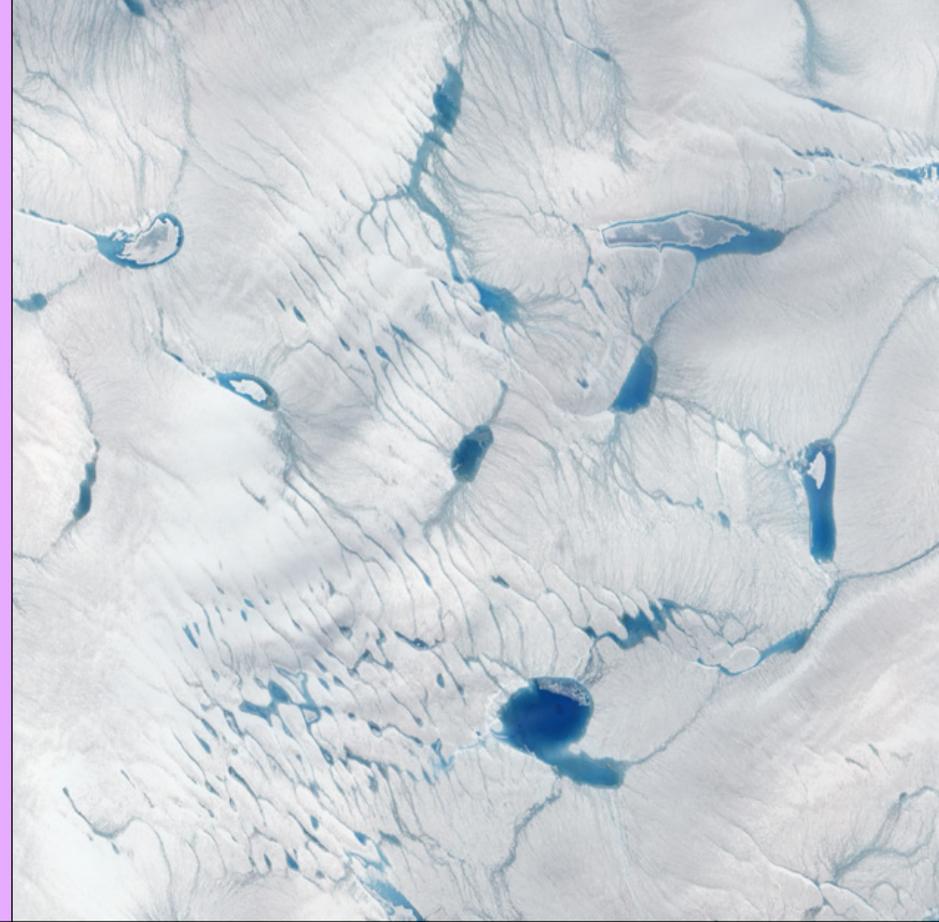


# SUSTAINABILITY REPORT 2021



**TOPSOE**

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STAY  
INFORMED



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## ABOUT THIS REPORT

This Sustainability Report covers relevant and significant environmental, social and governance activities for the 2021 calendar year for Haldor Topsoe A/S, complementing Topsoe's Annual Report 2021. It also serves as a supplement to our statutory disclosure on corporate social responsibility, sections 99a, 99b and 99d of the Danish Financial Statements Act.

Unless otherwise stated, sustainability data include consolidated data from Haldor Topsoe A/S and subsidiaries controlled by Topsoe.

Visit → [topsoe.com](https://topsoe.com) for previous reports.  
Contact us via → [sustainability@topsoe.com](mailto:sustainability@topsoe.com)

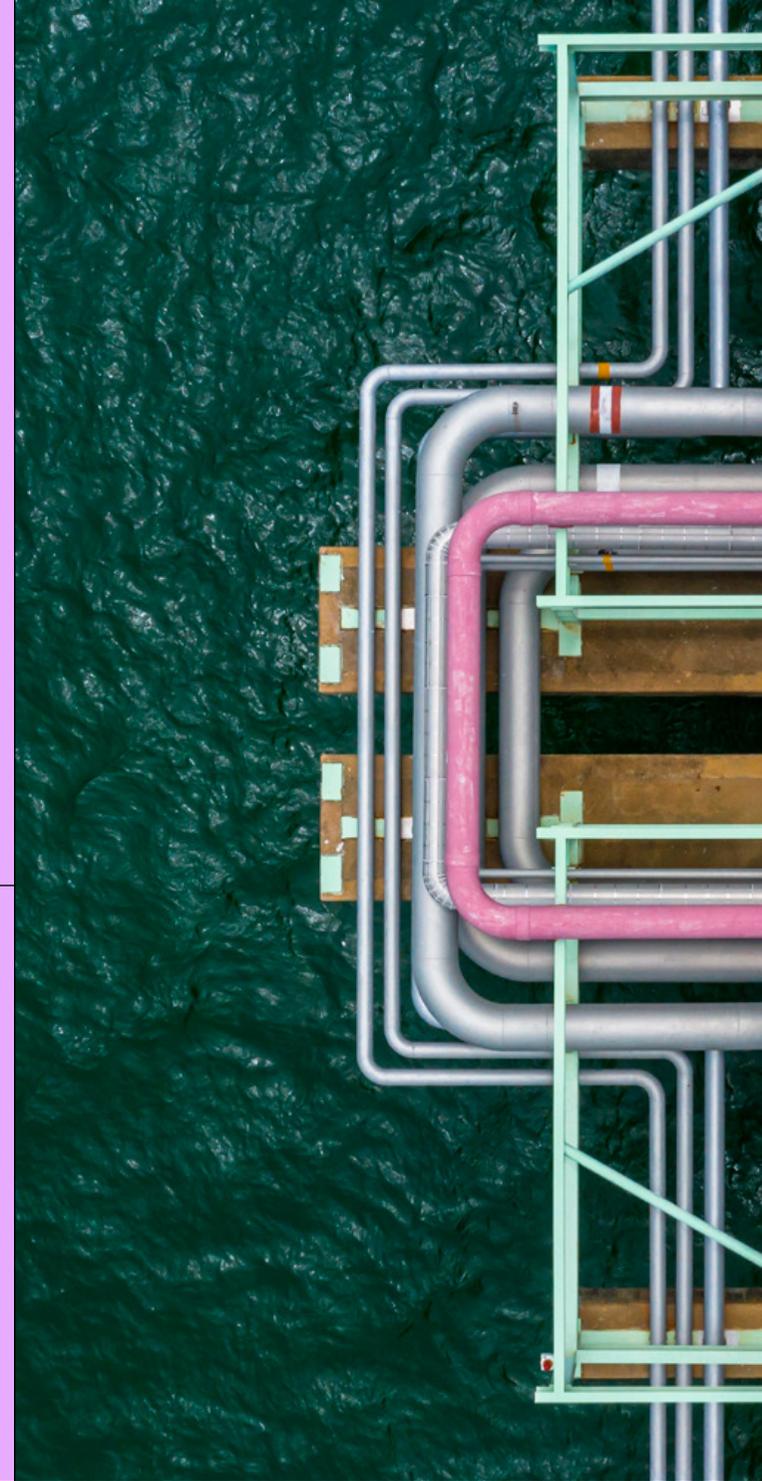


This is our **Communication on Progress** in implementing the Ten Principles of the **United Nations Global Compact** and supporting broader UN goals.

We welcome feedback on its contents.

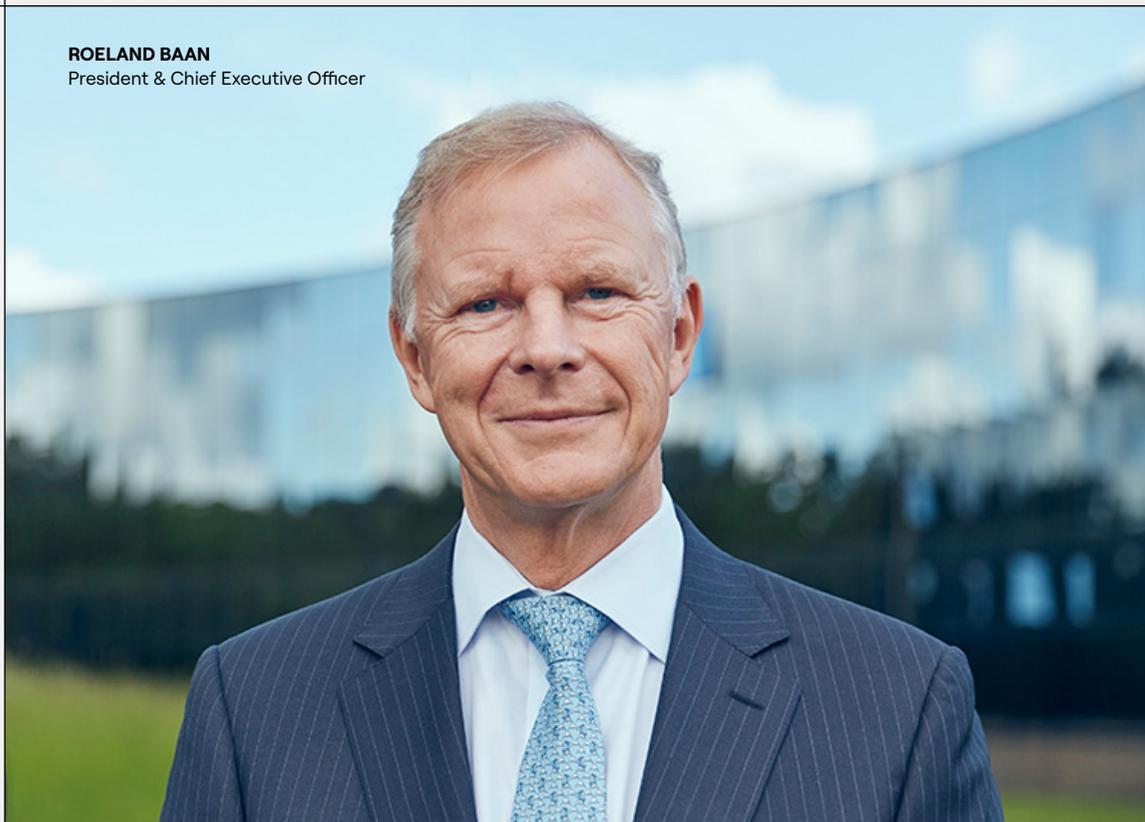
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# LEADING TOWARD ZERO

**ROELAND BAAN**  
President & Chief Executive Officer



The climate challenge is as real as ever. 51 billion tonnes of greenhouse gases are what the world adds to the atmosphere every year. That is the challenge we are facing. Our company vision for 2024 is to be recognized as the global leader in carbon emission reduction technologies.





It is our ambition to achieve net zero greenhouse gas emissions in our own operations within this decade (scope 1 & 2).

We are uniquely positioned to help society reduce carbon emissions and address climate change. Over decades, we have gained superior skills and expertise from developing technology, supplying catalyst, and improving energy efficiency for the chemical and refining industries. This strong legacy provides us with an unrivalled platform on which we are building our new low-carbon and zero-carbon solutions.

Overall, 2021 was a good year for Topsoe where we – despite of COVID-19 impacts – delivered a strong financial performance and continued the strategic transformation of Topsoe that we initiated in 2020. During 2021, we have developed new solutions and successfully put some into play. We have entered into a series of partnerships to jointly facilitate the future production of green hydrogen, green ammonia, green methanol, and eFuels. We launched our new strategy outlining how we will achieve our vision. And we established a dedicated Power-to-X organization to be even better positioned to drive the energy transition in hard-to-abate sectors.

#### **NET ZERO OPERATIONS WITHIN THIS DECADE**

Alongside our quest to help customers reduce their carbon emissions, we are also committed to reducing our own footprint and setting ambitious climate targets in line with our commitment to the Science Based

Target initiative. In 2021, we emitted 23% less greenhouse gases than in 2019. In 2022 we aim to achieve 25% absolute reduction. It is our ambition to achieve net zero greenhouse gas emissions in our own operations within this decade (scope 1 & 2). We are also working on finalizing our net zero ambition for our entire value chain (scope 3). More to come on that in 2022.

#### **IMPROVED SAFETY PERFORMANCE**

We have strengthened the overall safety culture in Topsoe, ending the year with a total recordable incident frequency (TRIF) result of 0.7, compared to 0.9 in 2020. I am proud to say that since 2018, we have managed to reduce incidents by 50%. This is the result of focused efforts to establish a Zero Harm mindset across the organization.

#### **SUSTAINABILITY IN OUR DAILY WORK**

In the past year, we have made important progress in the way that we work with sustainability at Topsoe. I have seen many examples during the year of how we have accelerated, broadened and deepened our efforts to become a more sustainable business. To ensure that we stay the course, we took a fresh look at our sustainability priorities and developed a new sustainability framework including new ambitions within safety, climate, diversity and engagement.

In this report, you can read about the policies, due diligence processes and

systems we have in place to manage and mitigate our most material social, environmental and governance risks.

#### **LOOKING AHEAD**

In the coming year, we stay committed to embedding the UN Global Compact's ten principles into everything we do, and we continue the implementation of our net zero action plans and dive deeper into measuring our impacts – especially within climate. We will also strengthen our safety program for contractors and make a review of our existing human rights due diligence practices to ensure a solid foundation.

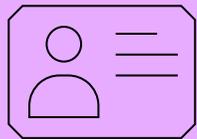
A special thanks to my colleagues, Topsoe's employees. None of the achievements of the past year would have been possible without your passion and dedication.

#### **ROELAND BAAN**

President & Chief Executive Officer

# TOPSOE AT A GLANCE

Topsoe is a leading developer and provider of solutions and technologies to produce fuels and chemicals essential to the energy transition. For more than 80 years, we have been perfecting chemistry to help industries produce more efficiently. Today, it is our ambition to lead the global transition of heavy industry and transport toward a zero-carbon future.



**2,133**

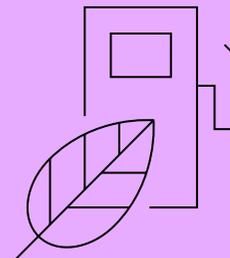
employees

**6,225**

in revenue  
(DKKm)

**903**

EBIT before special items  
(DKKm)



**#1**

in renewable diesel

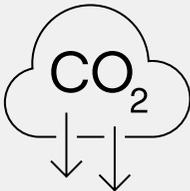
**9%**

of revenue  
invested in R&D

**#1**

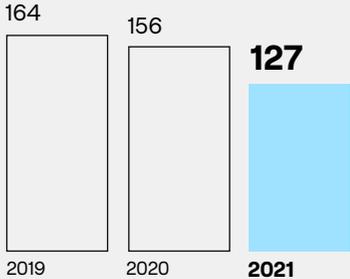
in ammonia

# PERFORMANCE HIGHLIGHTS 2021

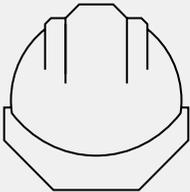


**127**

Carbon footprint  
Scope 1 & 2

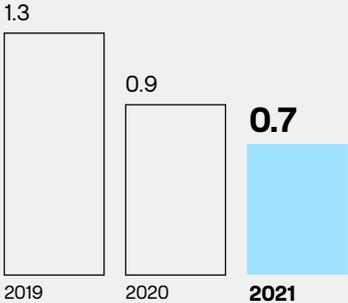


Thousand tonnes CO<sub>2</sub>e



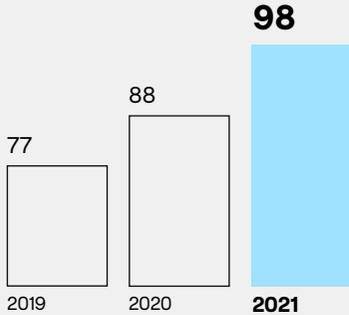
**0.7**

Safety



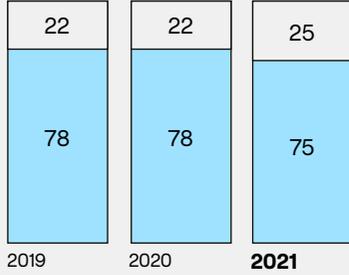
Total recordable incident frequency (TRIF) per 200,000 working hours

## Code of Conduct training



Completion rate (%) among Board members and employees

## Diversity – managers



○ Women (%) ● Men (%)

## OUR PURPOSE

# PERFECTING CHEMISTRY FOR A BETTER WORLD

Leaving the world in a better shape for future generations is what drives us – and our purpose ‘Perfecting chemistry for a better world’ is what guides us.

For decades, Topsoe has helped solve some of the world’s toughest challenges. Our ammonia solutions are used to produce fertilizers, which has helped feed growing populations. Other of our technologies help limit air pollution by reducing sulfur and other pollutants from fossil fuel emissions to environmentally safe levels – for the benefit of environmental stability and public health. Today, we focus on the climate challenge.



