growth for decades. Key Performance Indicators (KPIs), when standardized and consistent in how they are calculated, provide a numerical report card that allows companies to compare their own performance against other businesses and even between different sites within their own operations.

To that end, KPIs that track Freudenberg Sealing Technologies' sustainability initiatives are crucial for mapping the company's progress and growth in this critical area. Freudenberg Sealing Technologies has installed the Enablon data system to standardize and streamline KPI data collection within the company. Now that the system is up and functional across manufacturing sites, Freudenberg Sealing Technologies has been able to establish a baseline for tracking its sustainability progress. Going forward, these are the numbers to beat:

2022 Freudenberg Sealing Technologies' sustainability KPIs

420 GWh

Total energy used (GWh)

39 %

Share of Renewable Electricity

0.17 kWh/€

Energy Efficiency kWh/€

38.0 kt/Mio.€

Kilo Tons CO_2/Mio.€ Sales

11.9 tWaste/Mio.€

Tons Waste/Mio.€ Sales

Freudenberg Sealing Technologies Enablon database

More about sustainability at Freudenberg Sealing Technologies: https://www.fst.com/corporate/company/sustainability/

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