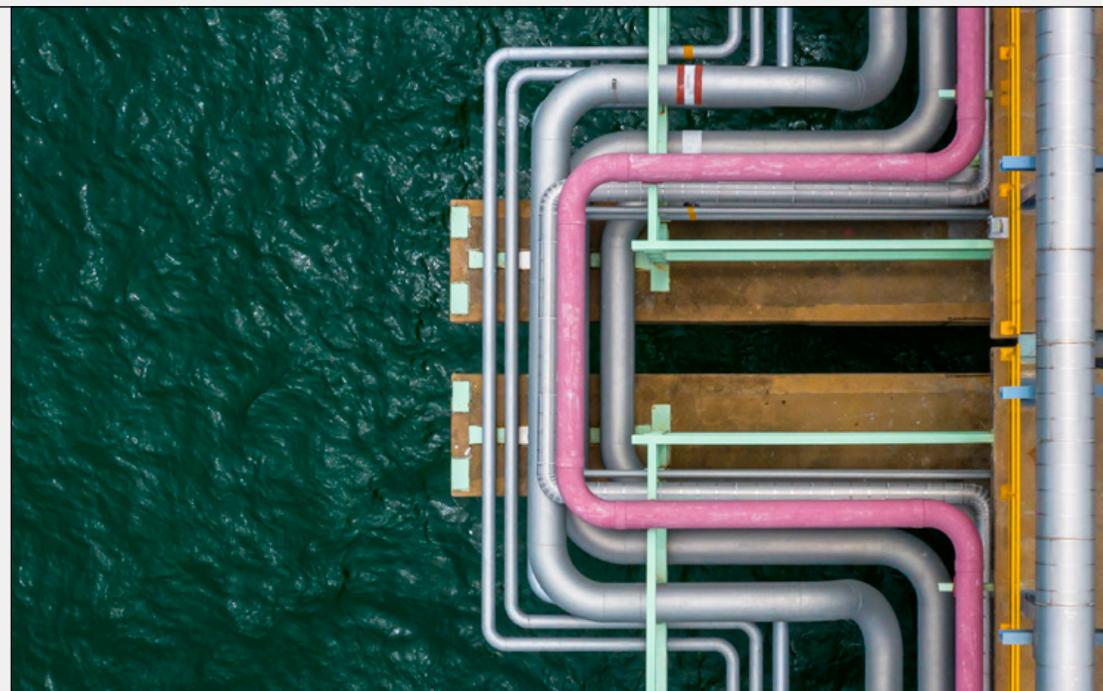
# OUR VISION

# TO BE RECOGNIZED AS THE GLOBAL LEADER IN CARBON EMISSION REDUCTION TECHNOLOGIES BY 2024

Today, the biggest global challenge is climate change. Carbon emissions must be reduced in a joint effort between countries, companies and citizens. We believe we need to accelerate these efforts.

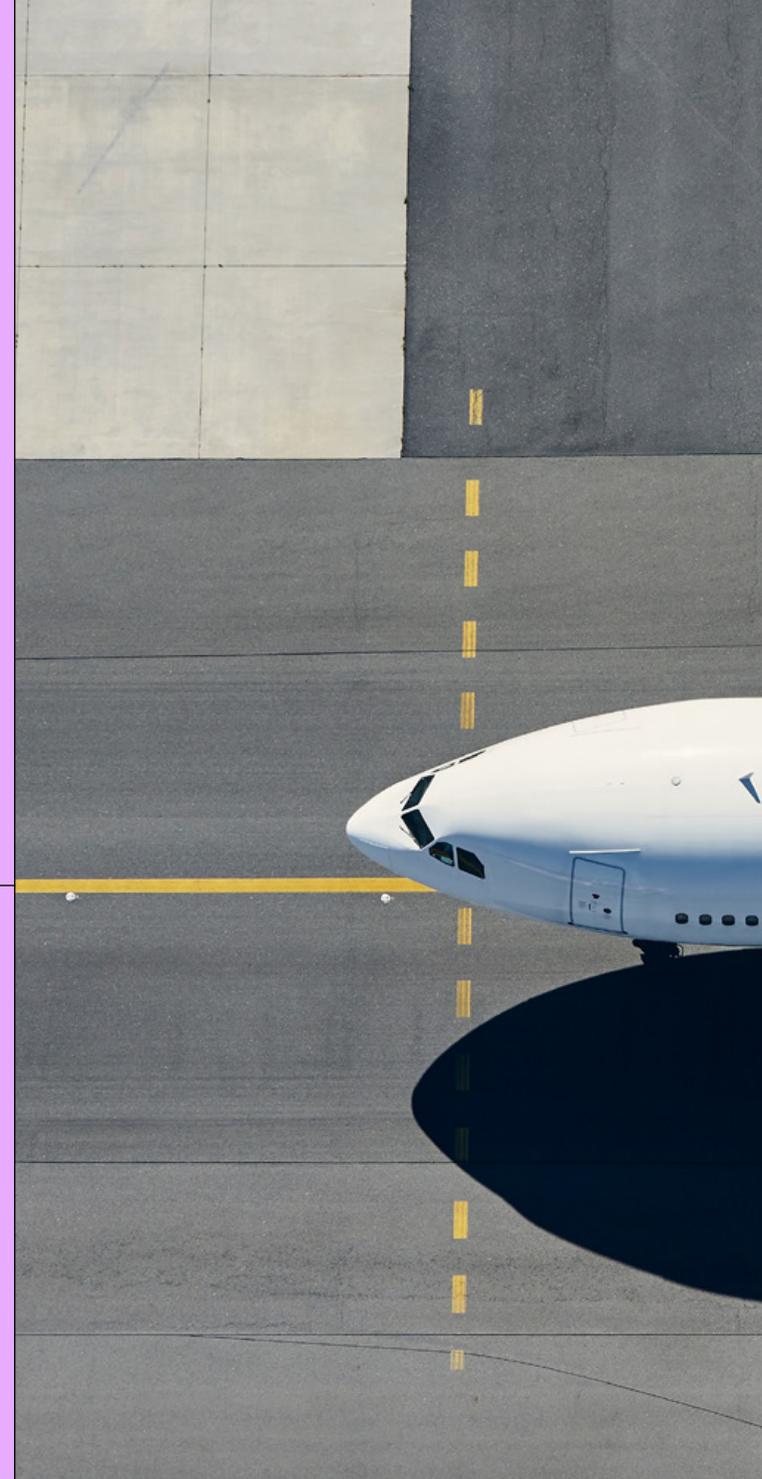
We provide our customers with world-leading technologies that enable them to produce essential chemicals and fuels in an energy-efficient way. While these offerings remain relevant, we strengthen our focus on technologies that can help accelerate a responsible transition to renewable energy sources.

We are one of very few companies, that possesses both the expertise and the technologies needed to transform renewable power, biomass, and waste into low-carbon fuels and chemicals as well as to deliver carbon capture solutions and thereby remove CO<sub>2</sub> at chemical plants using natural gas.



# WHAT WE DO & HOW WE CREATE VALUE

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# OUR STRATEGY

# THE 'GO-TO' COMPANY WITHIN DECARBONIZATION

Heavy industry and transport – whether by land, air, or sea – account for a large share of global greenhouse gas emissions, and the critical energy transition hinges on the availability of solutions that address the impact of these industries.

We continuously strive to develop the best possible solutions, and our strategy is designed to support our customers' decarbonization journey, address the climate challenge, and at the same time grow our business.

## Meeting market needs

Our strategy to meet existing and future market needs is based on three pillars:

1. Driving our customers' transition toward carbon emission reduction technologies
2. Building a leadership position in Power-to-X
3. Optimizing our traditional business



# OUR STRATEGY

## 1. DRIVING OUR CUSTOMERS' TRANSITION TOWARD CARBON EMISSION REDUCTION TECHNOLOGIES

Our existing technologies and insights can be used in several areas to help drive our customers' transition toward carbon emission reductions. This includes expanding our strong hydrogen technology position into blue ammonia, blue methanol, and blue hydrogen. In 2021, we saw keen interest from customers to introduce blue technologies

We expect growing demand for new and efficient solutions from, among others, the heavy-duty transport sector, with an ambition to introduce renewable fuels, and from industries like steel, cement, mining, and shipping who all want to lower their carbon footprint. This demand is partly driven by companies' own policies, partly by regulation, but also due to pressure from consumers who push for a greener future.

Today, Topsoe is the global market leader in renewable diesel made from feedstock such as vegetable oils and waste using its HydroFlex™ solution. Our position within renewable diesel can be expanded into all renewable fuels, and we can make biofuels for both the shipping industry as well as Sustainable Aviation Fuel (SAF). Read more on [→ page 15](#).

In addition, utilizing Topsoe's PureStep™ solution within plastic recycling and reuse will help customers reduce carbon emissions and at the same time contribute to addressing the significant problem of plastic waste. Read more on [→ page 18](#).

## 2. BUILDING A LEADERSHIP POSITION IN POWER-TO-X

The green hydrogen market is growing fast with a significant number of projects and investments already announced globally. Green hydrogen can be used directly as an energy carrier, as energy storage, or it can be used to produce green fuels and chemicals – and Topsoe has solutions for all applications.

Topsoe aims to become a global leader in Power-to-X with its highly efficient solid oxide electrolysis technology (SOEC). We are well-positioned as one of very few companies to offer end-to-end solutions within green hydrogen, green ammonia, green methanol, and eFuels. These solutions can be used in the so-called hard-to-abate sectors: aviation, shipping, heavy transport, and heavy industry. These are all industries where direct electrification is not a viable option.

In the power and utilities sector, green hydrogen, green ammonia, and green methanol can also be used to balance the power grid, which becomes increasingly important with the growing – but intermittent – electricity production from especially wind turbines and solar panels. Read more on [→ page 16](#).

To back our ambitions within Power-to-X, we restructured our internal setup in 2021 to be better positioned to pioneer the development of Power-to-X solutions and establish meaningful partnerships to not only develop technology, but also to attract investments and secure offtake.

Our strong commitment and capabilities within Power-to-X solidify our unique position and our potential to become the 'go-to' company for carbon emission reduction technologies. 

# OUR STRATEGY

## 3. OPTIMIZING OUR TRADITIONAL BUSINESS

Our well-known technologies and catalysts play a key role in ensuring energy-efficient production of the world's fuels and chemicals. They have helped us solve some of the world's toughest challenges. Our ammonia solutions supported fertilizer production that fed growing populations. When air pollution threatened environmental stability and public health, our technologies helped reduce sulfur and other pollutants from fossil fuel emissions to environmentally safe levels.

We build our transformation on decades of experience from developing and delivering these solutions. And this business is important for funding our growth within the energy transition. We will continue to strengthen our position within low sulfur fuels, hydrogen, ammonia, and methanol using our technologies and catalysts.

Furthermore, we strive to maintain our leading position within sulfur technology and catalysts used to reduce and eliminate sulfur emissions and air pollution from industry.



## RESEARCH & DEVELOPMENT

Our vision and strategy build on a strong scientific foundation with more than 80 years of research and development (R&D) and a deep-rooted passion for science.

- We generally reinvest 8-9% of our revenue in R&D every year.
- Around 350 employees are dedicated to R&D in both Denmark and India.
- 402 new patents were issued in 2021.
- 41% of Topsoe's published patents in 2021 are classified as green (according to EPO).
- Since 1950, Topsoe has contributed to 1,728 publications and has an overall Topsoe H-index of 157 demonstrating scientific leadership amongst industrial peers.

To ensure continuous development of the greener solutions of tomorrow and alignment with our strategy and vision, we have substantially increased our R&D investment in the development of carbon emission reduction technologies in 2021.

We collaborate with numerous universities and research institutes globally, and we sponsor research projects, chair professorships and PhD student grants. These long-term relationships keep us up-to-date on frontier research, and we co-develop important areas of interest at universities.

# OUR BUSINESS MODEL

Topsoe has a solution-focused business model covering the full value chain, progressing towards solutions to support our customers decarbonization journey.

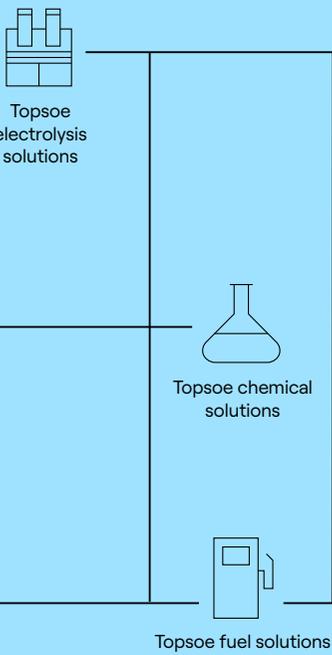
### ENERGY SOURCES

Fuels and chemicals can be produced from various ways of both renewable and fossil feedstocks.



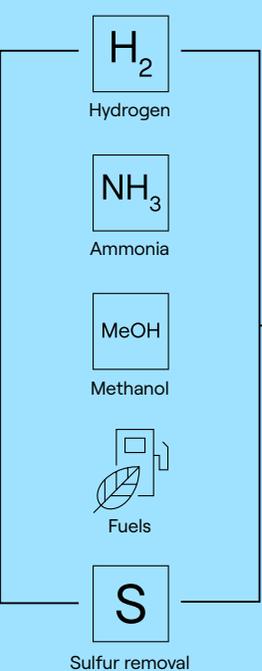
### SOLUTIONS

Topsoe helps customers on their decarbonization journey through advanced energy solutions, such as Power-to-X, renewable fuels and blue solutions for the chemicals.



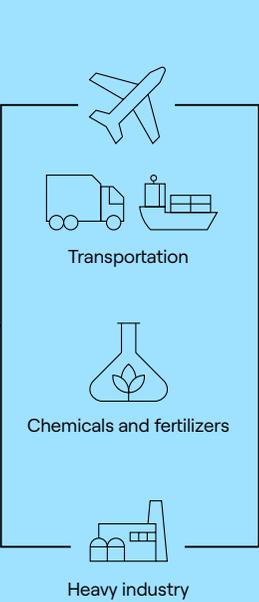
### CHEMICALS AND FUELS

For our customers, the output is more efficient processes or renewable feedstocks, that significantly can lower the carbon footprint, and thereby supporting them in their energy transition.



### UTILIZATION

The societal benefits of these end-products come, among other things, in the shape of a cleaner transportation sector and hard-to-abate sectors such as steel, cement, and mining, who can reduce their carbon footprint.



# OUR SOLUTIONS

## RENEWABLE FUELS AND THE ENERGY TRANSITION

Heavy industry and transport – whether by land, air, or sea – account for 29% of global greenhouse gas emissions (GHG), and the critical energy transition hinges on the availability of solutions that address the impact of these sectors. Utilizing biomass to produce renewable fuels like renewable diesel and jet fuel can help achieve near-term GHG reductions within heavy, long-haul transport.

Biofuels can be produced from a vast variety of feedstocks: first generation (e.g. rapeseed oil), second generation (e.g. waste oils and fats), or third generation (e.g. forestry and agricultural residue). GHG emission savings depend on the types of feedstocks and processes. Savings are typically above 80% for renewable diesel or Sustainable Aviation Fuel (SAF) produced from second generation feedstocks, and 50–65% when produced from first

generation feedstocks. Moreover, renewable diesel and SAF are commercially viable alternatives today that can be used in existing engines without modifications.

Sustainability concerns related to the ‘food versus fuel’ debate and issues around land use and deforestation are likely to limit the future use of certain feedstocks as a result of additional or updated regulations. ReFuelEU and FuelEU maritime are recent examples of initiatives prohibiting the use of edible oils for production of jet or marine fuel. However, many still consider renewable fuels the best medium-term solution to sustainable fuels, especially in the hard-to-abate sectors.

Topsoe believes that a mix of solutions is required and that these solutions can and should co-exist and complement each other in the race toward decarbonization. →

### TRANSITION IN ACTION

#### Sustainable Aviation Fuel (SAF)

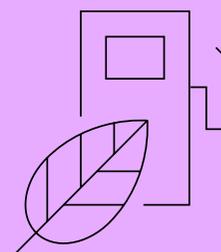
We work together with SkyNRG on developing and producing renewable diesel and jet fuel for the aviation industry.

→ [Read more](#)

#### Renewable diesel

Marathon Petroleum Corp. uses Topsoe’s hydrotreating solution, HydroFlex™, to transform waste products and bio-materials into renewable diesel. In 2021, Marathon began the production of renewable diesel from soy and corn oil.

→ [Read more](#)



GHG emission savings are typically above 80% for renewable diesel or sustainable aviation fuel (SAF) when produced from second generation feedstocks.

# OUR SOLUTIONS

## POWER-TO-X IN A NET ZERO CARBON ECONOMY

To achieve the climate goals of the Paris agreement and limit global warming, the world depends on energy efficiency, behavioral change, renewable power and direct electrification to reduce greenhouse gas emissions. In some sectors such as long-haul transport, chemicals and steel, it is proving difficult to achieve the carbon emission reductions needed, as these sectors cannot be easily electrified today. Decarbonizing the so-called hard-to-abate sectors is essential for the realization of a net zero carbon economy by 2050.

Power-to-X solutions can convert power from solar, wind, nuclear and hydro energy to low or zero carbon emission hydrogen. Hydrogen can be used separately or further processed into ammonia and combined with e.g. captured CO<sub>2</sub> into chemicals such as

methanol and eFuels to fuel sectors such as transportation (i.e. ships, aircraft and trucks), and heavy industry (e.g. steel and cement, refineries and power plants). One of these chemicals, i.e. ammonia, can also be applied as fertilizer. All commodities that the world will depend on for many years to come. Although hydrogen is already widely used in some industries, it has not yet realized its potential to support the clean energy transition. Green hydrogen has the potential to play a vital role.

### GREEN HYDROGEN POTENTIAL

Power-to-green hydrogen is the process of using electrolysis to split water into hydrogen and oxygen using renewable electricity. Green hydrogen has the ability to replace fossil fuel consumption and significantly reduce greenhouse gas

emissions in sectors that cannot be easily electrified today. IEA estimates that hydrogen and hydrogen-based fuels can help reduce CO<sub>2</sub> emissions by up to 60 Gt in 2021-2050, representing 6% of total cumulative emissions reductions.

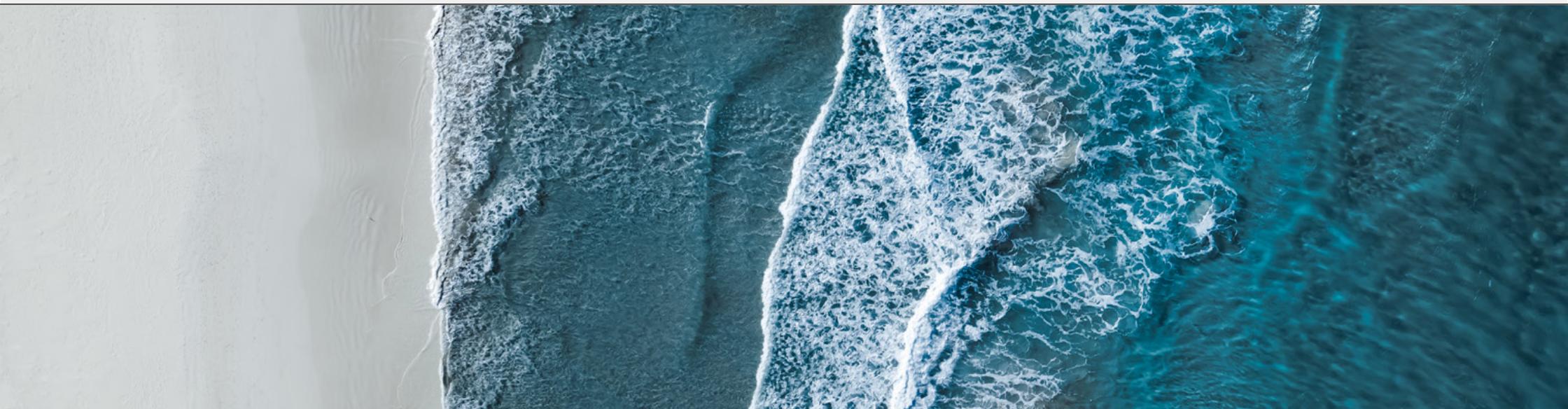
All major and emerging economies are investing heavily in green hydrogen and acknowledge hydrogen as an important pillar of a net zero economy. Many studies predict that by mid-century, there will be a global demand for green hydrogen of approx. 600-700 million tonnes. It is foreseen that in Europe alone, green hydrogen will account for 20% of the power demand by 2050.

### IS WATER FOOTPRINT AN ISSUE?

The water consumption associated with electrolysis has been raised as a concern. However, according to the International Renewable Energy Agency (IRENA), the water footprint of hydrogen production is significantly lower compared to other sectors such as agriculture or other industrial applications<sup>1</sup>. To ensure responsible production, it is, however, still relevant to consider local water scarcity and risk of stressing drinking water supplies if freshwater is used, or conversely the potential risk of distorting the marine ecosystem if seawater is used to produce green hydrogen.

1. [https://energypost.eu/hydrogen-production-in-2050-how-much-water-will-74ej-need/?utm\\_campaign=shareaholic&utm\\_medium=email\\_this&utm\\_source=email](https://energypost.eu/hydrogen-production-in-2050-how-much-water-will-74ej-need/?utm_campaign=shareaholic&utm_medium=email_this&utm_source=email) →

# OUR SOLUTIONS



## GREEN TECHNOLOGIES DEPEND ON RARE EARTH ELEMENTS

Technologies required to facilitate the green transition, e.g. wind turbines, solar panels and batteries, depend on rare earth elements as inputs. This is also the case for essential equipment used in Topsoe's high temperature electrolyzer technology (SOEC), which will be key in the production of green hydrogen. Rare earth elements are essential to modern life, but some are also critical to the green energy transition. While named rare earth elements, they are relatively abundant, yet difficult to find in large quantities. And as global demand continues to increase, there is a risk that global supply will be constrained.

To avoid that demand outstrips supply and to reduce the environmental and social impacts associated with the mining and processing of these rare earth elements, we – as in industry – need a greater focus on circular business models. We need to increase product lifetime, design products for recycling, strive for recovery of rare earths from products that have reached their end of life, and continue to search for alternative raw materials for producing these products.

Rare earth elements are a group of 17 chemically similar metallic elements in the periodic table, specifically the 15 lanthanides, scandium and yttrium. →

## TRANSITION IN ACTION

### Scaling up green hydrogen

Topsoe is investing in a manufacturing facility that will produce highly efficient solid oxide electrolyzer cells (SOEC). These electrolyzers will have a total capacity of 500 megawatt per year. Expected to be operational by 2024, the plant is currently the largest to have been announced.

[→ Read more](#)

### Carbon neutral chemicals fuels with eMethanol

Topsoe takes part in a Power-to-X project led by Liquid Wind. The consortium will establish commercial-scale facilities producing liquid, carbon neutral methanol from captured CO<sub>2</sub> and green hydrogen.

[→ Read more](#)

# OUR SOLUTIONS

## ENABLING MORE SUSTAINABLE PLASTICS

Modern life depends on plastics. It is used in everything from cars to medical devices to food packaging to personal protective equipment and even wind turbines. The ever-increasing consumption of plastic, its impact on biodiversity and contribution to climate change are not sustainable. We need to fundamentally rethink how we make, use, recycle and reuse plastic.

Today, more than 99% of plastics are produced from chemicals derived from non-renewable resources, such as oil, natural gas and coal. Greenhouse gases are emitted at all stages of the plastic lifecycle - at fossil fuel extraction, during transport, when the plastic is refined and produced, during handling of plastic waste, and once it reaches its end of life, whether it is burned, landfilled or ends up in the environment.

Advancing catalytic technologies to produce renewable/bio-based raw materials for plastic production and making them a commercially attractive option is one pathway toward reducing GHG emissions. Another pathway is to keep plastic material in circulation as long as possible, and in this way address the challenge of single-use and reduce plastic waste.



Demonstration plant for the production of bio-based MEG located in Lyngby, Denmark.

### TRANSITION IN ACTION

#### Bio-based chemicals for plastic production

Since 2017, Topsoe and Braskem have had a shared mission of producing Monoethylene glycol (MEG) from sugar. MEG is a raw material for polyethylene terephthalate (PET) - the third most widely used plastic material in the world.

[→ Read more](#)

#### Waste to plastic

Dow will use Topsoe's PureStep™ solution within plastic recycling and reuse to produce new plastics to be created from low-grade mixed plastic waste.

[→ Read more](#)

# PRODUCT SUSTAINABILITY

We are committed to documenting and reducing the environmental impacts of our solutions and operations. Our ambition is to reach net zero operations within this decade.

### OUR FOOTPRINT

In 2020, we calculated and disclosed our greenhouse gas (GHG) emissions for scope 1 and 2 in accordance with the Greenhouse Gas Protocol. In 2021, we committed to the Science Based Targets initiative (SBTi) for reducing GHG emissions across our value chain and setting net zero targets in line with climate science.

In the past year, our priority has been to develop Topsoe's full GHG emissions profile including all material emissions in our value chain (making 2020 our new baseline). Another priority has been to define a strategy and action plan for reducing emissions across our scope 1, 2 and 3 activities. We are currently refining some key aspects of the plan, before we expect to submit our net zero targets for scope 1, 2 and 3 to the SBTi during 2022.

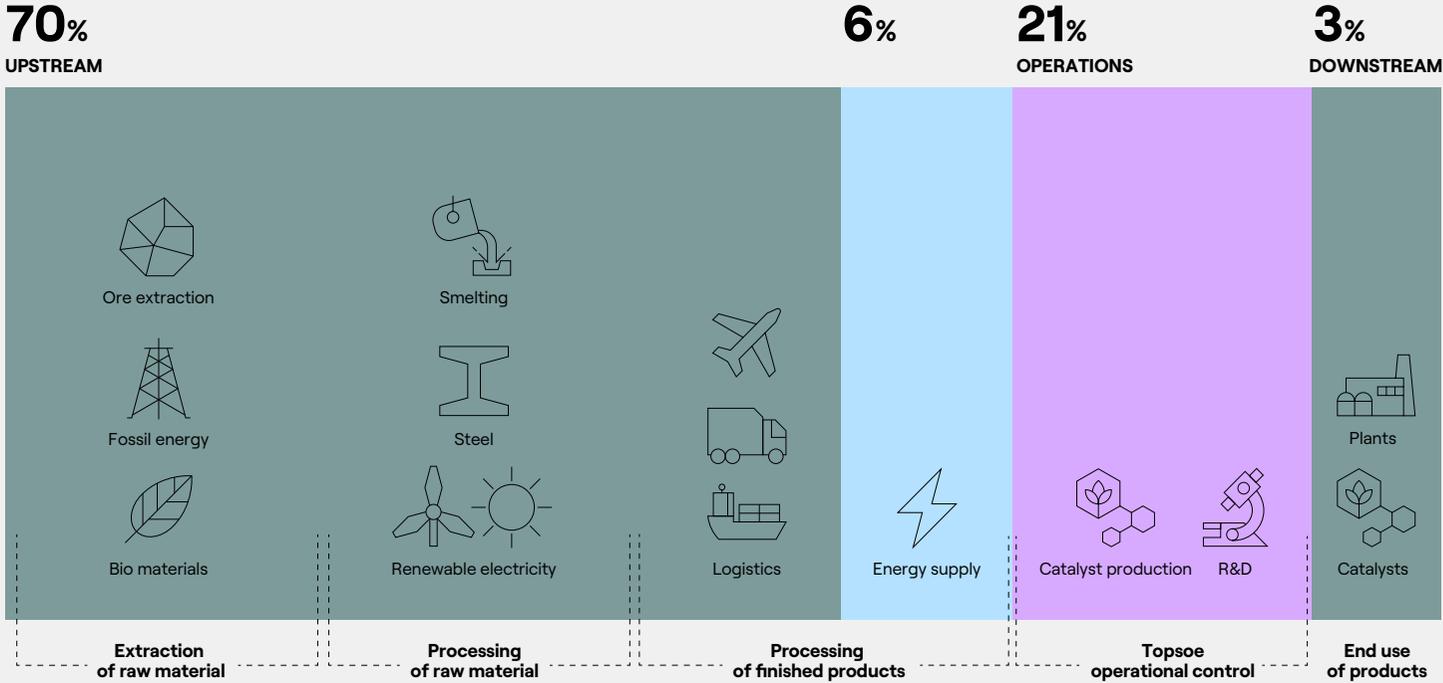
Our scope 3 analysis has determined the materiality of each of the 15 emission categories defined by the Greenhouse Gas Protocol, and concluded that our supply chain (i.e. Category 1 - Purchased Goods and Services) accounts for approximately 87% of our scope 3 emissions. →

### TOPSOE EMISSIONS PROFILE

Total greenhouse gas emissions: **585,440 tonnes CO<sub>2</sub>e**

## BASELINE 2020

- Scope 1
- Scope 2
- Scope 3



## NET ZERO OPERATIONS THIS DECADE

Our ambition is to reach net zero operations within this decade, following the principles of SBTi for corporate net zero targets.

Achieving net zero will require a mix of actions - from increasing energy efficiency to shifting toward more renewable energy among others. But it also involves tackling emissions from our chemical processes in our catalyst production. In 2021, our Global Supply function identified solutions for how to reduce nitrous oxide (N<sub>2</sub>O) emissions from our operations (scope 1) - our most material non-fossil greenhouse gas emission. N<sub>2</sub>O has a global warming impact of 265 times higher than that of carbon dioxide (CO<sub>2</sub>). These solutions will be implemented in 2022, and will be key in meeting our 2022 target of 25% absolute reduction in GHG emissions.

## DECARBONIZING OUR SUPPLY CHAIN

In 2021, we started preparations toward decarbonizing our supply chain (scope 3), by embedding decarbonization within procurement activities for 2022 and initiating training of procurement staff on key sustainability issues. The scope 3 analysis has determined the most material spend categories and suppliers. In 2022, we will invite suppliers to join our mission to decarbonize our value chain. The Carbon Disclosure Project (CDP) will complement direct engagement with key suppliers, and validate ambitions and progress against our scope 3 target.

## LIFE CYCLE ASSESSMENTS

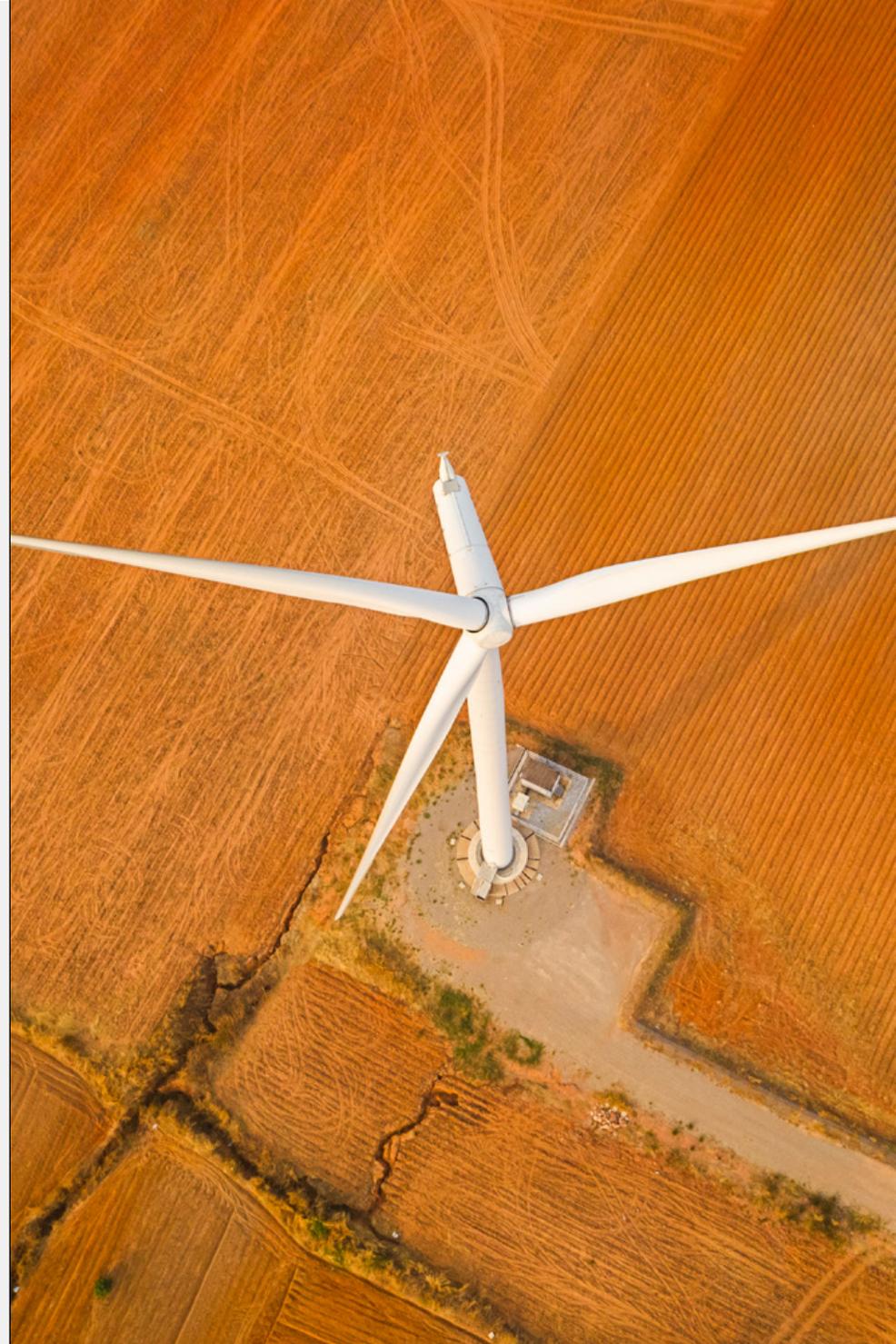
In 2021, we took initial steps to develop a life cycle assessment (LCA) management system at Topsoe. We will use LCAs to evaluate and document the environmental impacts of our solutions throughout their life cycle - from the extraction of the raw materials, through production, distribution, use, possible re-use/recycling and then final disposal. We will use these insights for continuous improvement in product design and production as well as knowledge sharing with customers.

ISO defines life cycle assessment as a technique for assessing the environmental aspects and potential impacts associated with a product by:

- compiling an inventory of relevant inputs and outputs of a product system,
- evaluating the potential environmental impacts associated with those inputs and outputs, and
- interpreting the results of the inventory analysis and impact assessment phases in relation to the objectives of the study.

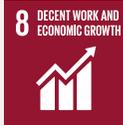
## EU TAXONOMY

The EU taxonomy is a classification framework designed to determine whether an economic activity is environmentally sustainable. In 2021, we made an initial assessment of the taxonomy to better understand potential implications for Topsoe's solutions considering both eligibility and alignment. In 2022, we will create a cross-functional task force to continue the work.



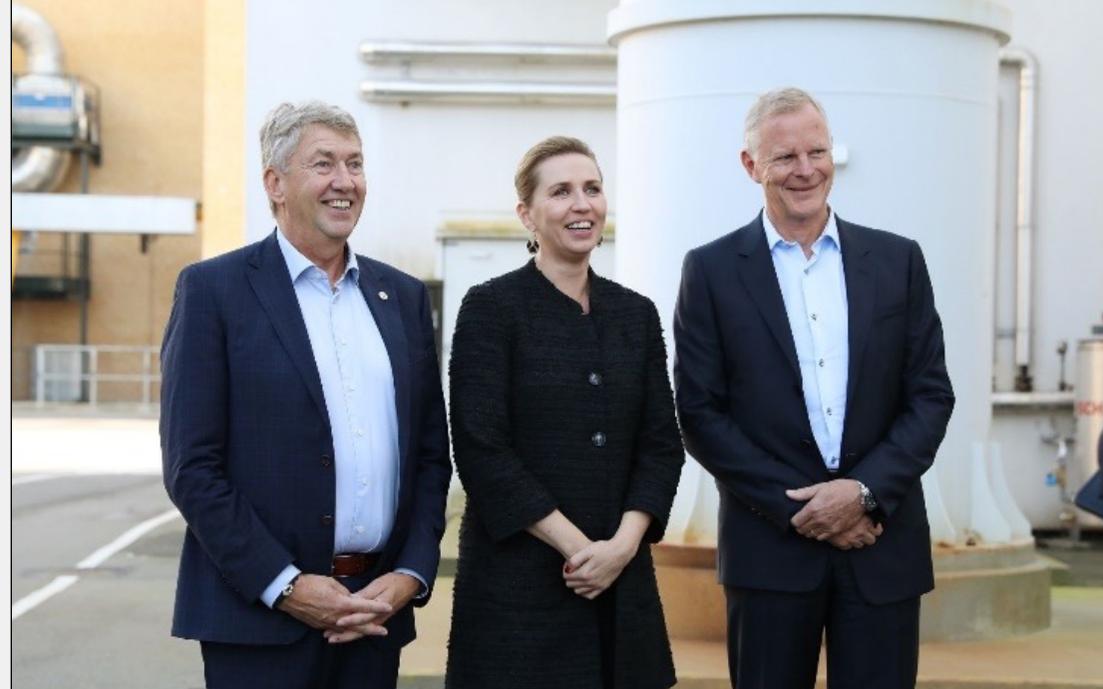
# SUSTAINABLE DEVELOPMENT GOALS

We contribute directly to the United Nation's Sustainable Development Goals (SDGs) nos. 13, 7, 3, 12, and 8. Partnerships and alliances with academia, customers, peers and suppliers are important levers to achieve our vision.  
 → [Read more](#) for a full overview of our impact on all 17 SDGs.

UN SDG	MATERIALITY	SOLUTIONS	OPERATIONS	UN SDG	MATERIALITY	SOLUTIONS	OPERATIONS
	High	We have the technologies needed to transform renewable electricity, biomass, and waste into green hydrogen, green ammonia, and zero emission fuels and chemicals. → <a href="#">Read more</a>	We strive for net zero operations within this decade. → <a href="#">Read more</a> We seek to continuously strengthen our resilience to physical climate risks. → <a href="#">Read more</a>		High	We have the technologies needed to transform renewable electricity into green hydrogen, green ammonia, and zero emission fuels and chemicals. → <a href="#">Read more</a>	We strive for net zero operations within this decade, which includes transitioning to renewable energy. → <a href="#">Read more</a>
	High	Our catalysts reduce – and in some cases also eliminate – air emissions such as sulfur, SOx and NOx from industry, for the benefit of public health. → <a href="#">Read more</a>	Our global operations involve potential safety risks for our employees, suppliers, customers, contractors and communities. We aspire to 'Zero Harm' and do not compromise on safety. → <a href="#">Read more</a>		Medium		We contribute directly and indirectly to economic and community development through employment, taxes, working conditions, and donations. → <a href="#">Read more</a> We respect human & labor rights and strive to uphold these in our global operations. → <a href="#">Read more</a>
	High	Our carbon emission reduction technologies contribute to a more sustainable production of fuels and chemicals. We are also involved in converting used plastics to new plastics. → <a href="#">Read more</a>	We work hard to ensure that our conduct is economically, environmentally, and socially sustainable. → <a href="#">Read more</a>				

# STAKEHOLDER ENGAGEMENT

We have stepped up our engagement in national, regional and international organizations, partnerships and alliances to contribute with our knowledge and expertise within chemistry and Power-to-X solutions to help accelerate the energy transition. We are determined to act as a global thought leader within carbon emission reduction technologies.



Danish Prime Minister Mette Frederiksen and local Mayor at the time John Schmidt Andersen (left) visited Topsoe's production site in Frederikssund, Denmark together with Topsoe CEO Roeland Baan in October 2021.

We have joined the following organizations, partnerships and alliances to engage with other business leaders and encourage key decision-makers to speed up the reforms and regulations needed for the energy transition:

- World Economic Forum (WEF) - Platform Partner on Energy & Materials
- The Hydrogen Council - Supporting Member
- Hydrogen Europe
- Hydrogen Denmark
- Methanol Institute
- European Clean Hydrogen Alliance (ECHA)

- Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping
- Confederation of Danish Industry
- Confederation of Danish Industry's Advisory Board on Power-to-X, Carbon Capture and Utilization (CCU) and Carbon Capture and Storage (CCS) - Chair
- Danish Energy
- Participation in four out of the 14 Danish climate partnerships: 1) Energy and utilities, 2) Waste, water and circular economy, 3) Marine transport, and 4) Energy-intensive industry

Relevant to our traditional business, we are members of the following organizations:

- The European Chemical Industry Council (Cefic)
- Catalyst Europe - Chair
- Several EU REACH Consortia
- The American Chemical Society
- Responsible Minerals Initiative
- International Molybdenum Association (IMOIA)
- Cobalt Institute

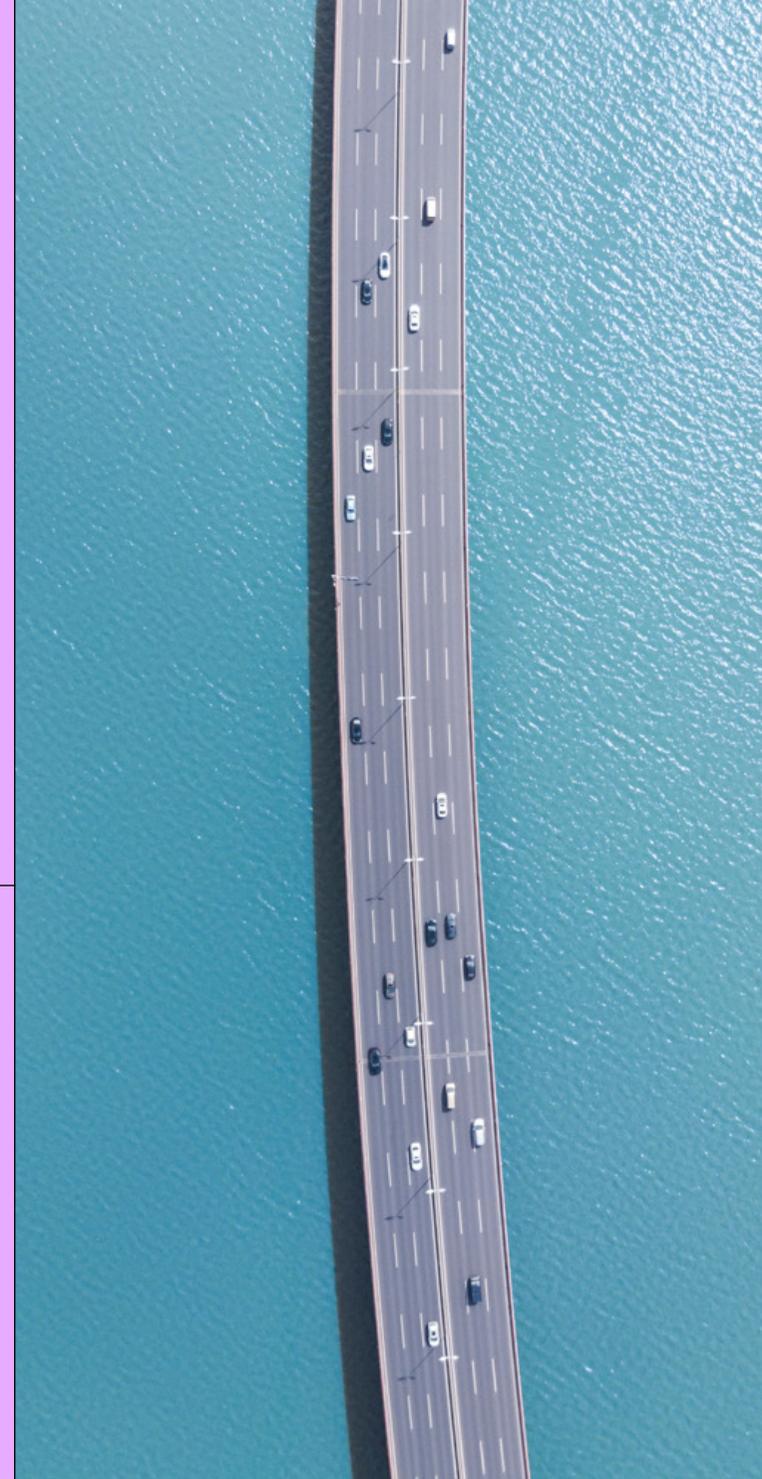
In countries where Topsoe has production, we have an ongoing dialogue with surrounding communities as well as

environmental protection authorities. Our production site in Denmark is located adjacent to a residential area, and we thus engage proactively with the local community. Generally, we receive very few complaints on an annual basis.

Our production site in the US is located in an industrial area, so here we take active part in a number of business associations and contribute to the local community, e.g. the Bay Area Community Advisory Panel (BAYCAP).

# OUR APPROACH TO SUSTAINABILITY

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# NEW SUSTAINABILITY FRAMEWORK

In 2021, we developed a new sustainability framework that sets direction and defines strategic focus areas, activities and targets, in support of our strategy and 2024 vision.

With this framework (next page), we ensure continuous development of material environmental, social, and governance (ESG) activities at Topsoe. On the basis of this framework, new sustainability targets have also been defined.

The framework was developed with an outside-in perspective in mind, considering global trends, challenges and risks as well as stakeholder concerns, expectations and interests. Through co-development with

relevant functional teams, we ensured ownership and integration into business planning, processes and activities across the organization. Our performance and progress against the framework priorities are outlined in the next chapters of this report.

Framework priorities were defined on the basis of an initial materiality assessment to determine the material sustainability and ESG topics for Topsoe. We studied sector-specific issues (e.g. EcoVadis Chemical

Sectors), customer sustainability requirements (e.g. pre-qualification questionnaires), banks' risk assessments of Topsoe, sustainability ratings and the emerging regulatory landscape. We also consulted internal experts from across the organization, among others from Finance, Compliance, Strategy, HSE and Public Affairs. In 2022, we plan to engage more external stakeholders in order to validate the materiality assessment.

## SUSTAINABILITY TARGETS

- Net zero GHG emissions in our own operations within this decade, incl. 25% absolute reduction in 2022 (baseline 2020)
- Top 25% score in the annual employee engagement survey of the benchmark by 2024
- Safety TRIF of 0.6 in 2022
- 30% women in management by 2024

Additional targets will be announced in 2022. →

**Where feasible, we align our sustainability efforts and disclosures with international frameworks and standards.**



# TOPSOE SUSTAINABILITY FRAMEWORK 2021-2024

Driving progress on environmental, social and governance issues.

<b>CARBON EMISSION REDUCTION</b>		<b>PRODUCT LIFE CYCLE</b>	
<ul style="list-style-type: none"> <li>– Low-carbon &amp; energy-efficient products, technologies &amp; services (incl. life cycle assessments)</li> <li>– Science-based emission reduction in the value chain</li> <li>– Public affairs, advocacy &amp; partnerships</li> </ul>		<ul style="list-style-type: none"> <li>– Sustainable &amp; circular product design</li> <li>– Address end-of-life product waste challenge</li> <li>– Advocacy &amp; partnerships</li> </ul>	

<b>ENVIRONMENT</b>		<b>PEOPLE</b>		<b>GOVERNANCE</b>	
<ul style="list-style-type: none"> <li>– Resource efficiency &amp; emissions management</li> <li>– Waste reduction</li> <li>– Resiliency in minerals sourcing</li> <li>– Chemical footprint management</li> </ul>		<ul style="list-style-type: none"> <li>– Safety, well-being &amp; fair working conditions</li> <li>– Inclusive &amp; diverse workplace</li> <li>– Responsible sourcing</li> <li>– Donations &amp; community development</li> </ul>		<ul style="list-style-type: none"> <li>– Governance frameworks</li> <li>– Compliance management, due diligence &amp; business ethics</li> <li>– Transparency &amp; disclosures</li> </ul>	

# SUSTAINABILITY GOVERNANCE

To drive our sustainability efforts, we ensure strong alignment across our global organization – from management to key functional teams.

## REVIEWERS

The Audit Committee assists the Board in overseeing aspects relating to accounting, auditing, risks, internal controls and financial, environmental, social and governance data.

## DECISION MAKERS

The Committee oversees the implementation of Topsoe's Code of Conduct and material sustainability topics. Consists of the CEO, CFO, Chief Commercial Officer, Chief Strategy & Innovation Officer, Chief Communications & Brand Officer, Chief Compliance Officer, and is chaired by the Group General Counsel.



## APPROVERS

The Board of Directors approves direction, strategic targets and the Sustainability Report.

## DECISION MAKERS

Overall accountable for Sustainability framework, targets and action plans.

## DEVELOPERS

Sets direction and targets. Works closely with functional teams to embed sustainability. Monitors and reports on progress against ambitions and targets.



## IMPLEMENTORS

Integrate initiatives into business operations.

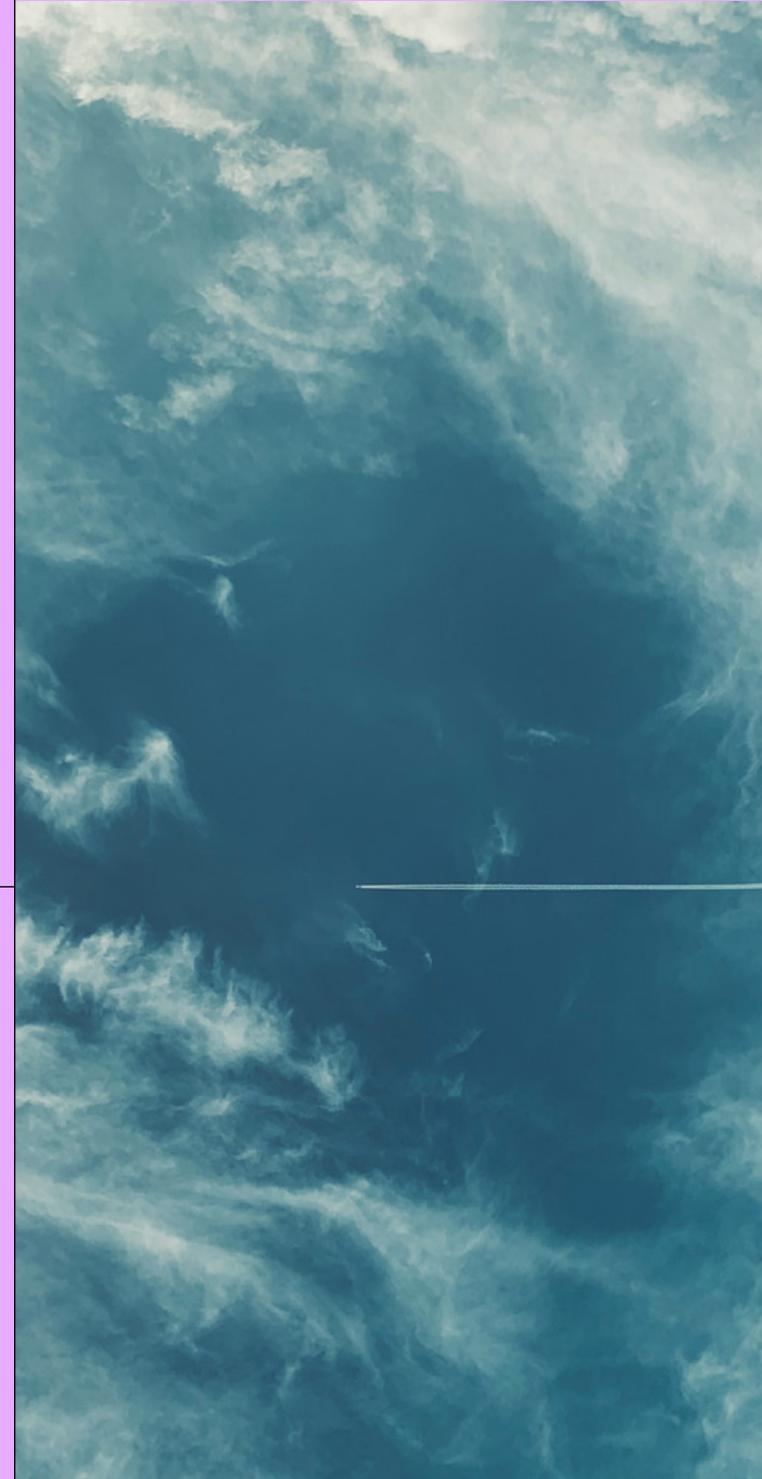
- REGULATORY AFFAIRS
- GLOBAL SUPPLY
- HEALTH, SAFETY & ENVIRONMENT

- RESEARCH & DEVELOPMENT
- HUMAN RESOURCES
- PROCUREMENT

- FINANCE
- COMPLIANCE
- COMMERCIAL

# ENVIRONMENT

Environmental management	<b>28</b>
Resource efficiency & emissions management	<b>31</b>
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Chemical footprint management	<b>35</b>



## PROGRESS IN 2021

- Commitment to the Science Based Targets initiative
- Net zero ambition and roadmap defined for operational greenhouse gas emissions (scope 1 and 2)
- Established overview of material greenhouse gas emissions in our value chain (scope 3)
- Renewal of ISO 14001 certificate at Danish production site
- Completed Responsible Care® RC14001 audit at US production site

## PRIORITIES 2022

- Reduce our operational GHG emissions by 25% (scope 1 & 2)
- Validation of net zero targets by the Science Based Targets initiative
- Implement net zero roadmap for reduction of greenhouse gas emissions
- Kick off decarbonization strategy with suppliers
- Develop circular economy within Topsoe activities and business models

# ENVIRONMENTAL MANAGEMENT

Production of catalysts is associated with extensive use of raw materials, energy and water, while also causing emissions. We are committed to ensuring that our own environmental impacts are continually reduced and always kept within the limits of applicable regulations.

We conduct our daily operations in an environmentally sound manner, ensuring safe handling of chemicals and a continuous reduction of waste, emissions, and resource consumption. Requirements of environmental management systems and quality within production drive continuous efficiency improvements.

We also strive to minimize our environmental impacts across our entire value chain. We do so by continually evaluating whether the materials and processes we use could constitute a potential risk to the environment.

Read our Global Environmental Policy on [→ topsoe.com](https://www.topsoe.com)

We have procedures in place that ensure systematic and ongoing monitoring of current and future regulatory obligations and stakeholder requirements. This way we proactively identify external changes that might affect our operations and require changes to our internal processes.

This chapter covers the environmental performance of our two production sites in Frederikssund, Denmark, and Bayport, United States, as well as Topsoe's headquarters in Lyngby, Denmark.

## MANAGEMENT SYSTEMS

Local Health, Safety & Environment (HSE) teams ensure operational compliance with relevant regulations. As part of their local [→](#)



## US NEW CATALYST PLANT

In November, we broke ground for a new catalyst plant located at our existing site in the US that will enable production of an additional 15,000 tonnes of catalysts (TK catalysts) every year. These catalysts play an important role in converting crude oil and renewable feedstocks into chemicals and fuels. The plant design incorporates the best elements from our existing plants, ensuring high energy efficiency, reduced emissions and resilience to climate change. The plant is expected to be fully operational in 2023.

[→ Read more](#)

HSE improvement plans, they set annual targets to ensure continuous improvement of procedures, processes, risk assessments and internal spot checks.

In 2021, important progress was made to ensure better alignment of environmental practices of our two production sites.

→ Our production site in the United States (US) finalized the implementation of the environmental management system under the American Chemistry Council's Responsible Care® (RC14001). The final audit was completed in January 2022.

→ Our production site in Denmark was recertified in ISO 14001 in April, and the audit identified four minor non-conformities which have all been corrected.

→ Implementation of a new software solution within SAP to manage industrial HSE activities was started in May 2021. Go-live is planned for March 2022. The SAP solution will provide increased quality and control of HSE data points, enable improved analysis and mitigation of risks, and continuous monitoring of improvements to ensure compliance with permits.

### ENVIRONMENTAL INCIDENTS

Despite solid management systems and procedures, environmental incidents do unfortunately happen. We have planned and developed emergency response procedures to limit the damage caused by such incidents. Our efforts to prevent, mitigate, manage and report on incidents fall within our global HSE governance framework and procedures. →

In 2021, we reported a total of 22 non-conformities to environmental authorities (11 in Denmark and 11 in the US), compared to 23 in 2020.

We had one major release of 95 kg of NO<sub>x</sub>, which was caused during a fire at our Danish production site.

We had a total of 21 minor releases. Our Danish operations caused 12 minor releases exceeding a threshold value by a factor of three, although within monthly permitted limits - related to release to air of ammonia and dust. These were not in violation of the permit, but still required a notification to the authorities. US operations had nine minor releases. Root cause analysis has provided input to improved procedures to mitigate future risks.

### PHYSICAL CLIMATE RISKS

Extreme weather conditions, natural disasters and changes in sea level may cause impacts to our operations and physical assets.

We seek to continuously strengthen our resilience to these external impacts through preventative measures, with well-trained emergency response teams ready to handle potential impacts.

Our production site in the US had to activate their hurricane preparedness procedures twice during 2021, fortunately with no injuries to employees nor damage to our assets. An extreme freeze in February, on the other hand, caused injury to a colleague and damaged the site's water piping, resulting in increased water consumption. For improved preparedness in the event of future freezes, the site has now developed specific checklists for freezes.

## US

# DESIGNING OUT NON-CONFORMITIES

By improving the engineering design for one of our production units in the US, we have eliminated the possibility of spills and releases during on-site transportation of alumina. The solution was to incorporate direct piping from the nearby silo station into the production unit.

## DENMARK

# MINOR SPILLS REDUCED BY 66%

During 2021, our Danish operations had an increased focus on improving the classification of environmental incidents, by enabling appropriate categorization according to Topsoe's Risk Matrix. Application of the new methodology identified that one production unit was experiencing many minor spills. Root causes were identified and actions implemented to prevent reoccurrence. This has led to 66% reduction in minor spills, increased reporting on observations and improved instructions on how to manage and transport dangerous goods.

# RESOURCE EFFICIENCY & EMISSIONS MANAGEMENT

## ENERGY

Our energy consumption has a material adverse impact on our scope 1 and 2 emissions profile. Natural gas and electricity are the main causes. Our energy consumption is a focus area within our ISO 14001 (Denmark) and our new RC 14001 management system (US).

Total energy consumption was 959 TJ in 2021, compared to 1,143 TJ in 2020. Reduction in production activities at our Danish production site during 2021 was the main cause for lower energy consumption in 2021. This was driven by several factors including a strategic focus to reduce inventory as well as lower customer demand for Topsoe products due to COVID-19 resulting in shutdowns. Realization of efficiency improvements in operations is reliant on optimized uptime, as startups are always energy intensive. Therefore, GHG

emission levels were impacted by shutdowns. On the other hand, these shutdowns also freed up time for maintenance and upgrades within the plants, which will drive further energy efficiencies.

Local energy-savings initiatives at our Danish production site included installation of a new cooling tower with a 50% higher energy efficiency than the old cooling tower. Additionally, two new heat pumps were installed. One of the heat pumps will save ~55 tCO<sub>2</sub> annually, and the other will remove the need for district heating in the winter and cooling by electricity in the summer.

Implementation of district heating at our headquarters in 2020 has led to a reduction in natural gas consumption from 1.4 million Nm<sup>3</sup> in 2020 to 428,802 Nm<sup>3</sup> in 2021. This led to a net reduction of 1,322 tCO<sub>2</sub>e.

Surplus heat generated at our production sites is optimized and used where possible, to provide heating for other processes at our sites, thus improving energy efficiency.

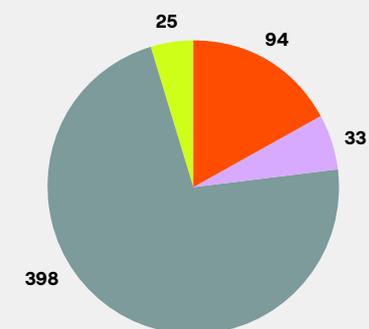
Our Danish production site has delivered surplus heat to the local district heating system since 2013 (see next page).

## GREENHOUSE GAS EMISSIONS

In 2021, our total GHG emissions (scope 1 and 2, market-based) amounted to 126,881 tCO<sub>2</sub>e, which is a significant decrease of 19% compared to 156,406 tCO<sub>2</sub>e in 2020 and 23% compared to 164,436 tCO<sub>2</sub>e in 2019. This development was driven by energy savings in our production, variations in production mix, and shutdowns of production due to COVID-19 impacts on customer demand for Topsoe solutions. Also local energy-saving initiatives and conversion from natural gas to district

## TOTAL GHG EMISSIONS

(thousand tonnes CO<sub>2</sub>e, 2021)



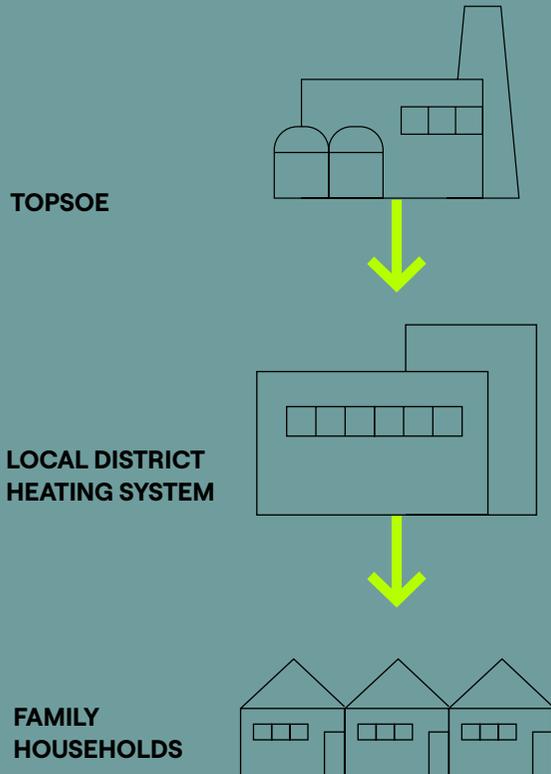
**TOTAL**  
**550**

- Scope 1
- Scope 2 - Market-based
- Scope 3 - Upstream
- Scope 3 - Downstream



## DANISH OPERATIONS CONTRIBUTE TO INDUSTRIAL-URBAN SYMBIOSIS

Every year, Topsoe sends surplus heat from its production site in Denmark to the local district heating system. This contributes to lowering the carbon emissions of the local community.



Total contribution 2017-2021: **174,530 MWh**  
 Contribution 2021: **30,965 MWh**, equivalent to **~1,710 family households**, carbon displacement of 6,183 tCO<sub>2</sub>e.

heating at our headquarters (net saving of 1,322 tCO<sub>2</sub>e) contributed to the lower emission level in 2021.

## WATER

Water as a resource is key within our operations. We both extract it from wells and purchase it from utility providers. All water is treated prior to being used and returned to the environment or the utility provider. Rainwater (surface water) which is captured within the perimeter of our sites is treated to ensure the protection of our neighboring water receptors when discharged.

Danish and US operational water consumption was 205,452 m<sup>3</sup> in 2021 compared to 221,680 m<sup>3</sup> in 2020 (7% reduction). Our Danish production experienced a decrease of 50,149 m<sup>3</sup> (28%) caused by shutdowns and changes in customer demands as a result of COVID-19. In comparison, our US production increased by 33,920 m<sup>3</sup> (81%), as an extreme freeze in February resulted in several large water leaks.

Our Danish production consumes water from both a utility provider and ground water pumped from our own wells. The latter covers the majority of our operational requirements. During 2021, efficiency and optimization improvements were implemented to the pumping system within the degassing and filtration sections of the process. This has improved the quality of the extracted water. Our US production uses water from a utility provider. A system upgrade in 2021 directs water through a clarifier to remove

suspended solids, thus purifying the water to make it suitable for use in our production processes. To increase the quality of water returned to the utility provider, two 1,000-gallon tanks were installed. These reduce acidity, which improve water neutralization, while increasing the pollution prevention measures from operational processes. Within our annual local Enterprise Risk Management process, initiatives are reviewed to identify opportunities to improve e.g. water management and mitigate any potential risks.

## OTHER EMISSIONS

In addition to GHG emissions, Topsoe's operations also result in other emissions, including nitrogen oxides (NO<sub>x</sub>), ammonia (NH<sub>3</sub>), sulfur dioxide (SO<sub>x</sub>) and dust. These emissions are all regulated as part of our license to operate. The emissions arise through the physical handling of the raw materials and various processes within the production of catalyst. Both our ISO 14001 and RC 14001 environmental management systems require a focus on continuously reducing these.

## WASTE

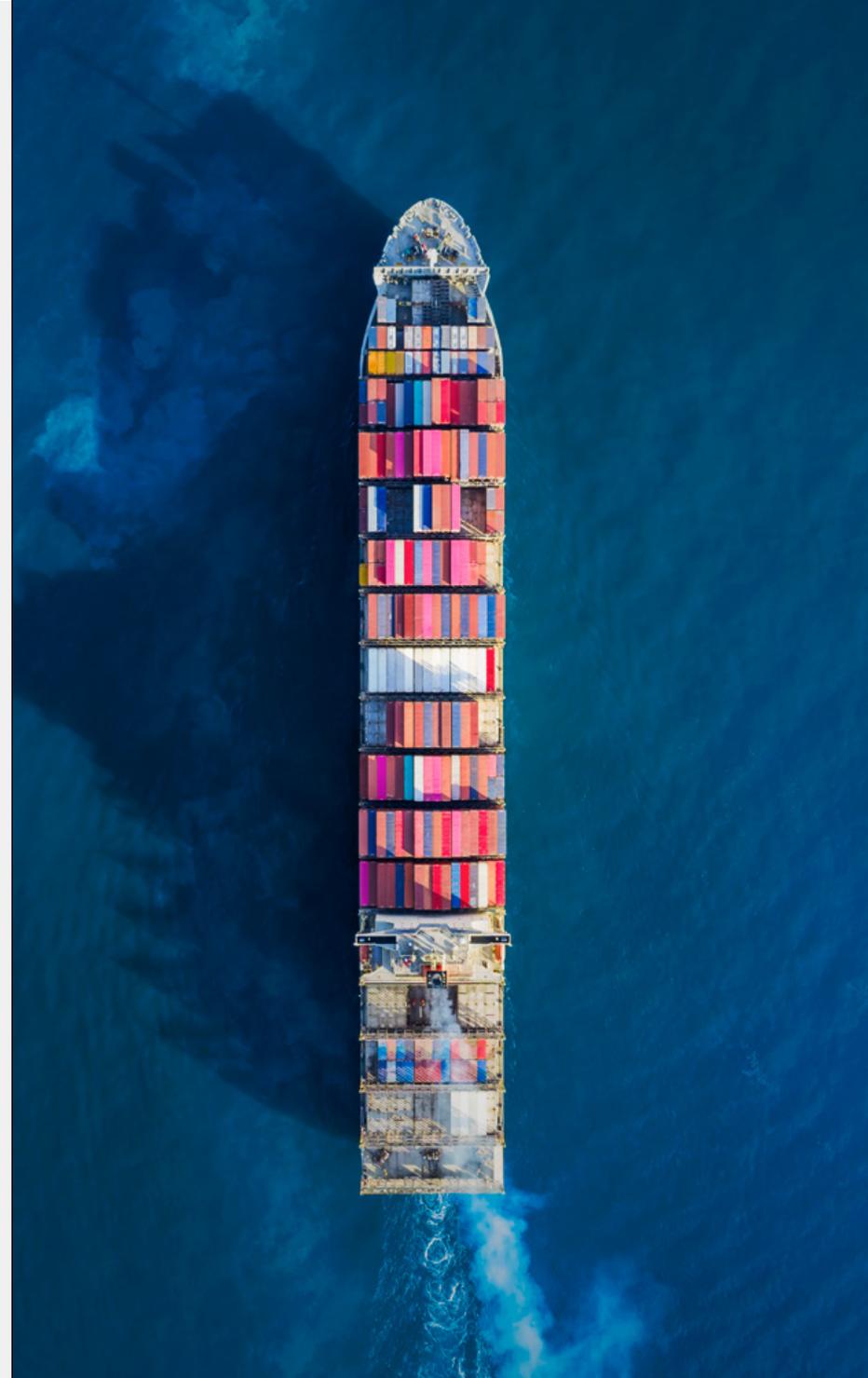
Topsoe makes continuous efforts to reduce waste volumes, by optimizing production processes to improve resource management. All material fractions are evaluated for possible internal or external use, and alternatively, where recycling is not possible, authorized disposal. In all cases, the material is transported and processed by authorized contractors to ensure it is handled in an →

efficient, safe and compliant manner. During 2021, Topsoe produced 4,251 tonnes of operational waste, compared to 5,011 tonnes in 2020, representing a gross reduction of 15%. Danish and US operations realized net reductions of 14% (638 tonnes) and 23% (122 tonnes) respectively. Reduced production levels have influenced this but are not solely responsible.

A key driver at our Danish production site was the reduction of non-hazardous soil sent to landfill, equating a 302 tonne (89%) reduction between 2020 to 2021. Hazardous copper sent to recycling increased by 179 tonnes (47%) during 2021. 88 tonnes of hazardous waste was landfilled.

Reduction drivers at our US operations included the recycling of new non-hazardous waste fractions instead of sending them for energy recovering, which was also reduced by 373 tonnes (93%) from 2020 to 2021. Despite these positive achievements, scrap sent to landfill unfortunately increased by 183 tonnes (152%).

During 2021, both our Danish and US operations identified new ways to optimize production processes and reduce resource consumption without compromising the performance of our catalysts. The US made optimizations of our production line for hydrotreating catalysts in 2021, which is expected to provide an annual reduction in raw material consumption by more than 200,000 tonnes once fully implemented in 2022. Our Danish operations made optimization of the productline for our sulfuric acid catalysts which enabled the closure of one drying/impregnation oven. This will reduce natural gas consumption and associated GHG emissions (scope 1).



# RESILIENCY IN MINERALS SOURCING

We regularly assess the resiliency of our supply chain with respect to single source suppliers, raw materials constraints, geopolitical uncertainties as well as challenges caused by climate change and/or health disaster disruptions.

The clean energy transition could unleash unprecedented global demand for some metals and minerals in the coming decades, resulting in large price increases. In some instances, it is already the case. In 2021, Topsoe announced a price increase for its catalysts containing vanadium, as a consequence of higher vanadium prices.

One way of bolstering supply security and alleviating the pressure on global supply is to reduce the reliance on mining and instead recover these critical minerals and metals from products that have reached their end of life. There is still a long way to go within the catalyst industry to ensure efficient recovery of minerals and metals.

At Topsoe, we believe there is both a benefit for the catalyst market and for society to explore and develop circular business models, to enable a more sustainable approach to handling spent catalysts as a resource and not waste.

Topsoe reactivates selected spent hydrotreating catalysts through our ReFRESH™ process to restore up to 95% of the fresh catalyst activity.

Our general approach to responsible sourcing is described on [→ page 43](#), including 3TG/conflict minerals on [→ page 44](#).



## THE KIRKPATRICK CHEMICAL ENGINEERING ACHIEVEMENT AWARD

In November, Topsoe received the prestigious Kirkpatrick Chemical Engineering Achievement Award for our hydrotreating catalyst (TK-6001 HySwell™), and the technology behind it. The TK-6001 HySwell™ catalyst increases product circularity because it can be regenerated and reused two to three times before it is reclaimed, without compromising performance. This reduces the consumption of energy and virgin metals. Similar traditional catalysts can only be reclaimed at the end of their life, i.e. downcycling.

# CHEMICAL FOOTPRINT MANAGEMENT

We strive to minimize the use of hazardous chemicals where feasible. Often, however, the hazardous materials in our products play a key role in the product performance and cannot be easily replaced by less hazardous alternatives.

Our approach to chemical and product safety management is to identify and mitigate potential risks where possible before products are made available for commercial use. Use of chemicals is an integrated component of our product development system. We assess hazards and risks at all steps - from raw material, intermediates in the production to final product - throughout the R&D process. In 2021, one hazardous raw material was substituted with a less hazardous alternative.

Determining the long-term health impacts of hazardous chemicals is an evolving science with a lot of new knowledge available in recent years. Historically, Topsoe's approach was to stay within compliance of the norms. We are making it a top priority to stay abreast of the state-of-the-art procedures and processes. We are also actively finding alternatives to hazardous chemicals used in our processes wherever feasible.

We ensure that employees, customers, contractors, and others handling our products have the information they need to mitigate the chemical risk associated with our products. This includes Safety Data Sheets (SDS), detailed procedures, workplace instructions, checklists, communication about hazards and safe handling, training, and monitoring programs.

All chemical substances used by us are evaluated with respect to hazard classification according to the criteria of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

Topsoe's catalysts are mixtures and classified in accordance with GHS criteria. All chemicals and products classified as carcinogen, mutagen or reprotoxic (CMRs) have high priority with respect to handling and precautionary measures. Between 5-10 substances used in around 300 of our finished products are classified as High Priority Chemicals. Around 250 finished

Topsoe products are non-high priority products.

We have a well-functioning management system in place which ensures that:

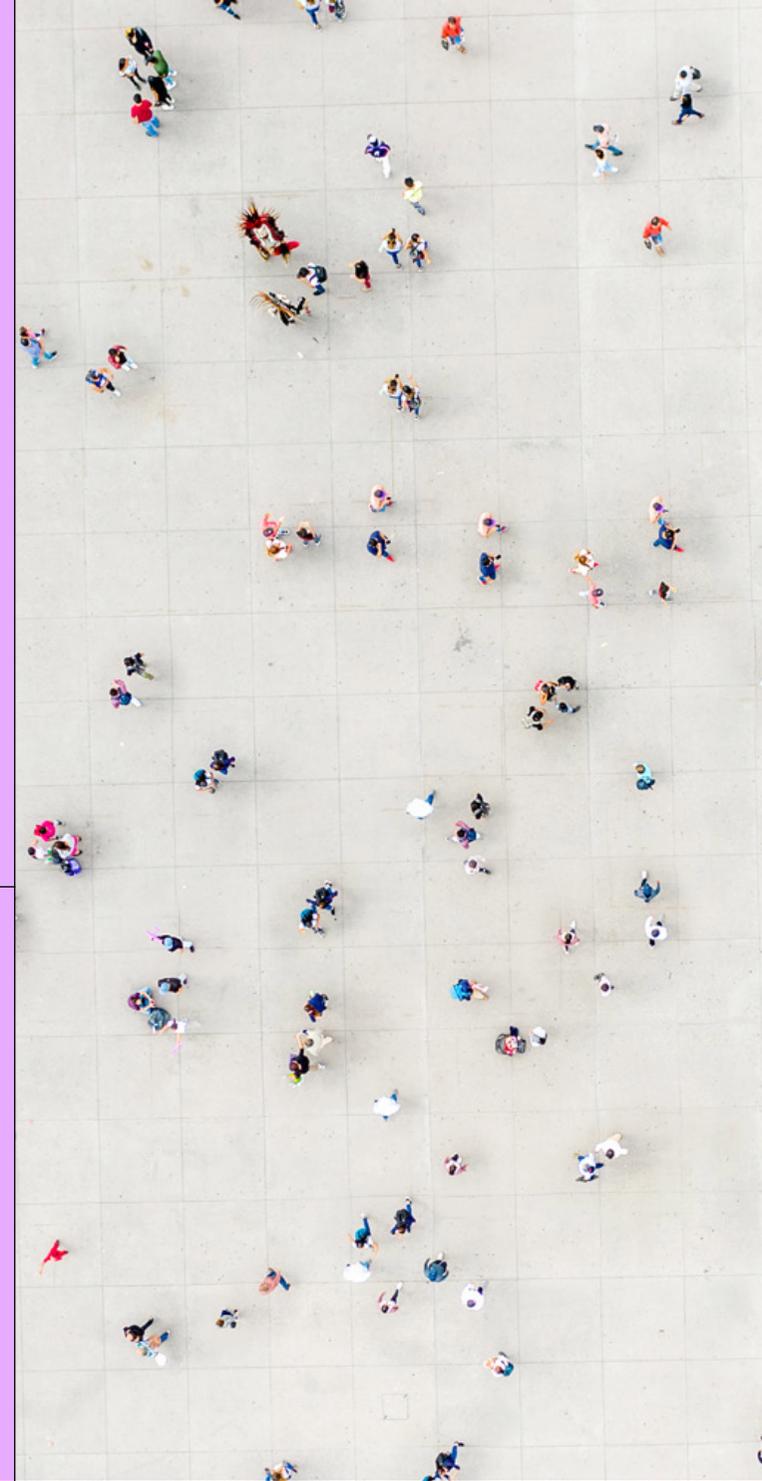
- all chemicals imported by us are received, maintained, and documented in compliance with applicable regulations and requirements;
- all registrations of inbound chemicals are validated;
- we monitor all relevant regulatory requirements and continuously evaluate the potential impact on our operations;
- we implement regulatory changes relating to hazard classifications of our products and hazard communication to ensure that our labels and SDS always are correct and up to date;
- registration requirements for our products are met in various jurisdictions, including EU REACH, Korea REACH, registration requirements in Turkey and BREXIT; and
- requirements on transportation of dangerous goods are fulfilled.



Our approach to chemical and product safety management is to identify and mitigate where possible potential risks before products are made available for commercial use.

# PEOPLE

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Donations & community development	45



## PROGRESS IN 2021

- Improvement in TRIF for employees
- Improved gender diversity ratio among managers
- Implementation of new performance management system
- Launch of Great Place to Work initiatives
- Implementation of Responsible Care® RC 14001 (US operations)
- Member of Responsible Minerals Initiative
- Conflict minerals policy updated to include cobalt and renamed 'Responsible Minerals Sourcing Policy'
- New partnership with Save the Children

## PRIORITIES 2022

- Develop diversity and inclusion initiatives, incl. unconscious bias training
- Develop company-wide human rights framework
- Strengthen our health and safety program for contractors
- Achieve TRIF of 0.6 for employees
- Extend zero harm training of leaders to include employees as well as contractors
- Sustainability training of key employees and functions

# SAFETY, WELL-BEING & FAIR WORKING CONDITIONS

We want Topsoe to be a great place to work. Our people are integral to the success of Topsoe. Developing a high-performance culture to reach our ambitious targets is reliant on engaged and motivated employees, who are provided with excellent working conditions and development opportunities.

## HEALTH & SAFETY

In Topsoe, we aspire toward 'Zero Harm'. Given the nature of our business, excellence in health & safety is our license to operate, and we are committed to ensuring the safety of our employees, contractors, business partners and community members.

Our health, safety and environmental (HSE) management system follows international standards such as ISO 45001 (Denmark) and RC 14001 (US), which include defined procedures, regular risk assessments,

internal spot checks, improvement plans, monitoring and reporting. We have a strong focus on preventing and mitigating safety risks through training, Zero Harm walks at our own sites, registration of observations and near misses, and sharing of learnings across the organization.

Our Global Health & Safety Policy was updated in 2021 to further reflect our Zero Harm aspiration as well as emphasize our increased focus on contractor safety.



Read our Global Health & Safety Policy on [→ topsoe.com](https://topsoe.com)

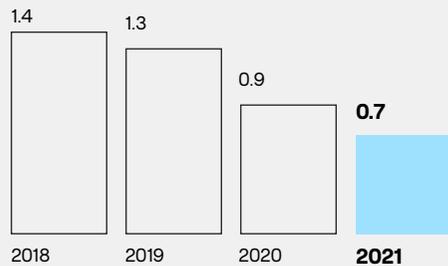
In Denmark, Topsoe has established Health & Safety Committees comprising managers and employees, who receive mandatory training, ensuring open dialogue around employees' interests.

By the end of 2021, the total recordable incident frequency (TRIF) per 200,000 working hours for employees was 0.7, which is a significant improvement compared to 0.9

## SAFETY

Ratio

# 0.7



Total recordable incident frequency (TRIF) per 200,000 working hours.

in 2020 and 1.3 in 2019, and in line with our target for the year of 0.7. Our TRIF target for 2022 is 0.6. Based on 2021 data, the main injuries were finger, hand and lower arm injuries.

In 2021, we have strengthened Topsoe's overall safety culture and intensified efforts in several areas.

→ All managers in operations have received an average of 12-16 hours of training in Zero Harm leadership and safety risk management to strengthen our risk identification, assessment and mitigation processes.

→ We took a more thorough look at the potential severity level of our incidents, including injuries and near misses, to ensure that our mitigation efforts are applied to high potential incidents (a combination of frequency/severity). 3% of our reported incidents have high potential.

→ We have strengthened local accountability and execution in our regional offices by appointing field safety liaisons responsible for setting standards and ensuring training of colleagues working at customer sites.

→ We launched a new IT solution (SAP EHS) to strengthen data management and analytics, ensure a more harmonized reporting system, and optimize workflows globally.

→ Contractor safety received additional focus in 2021 and will continue to do so in the years to come. We are not meeting our own high standards in this area, and we are determined for this to change.

→ Other new initiatives included monthly 'Zero Harm' calls for all employees globally to facilitate knowledge sharing around learnings and good practices across the organization, as well as improved outdoor safety at Topsoe's headquarters in Denmark.

COVID-19 continued to require a strong focus during 2021 to keep our operations running. Our COVID-19 response system, developed in 2020, continued in 2021 with few modifications. In general, we have taken a precautionary approach, always assessing risks and operational situations individually, prioritizing according to business-critical needs and geographical contexts, and complying with the recommendations from the local authorities. We have had a special focus on employees travelling to customer sites around the world.

## CHEMICAL PRODUCT STEWARDSHIP

We maintain a high standard of safety for all employees who work with chemicals through detailed procedures, workplace instructions, checklists, communication about hazards and safe handling, training and monitoring programs. We also make sure that business partners such as customers, contractors, and others handling Topsoe's products have all the information

they need to understand and mitigate the chemical risk associated with the handling and use of our products. All Topsoe's products are accompanied by Safety Data Sheets that provide information on safe handling of the products as well as emergency instructions.

Safety Data Sheets can be requested via [→ topsoe.com](https://topsoe.com)

Our approach to minimizing the use of hazardous chemicals is an integrated component of product design processes. But in some cases, these chemicals play a key role in the product performance and cannot be easily replaced by less hazardous alternatives. However, we have managed to find alternatives to some of our catalysts containing chromium. See [→ page 40](#).

## HUMAN RIGHTS

As a member of the UN Global Compact, we are committed to respecting all human and labor rights, as defined in the Universal Declaration of Human Rights, the International Covenant on Civil and Political Rights, the International Covenant on Economic, Social and Cultural Rights, and the International Labor Organization's Declaration on Fundamental Principles and Rights at Work.



# MOST SALIENT HUMAN RIGHTS RISKS

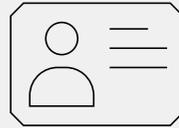
→ Click the arrows to read more in other sections of the report

Respect for human rights is an integral element of several of the focus areas in our sustainability framework: ensuring a fair and safe work environment, creating a workplace that is diverse and inclusive and free of discrimination, establishing a strong ethical business culture and ensuring responsibility throughout our value chain.

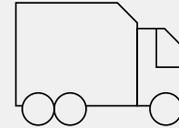
We are committed to continuously embedding a human rights-based perspective across our business practices in line with the UN Guiding Principles on Business and Human Rights. Our responsibilities go beyond our own employees and we are committed to safeguarding the rights of people in our business relationships, including clients, contractors, suppliers and our neighboring communities.

As a global company with a complex value chain, we can potentially cause, contribute to or be linked to adverse impact on human rights. The table on the right presents the most salient human rights risks that Topsoe is exposed to as well as key policies that incorporate how we work with human rights, reflecting the cross-functional nature of the topic.

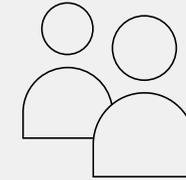
We strive to mitigate any negative impact on human rights by proactively assessing potential impacts throughout our value chain and by ensuring that a human rights perspective is integrated into our policies and procedures. We provide rights holders with access to our established grievance →



## Topsoe employees



## Value chain (Suppliers, Contractors & Customers)



## Communities

### Human rights risks

Safe and healthy working conditions →  
Right to health →  
Right to non-discrimination →

Safe and healthy working conditions →  
Right to non-discrimination →  
Right not to be subjected to slavery, servitude, or forced labor →  
Right to health →

Right to health →

### Risk mitigation

Topsoe Code of Conduct →  
Global Health & Safety Policy →  
Ensuring fair working conditions →  
Global Diversity Policy →

Supplier Code of Conduct →  
Global Health & Safety Policy incl. contractor safety →  
Responsible Minerals Sourcing Policy →  
Chemical Product Stewardship incl. Safety Data Sheets →

Global Environmental Policy →  
Global Health & Safety Policy →  
Chemical footprint management →

### Grievance mechanism

Topsoe Compliance Hotline →  
TopsoeTALKS →

Topsoe Compliance Hotline →  
Topsoe expects suppliers to establish own grievance mechanism →

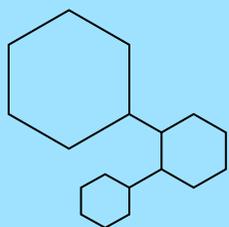
Topsoe Compliance Hotline →  
Stakeholder dialog →

### Measurement/ KPIs

Engagement score →  
Total Recordable Incident Frequency →  
Fatalities →  
Gender diversity →  
Substantiated reports via Topsoe Compliance Hotline →

Suppliers' commitment to Supplier Code of Conduct (%) →  
Substantiated reports via Topsoe Compliance Hotline →

Environmental incidents (spills and releases) →  
Substantiated reports via Topsoe Compliance Hotline →



## SAFER BY DESIGN: CHROMIUM-FREE CATALYSTS

Over the last decade, we have worked to gradually phase out chromium from our catalyst portfolio. Between 2010 and 2014, four catalysts were replaced with chromium-free alternatives. In 2021, two catalyst products were discontinued. A better and safer chromium-free alternative to Topsoe's high temperature shift catalyst was made commercially available in 2021, and we are currently developing a plan for phasing out the old product. We will continue until there is no more chromium in our catalyst portfolio.

mechanism, the Topsoe Compliance Hotline, to enable affected rights holders to voice any adverse impact that they may experience.

The Compliance & Governance team conducts annual compliance assessments related to human rights compliance. Human rights issues are monitored by the Compliance & Sustainability Committee, who also endorses and prioritizes actions and initiatives.

In 2021, Topsoe's Code of Conduct was updated to ensure an even stronger emphasis on our commitment to respecting human rights in all our operations and business relationships. Human rights issues were also included in our mandatory compliance & sustainability e-learning for all employees, and we published our first annual UK Modern Slavery Act Statement.

Going forward, our focus will be on ensuring a solid foundation for our due diligence practices and to improve tracking and reporting on our human rights risks.

### EMPLOYEE ENGAGEMENT & WELL-BEING

A fair, equal and respectful workplace provides a solid foundation for engagement and well-being for our employees and contributes toward a high-performing organization. We strive to provide good and fair working conditions in our global business. Employees have the right to join labor unions, and we ensure fair working

hours, remuneration and social benefits. In Denmark, we ensure a structured social dialog between management and employee representatives. We provide access to free fitness facilities and promote social interaction through annual gatherings, although such have been kept to a minimum due to COVID-19.

In 2021, we launched our 'Great Place to Work' initiative in Denmark with focus on health, flexibility at work and improved benefits to better align with the market. This included optional health checks for all employees, access to online doctor appointments, and improved health and pension insurance. Based on the COVID-19 experience, we also updated our global Flexible Work Policy supported by an expanded scope of IT equipment for home offices. We also provided access to online doctor appointments in India.

Our global employee engagement surveys, i.e. Topsoe Voices, are established feedback tools, which we use to actively involve employees in shaping the workplace at Topsoe. Well-being questions are also included in the engagement survey.

In 2021, we conducted three surveys, compared to six surveys in 2020, to give the organization more time to act on the insights between surveys. All surveys had very high response rates of more than 85%. The final – and most comprehensive – engagement survey was completed in November and showed an employee

engagement of 69%, 6 percentage points below our target of 75%. Our engagement score remains affected by the challenges arising from COVID-19 and the organizational restructuring in November 2020. Topsoe's purpose, vision, and the new strategy launched in August are perceived as highly motivating by employees, who also take great pride in working for Topsoe. In total, we received 1,500 comments and suggestions from employees on how to improve engagement and well-being, and these serve as input for initiatives and decisions in the time to come. Our target is to be in the top 25% of the industry benchmark in 2024.

During 2021, the Senior Leadership Team continued hosting monthly, virtual town hall meetings as well as live Q&A sessions with our CEO. Both fora have facilitated a continuous and open dialog on areas for improvement.

This year, we saw an increase in employee turnover from 6.0% to 8.7%. We attribute this to the restructuring in 2020, our new strategic direction, and the general high demand for highly skilled workers in today's labor market.

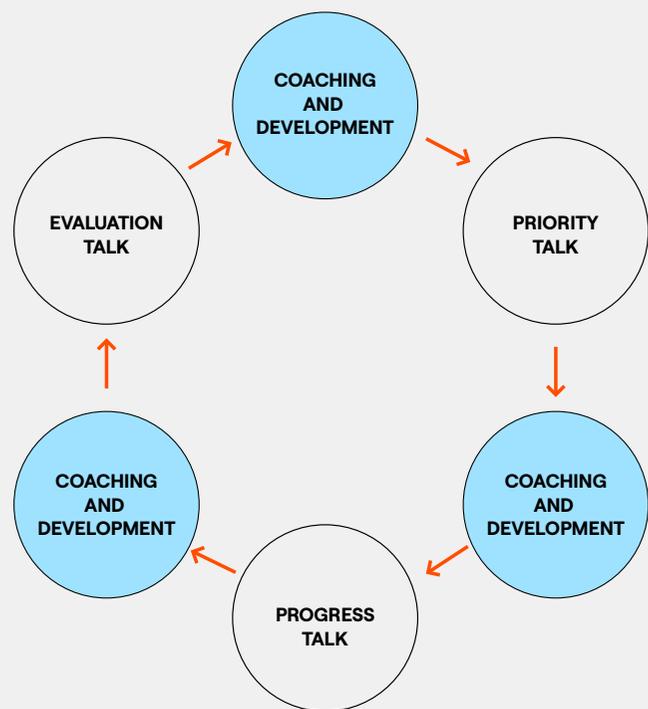
### EMPLOYEE DEVELOPMENT

Providing employees with ample opportunity to continuously develop and build new skills is key to maintaining an engaging working environment and ensuring that we can continue to attract and retain the sharpest minds.



# TOPSOE TALKS

Read more about our mission critical behaviours in our [→ Annual Report](#)



## OUR MISSION CRITICAL BEHAVIORS ARE

- I set ambitious goals for my work aligned with business priorities
- I will trust others and seek to gain their trust
- I relentlessly drive to make things better
- I communicate expectations and give open and honest feedback
- I collaborate in the pursuit of company goals

In 2021, we introduced a new performance management solution with the objective of building a high-performance culture in Topsoe. This approach is centered around three talks (i.e. TopsoeTALKS) spread out over the year, where manager and employee set individual goals, follow up and evaluate on individual performance. This lays the foundation for an open and honest feedback culture focused on results, performance and behaviors. As part of this, we also identified mission critical behaviors that define what good performance looks like and provide a transparent evaluation framework. 45 senior leaders were trained in elite leadership and how to build high-performance teams.

Going forward, this new performance management solution will improve our ability to identify talents, as well as implement development programs for employees and leaders that match future expectations, thus promoting career mobility at Topsoe.

The Topsoe Business Academy, consisting of monthly virtual presentations of key business areas, was launched in 2021 to enhance the general business understanding across our organization.

In Topsoe, we have a focus on building new skills and competencies as part of the day-to-day job. This is supported through the Topsoe Learning & Development Toolbox, which builds on employee development being 70% experience-based, 20% relationship-based through coaching and mentoring, and 10% training-based through formalized training programs and courses. Learnings from COVID-19 have shown an increase in demand in Topsoe for utilizing the benefits of working more digitally. As a result, more of our learning and development activities take place as webinars, e-learning programs and online seminars, which are more easily adapted to the schedules and geographies of our employees.

# DIVERSE & INCLUSIVE WORKPLACE

We strive for an inclusive and diverse workplace where everyone thrives and where we can harness the business benefits of different perspectives, backgrounds and experiences. Read our Global Diversity Policy on → [topsoe.com](https://topsoe.com)

## GENDER DIVERSITY

We are challenged by a typical under-representation of women in the STEM sectors. According to UNESCO, only 35% of STEM students in higher education globally are women. However, we remain determined to increase gender diversity at all levels, and our goal is 30% women in management positions by 2024. During 2021, we hosted 'Girls' Day in Science,' hoping that we can inspire the next generation of female scientists. We also participated in UN Global Compact's Target Gender Equality Program to gain inspiration for future initiatives. When using external recruitment agencies, we request gender-balanced shortlists.

By the end of 2021, the gender distribution among employees was 25% women and 75% men, compared to 26% and 74% in 2020. Looking at gender representation among managers, there has been a positive development in the share of women in 2021 to 25%, up from 22% in 2020. In the Senior Leadership Team, a change during 2021

shifted the gender balance to 22% women, compared to 33% in 2020.

Topsoe's Board of Directors consists of 12 members including four employee-elected board members. As of December, the shareholder-elected board members comprised one female and seven male members, unchanged from the year before. Given that there were also no changes to the Board composition following the re-election at the Annual General Meeting in 2021, our target of two female board members by 2024 was not met. The Board continues to focus on this target when evaluating its composition, competencies and potential future candidates. When including the employee-elected board members, four members were female, and eight members were male.

## INCLUSION

We have zero tolerance on harassment and discrimination, as iterated in our Anti-Harassment Policy. The policy was updated in 2021 to ensure better alignment across the organization on what is understood by harassment and how to report it in case harassment does takes place at the workplace. We also have a policy in place to motivate and retain senior employees through individual arrangements in Denmark.

## GENDER DIVERSITY

### BOARD OF DIRECTORS



### SENIOR LEADERSHIP TEAM



### MANAGERS



### EMPLOYEES



# RESPONSIBLE SOURCING

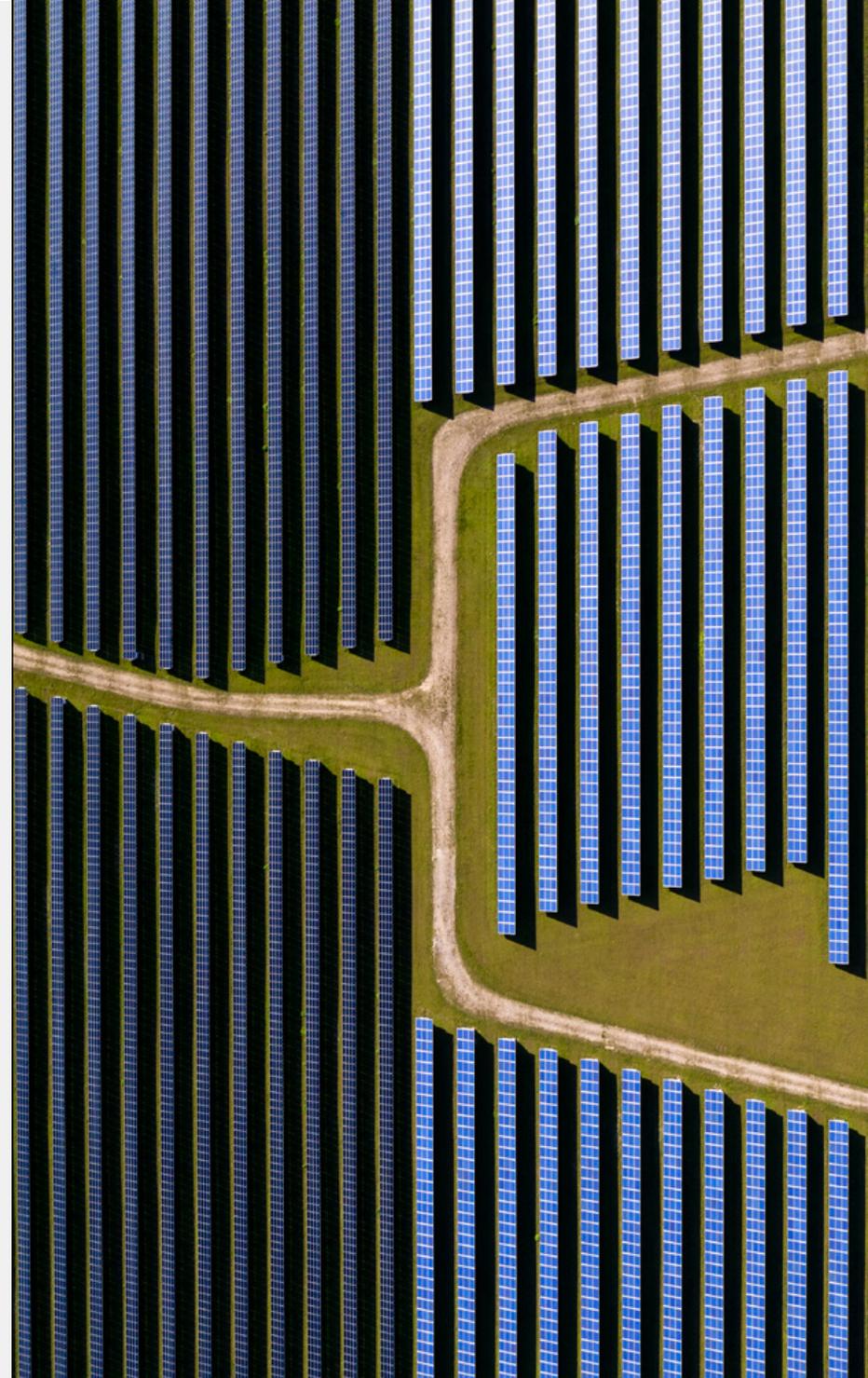
We pursue a responsible and balanced approach to our supply base and seek to integrate commercial risk, quality aspects as well as social, environmental, and ethical responsibility.

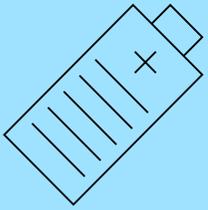
Topsoe buys raw materials and hardware from a global network of more than 500 suppliers. Most of these suppliers are based in countries which according to risk indicators such as child and forced labor, corruption perception index and freedom of association are classified as so-called low-risk countries. If identified, high-risk suppliers are subject to enhanced due diligence measures.

In 2021, Topsoe launched a new supplier assessment program to ensure improved due diligence of new suppliers. The program includes an expanded questionnaire covering suppliers' climate change activities, good and fair working conditions and sustainability performance benchmarks, which widens the scope for the sustainability assessment of our suppliers. In November, the process was implemented for potential new raw materials suppliers. Roll-out for remaining product categories continues in 2022.

To create the best foundation for ensuring strong and ethical supply chains, we expect our suppliers to commit to our standards of responsible business conduct. Topsoe's Supplier Code of Conduct outlines what we require from suppliers when it comes to human rights, fair working conditions, health & safety, environmental impact, and ethical business conduct. Included in this, we expect suppliers to establish a grievance mechanism to ensure that impacted rights holders can voice potential concerns, and we also provide information to suppliers on how they can access our grievance mechanism, the Topsoe Compliance Hotline.

Since the beginning of 2021, we have asked suppliers to sign our Supplier Code of Conduct or adhere to their own Code of equivalent standard. In case of suppliers not accepting our Code or failing to comply with our Code, we will seek to resolve this through dialog as the first measure.





# COBALT-FREE BATTERY MATERIALS

The lithium-ion battery is key to modern life and it is used for everything from phones and laptops to cars. Cobalt is a rare earth metal that is found in the cathode of almost all lithium-ion batteries used today.

Over the last decade, Topsoe has achieved decisive progress in developing next generation cathode material, so-called Lithium Nickel Manganese Oxide, LNMO. It is cobalt-free, high in manganese and relatively low in nickel and competitive with the performance of mainstream lithium-ion battery technologies on the market today. When brought to market, this cathode material will help mitigate issues related to cobalt mining. In 2021, Topsoe signed the first supply agreement for pilot production of cobalt-free cathode material with Morrow.

[→ Read more](#)

By the end of 2021, 70% of targeted suppliers had signed our Code or equivalent. In 2022, commitment to our Code will be a mandatory part of the onboarding process for new suppliers. Our ambition is to achieve 90% implementation of the Code in 2022 on a re-defined supplier scope based on spend.

Read Topsoe's Supplier Code of Conduct on [→ topsoe.com](https://topsoe.com)

## RESPONSIBLE MINERALS SOURCING

The term 'conflict minerals' refers to tin, tungsten, tantalum, and gold – also known as 3TG. These minerals are predominantly mined in areas suffering from armed conflicts such as civil war or witnessing weak or non-existing governance, and where systematic violations of international law, including human rights abuses, occur.

Topsoe is committed to responsible sourcing of tungsten, which is used in the production of some of our catalysts, and to comply with all applicable requirements, such as the EU Conflict Mineral Regulation. We have established a due diligence system based on the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas.

We require that our suppliers of tungsten declare that they comply with the above regulations and follow the required business standards for smelters and importers. All suppliers have identified the smelters relevant to the Topsoe value chain, and all

smelters are conformant with the Responsible Minerals Assurance Process (RMAP), which is the assessment program established by the Responsible Minerals Initiative. Topsoe became a member of the Responsible Minerals Initiative in 2021. We annually update our Conflict Minerals Reporting Template to provide our customers with up-to-date information on the minerals used in our products.

In 2021, the policy governing the due diligence related to conflict minerals was expanded to also include cobalt, and it was renamed 'Responsible Minerals Sourcing Policy'.

Read our Responsible Minerals Sourcing Policy on [→ topsoe.com](https://topsoe.com)

## COVID-19 IMPACT

The COVID-19 pandemic continued to affect our supply chain in 2021. Global transport has been disrupted, resulting in steep price increases and occasional delays. Changes in demand patterns have affected raw material prices significantly. Despite these fluctuations, deliveries from both Topsoe's own operations as well as from Topsoe's suppliers have remained stable.

# DONATIONS & COMMUNITY DEVELOPMENT

Doing good for others is a core company value. Every year, Topsoe allocates 0.1% of its annual revenue to global and local donations and community engagement activities. In 2021, Topsoe donated DKK 5.2 million.



← **COVID-19 Emergency Partner to UNICEF**

In 2021, Topsoe continued to support children affected by the global pandemic. As a key contribution, we supported the COVAX program, which has helped ensure vaccination of teachers and health workers, so that children could return safely to school and receive necessary health treatments. In September, we participated in a high-level UNICEF roundtable, providing input on how the corporate sector can engage strategically to help address global challenges such as COVID-19.

Image credit: UNICEF

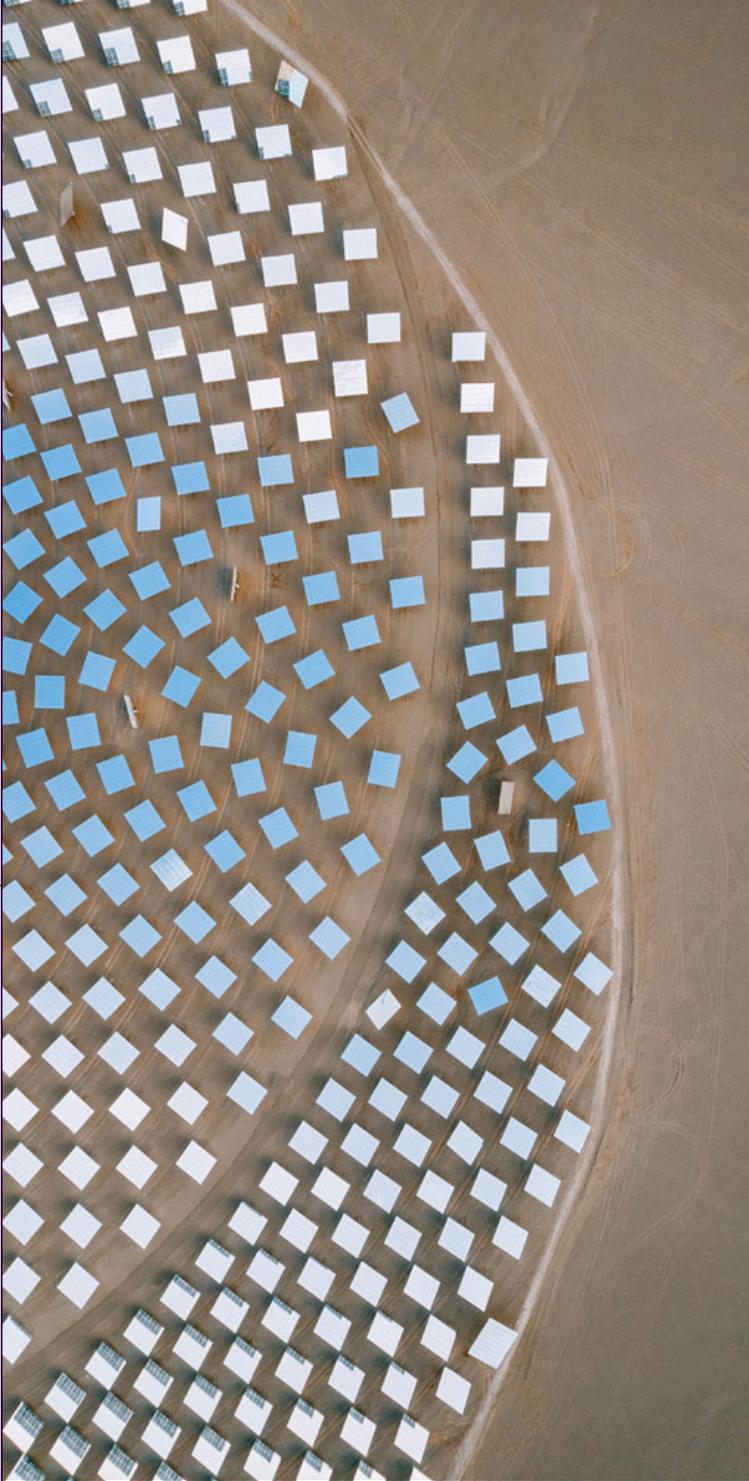
↑ **New three-year partnership with Save the Children**

Creating a better link between global donations and our company vision, we have partnered up with Save the Children to support 1) 18,000 children in Mali who are affected by climate change; and 2) their Child Emergency Fund, which ensures quick and effective humanitarian assistance in the aftermath of natural disasters, among others.

Image credit: Seyba Keita / Save the Children

# GOVERNANCE

Governance frameworks	47
Compliance management, due diligence & business ethics	49



## PROGRESS IN 2021

- Launch of updated Code of Conduct
- Launch of Competition Law e-learning
- 600 compliance reviews of third parties

## PRIORITIES 2022

- Strengthen our approach to minimizing anti-corruption risks with new training, optimized procedures and new control
- Internal awareness creation related to competition law

# GOVERNANCE FRAMEWORKS

Topsoe is committed to performing its activities in a compliant, transparent, and responsible manner. We lead our company based on good governance practices and have implemented governance and business structures to ensure that our customers, owners, business partners and other stakeholders can always trust us.

External regulations and business-related expectations are monitored and implemented through the Topsoe Code of Conduct and related policies, procedures, processes, and training.

Senior management is responsible for ensuring compliance with relevant requirements. The Compliance & Governance team conducts internal, annual assessments to test and document that the organization's monitoring and business procedures are up to date.

Topsoe's Compliance & Sustainability Committee oversees the portfolio of critical requirements and related risks, with regular reporting to the Board of Directors and as

relevant to the Audit Committee. The Compliance & Sustainability Committee meets at least two times per year. The Committee monitors material issues, sets direction for compliant and ethical business conduct, and oversees matters related to e.g. the Topsoe Code of Conduct, anti-corruption, trade, competition, and data privacy.

Read more about Corporate Governance on [→ topsoe.com](https://www.topsoe.com)

### CODE OF CONDUCT

Topsoe's Code of Conduct and associated policies put our company values into action and set standards for our behavior by outlining the requirements and processes

that employees must comply with in their daily work. Our Code of Conduct is a focal element of our compliance program and has been implemented throughout the organization through e-learning, policies, and processes relating to anti-corruption, anti-money laundering, economic sanctions, competition law, health & safety, and other business critical issues.

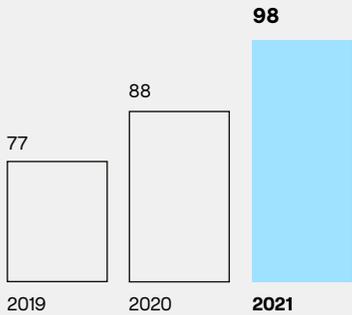
Topsoe employees receive Code of Conduct training as part of our global Compliance & Sustainability e-learning course. The training includes modules on anti-corruption (hospitality, gifts and entertainment), confidentiality, handling of potential conflicts of interest and practices for avoiding





CODE OF CONDUCT TRAINING

98



Completion rate (%) among Board members and employees

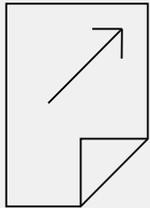
harassment. In March 2021, we re-launched our Code of Conduct and related e-learning which is mandatory for our Board of Directors and all employees. The e-learning was completed by 98% by year end, close to our annual target of 100% completion. The re-launch was supported by a global campaign where departments conducted a local risk assessment and reported back identified points of awareness.

**COMPLIANCE HOTLINE**

Topsoe's global Compliance Hotline (whistleblower solution) provides employees and external stakeholders with a channel for reporting concerns of unethical or unlawful behavior, anonymously if desired. Generally, and historically, internal concerns are reported openly and directly to colleagues

responsible for the relevant areas rather than through the Hotline. Hotline reports are handled by the Chief Compliance Officer and the Group General Counsel and managed according to complexity and severity as described in our compliance investigation procedure. Status on Hotline reports is reported to the Compliance & Sustainability Committee, to the Audit Committee and to the Board of Directors on an ad-hoc basis or at least annually.

During 2021, the reports received through the Hotline were handled and resolved in due time, and no reports of concerns were substantiated. Structures were evaluated to ensure alignment with the requirements of the EU Whistleblower Protection Directive and applicable law.



Topsoe's Compliance Hotline → [Read more](#)

Topsoe's Code of Conduct → [Read more](#)

# COMPLIANCE MANAGEMENT, DUE DILIGENCE & BUSINESS ETHICS

## RISK MANAGEMENT

Risks are a natural part of Topsoe's business activities. Topsoe operates an Enterprise Risk Management (ERM) setup to identify, quantify and mitigate risk related to the operation of Topsoe. Risks are annually identified and assessed followed by mitigating activities via thorough dialog with management teams across the organization. The Senior Leadership Team and the Audit Committee oversee the progress of risk mitigation.

Read more about our ERM process in our [Annual Report](#)

## ANTI-CORRUPTION & FAIR COMPETITION

Topsoe's global operations are exposed to the risk of encountering corrupt or unethical behavior. We are committed to always working against any type of corruption, bribery, fraud, or anti-competitive behavior. We have policies in

place for giving and receiving hospitality, gifts, and entertainment, and our third-party assurance and compliance due diligence processes support the continuing lawful conduct of our business and operations.

A key element of our updated Code of Conduct is a reinforced emphasis on our zero tolerance toward corrupt behavior. As a result, we have optimized business standards and policies, specific business partner procedures, as well as our contractual standards. Employees are trained in anti-corruption and anti-bribery as part of our mandatory e-learning course.

We launched a new Competition Law e-learning course in 2021, which is mandatory for key functions.

## GLOBAL TRADE DYNAMICS

Economic sanctions continued to impact global trade during the year. Topsoe continuously monitors and adjusts its

compliance program in accordance with applicable EU, US, and UN regulations, with special focus on export licenses for dual-use items and restrictions or prohibitions on commercial dealings with sanctioned countries and parties.

We successfully navigated new Belarus sanctions introduced in the first half of 2021 and have expanded our procedures to specifically address sanctions risks in certain jurisdictions.

In June, the Danish Business Authority selected Topsoe for an audit on the obligations under the EU's dual-use regulation. Minor findings and optimizations were identified and immediately addressed following a constructive visit. Our dual-use licenses were renewed without remarks following the audit.

## THIRD PARTY ASSURANCE & COMPLIANCE DUE DILIGENCE

To minimize third party risks, Topsoe performs compliance due diligence on several business partners as well as risk assessments based on the findings. This includes checking whether third parties are subject to economic sanctions and analyzing potential unlawful behavior, ranging from human rights violations over corruption to tax evasion risks.

In 2021, we reviewed 600 third parties, an increase of 37% compared to 2020, likely driven by increased awareness internally of the requirement of third-party screening. The conducted reviews resulted in both rejection of potential business partners, actions taken to eliminate risks, and acceptance of suitable business partners.

We have taken steps to further integrate ESG parameters into our assessment of third parties to ensure a holistic view of 

risks to both business, people and the environment, related to the operations of third parties.

Specified functions globally are currently receiving mandatory training through e-learning in a course we call 'Transparent Trade'.

### **DATA PRIVACY & PROTECTION OF INFORMATION**

Digitalization brings a world of opportunities for new ways of working, but also represents challenges when it comes to handling and protection of data. The privacy of individuals is important to us, and we are continuously adapting our processes to comply with privacy regulations that apply to our business.

Protecting our knowledge is critical and requires continuous optimizations. In 2021, we have made improvements where relevant and critical, and a more in-depth analysis has been initiated to further upgrade security levels, focusing on awareness, systems and controls.

Our use of data is limited to non-sensitive customer and employee data. The processing of data is done in accordance with all applicable laws such as GDPR and in accordance with the company's policies for data privacy and IT security. Advanced technologies such as AI and machine learning are used for operational performance data. With the limited processing of data, it is our assessment that

a policy for data ethics is not needed. We will evaluate the potential for and relevance of establishing such a policy in 2022.

### **CRISIS MANAGEMENT & EMERGENCY RESPONSE SYSTEM**

Our crisis management and emergency response systems are constructed to be scalable and applicable to any kind of crisis, accident or disaster. The aim is to limit the impact on people, the environment, and other assets, as well as the company's reputation, and external stakeholders. Business continuity aspects are built into our crisis management system.

Dealing with the ongoing COVID-19 pandemic has shown us that the structures we have in place provide us with a solid foundation for navigating challenges in an efficient and agile manner.

Our two-tiered task force, which ensures alignment across all levels of the organization, can be scaled up and down as needed. The second tier is our primary response team, which comprises an operational team of employee representatives from Safety, IT, Facility, Communication, Travel and HR. When relevant, we can activate our tier one comprising senior management representatives who focus on globally applicable aspects, including harmonized response.

Our crisis response across locations has proven to be robust, as we have managed to

respond effectively to events such as a fire, a deep freeze winter and one hurricane. At our US production site, we took on the coordinating role in collaboration with local authorities for a fire exercise involving companies in the industrial area.

### **RESPONSIBLE TAX**

Topsoe is committed to contributing to the further development of the communities in which the company operates. A responsible tax approach forms an integral part of that commitment. Topsoe's tax policy applies to all group companies and is approved by the Board of Directors.

In 2021, we paid DKK 100 million in tax globally. We expect to have a tax refund of DKK 30 million for 2021. The tax refund is primarily due to increased write-off on R&D cost in Denmark.

Topsoe has a responsible, transparent and consistent approach to all tax matters. We always do our utmost to comply with tax legislation in the countries in which we operate, by following both the letter and the intention of the law.

We pay taxes where value is created, and we do not use contrived or abnormal tax structures that are intended for tax avoidance, which have no commercial substance, or which do not meet the spirit of local or international tax law. When establishing subsidiaries and branches, Topsoe will consider this based on the business opportunities that represent

themselves. Topsoe does not use tax havens, where the business activities are elsewhere, to gain tax benefits.

Topsoe makes best efforts to secure that the tax position in the company reflects the business reality of the transaction. We submit country-by-country reporting and transfer pricing documentation in accordance with the laws in the countries where we are present.

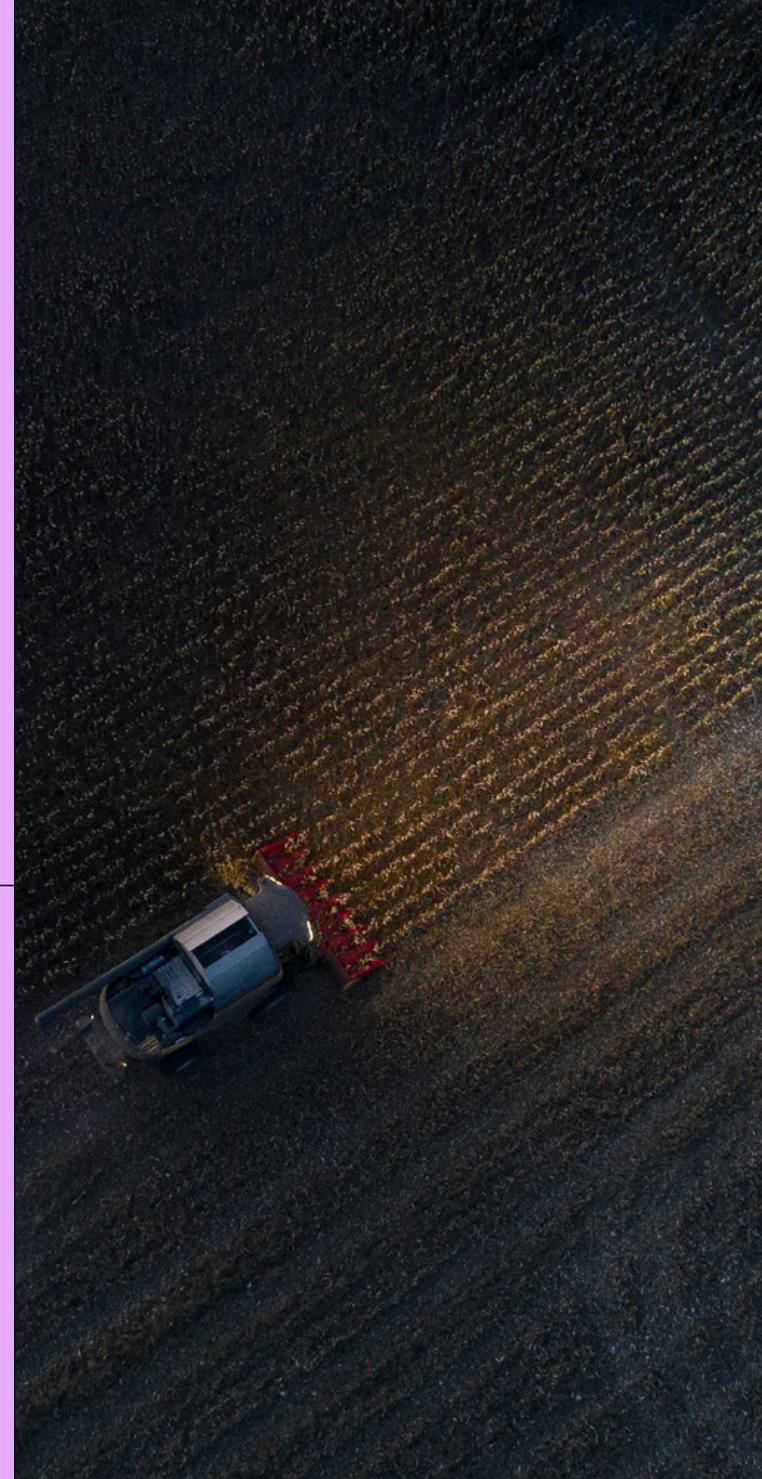
Read our Tax policy on → [topsoe.com](https://www.topsoe.com)

# PERFORMANCE DATA & DEFINITIONS

Performance data  
Data definitions

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53



# PERFORMANCE DATA

	2021	2020	2019
<b>Innovation</b>			
R&D spend-to-revenue ratio (%)	9.2	8.3	8.0
New commercialized solutions (number)	17	13	14
Issued patents per year (number)	402	489	323
Green patents - published patents per year in EPO (%)	41	49	49
<b>Environment</b>			
Energy consumption (TJ) - natural gas and electricity	959	1,143 <sup>1</sup>	984
GHG emissions - scope 1, 2, 3 - Market-based (1,000 tCO <sub>2</sub> e)	550	585	-
GHG emissions - scope 1 (1,000 tCO <sub>2</sub> e)	94	121	120
GHG emissions - scope 2 - Location-based (1,000 tCO <sub>2</sub> e)	14	16 <sup>1</sup>	27
GHG emissions - scope 2 - Market-based (1,000 tCO <sub>2</sub> e)	33	35 <sup>1</sup>	44
GHG emissions - material scope 3 (1,000 tCO <sub>2</sub> e)	423	429	-
Products to market (1,000 tonnes)	77	91	84
Water consumption (1,000 m <sup>3</sup> )	205	222 <sup>2</sup>	263 <sup>2</sup>
Waste total (tonnes)	4,251	5,011 <sup>3</sup>	4,932
Waste total hazardous (tonnes)	3,219	3,455	3,389
Waste total non-hazardous (tonnes)	1,032	1,556	1,542
Environmental non-conformities (number)	22	23	23
Spills - major <sup>4</sup> (number)	0	1	0
Spills - minor (number)	149	413	358
Releases - major (number)	1	2	1
Releases - minor (number)	21	18	21

- Scope 2 emission factor in Denmark where updated since reported in 2020. This resulted in the location-based emission factor changing from 145 to 122 gCO<sub>2</sub>e/kWh and the market-based emission factor from 346 to 378 gCO<sub>2</sub>e/kWh.
- Water consumption for 2020 has been restated for US operations at 41,830 m<sup>3</sup> compared to 62,351 m<sup>3</sup>. Change is due to improved reporting processes and year-end restatements.
- Waste reported for 2020 has decreased by 15%. Change is due to improved reporting processes and year-end restatements.

	2021	2020	2019
<b>People</b>			
Average number of employees	2,133	2,268	2,238
Employee engagement score (%)	69	73	63
Employee turnover (%) <sup>5</sup>	8.70	6.04	6.99
Total recordable incident frequency (TRIF) per 200,000 working hours - employees	0.69	0.90	1.29
Fatalities - employees (number)	0	0	0
Gender - all employees - male/female (%)	75/25	74/26	73/27
Gender - Senior Leadership Team - male/female (%)	78/22	67/33	60/40
Gender - managers - male/female (%)	75/25	78/22	78/22
Gender - Board of Directors - male/female (%)	87/13	87/13	86/14
Supplier Code of Conduct implementation (%)	70	46	-
Tungsten smelters conformant with RMAP (%)	100	-	-
Donations spend (DKK million)	5.2	5.0	3.3
<b>Governance</b>			
Code of Conduct training - completion rate (%)	98	88	77
Compliance Hotline - substantiated reports (number)	0	0	0
Topsoe compliance due diligence screenings of third parties (number)	600	437	376
<b>Financial performance (DKK million)</b>			
Revenue	6,255	6,179	5,897
EBITDA	1,233	1,178	1,125
EBIT before special items	903	853	806
Net profit	890	480	714
Corporation tax	164	114	224

- Number of environmental incidents are provided on a more granular level of incident type compared to previous years.
- Employee turnover has been changed from total turnover to turnover related to employees who have retired or resigned.

# DATA BOUNDARIES

Information and data presented in this report cover Haldor Topsoe A/S and subsidiaries controlled by Topsoe.

Information and data related to energy consumption and GHG emissions are reported for all Topsoe sites including operations, R&D, and regional offices. All other environmental performance data represent our Danish and US operations only.

## NOTE – GHG REDUCTION TARGET 2021 (15%)

Our target for 2021 was to reduce our scope 1 and 2 emissions by 15% on a like-for-like basis, using 2019 as the baseline year. During 2021, we have realized that it is challenging for us to apply a like-for-like principle as well as intensity targets for our catalyst production, although this would be the more appropriate way to monitor progress. The challenge arises from the diversity of our production mix, and the fact that we need more granularity in the data about energy consumption for production runs of catalysts. Work has been initiated to identify what is needed to automate energy consumption per product run. In the meantime, we can only report on absolute reductions.

# DATA DEFINITIONS

## AVERAGE NUMBER OF EMPLOYEES

Reported as full-time equivalents (FTEs) based on a yearly average.

## CODE OF CONDUCT TRAINING

Refers to the completion rate for Board of Directors and employees by the end of the calendar year, as a percentage of all employees/Board members in scope. For employees, it includes all permanent and temporary operators, technicians, students and office-based employees globally. Employees with limited access to Topsoe systems via a PC are trained face-to-face, and retroactively documented.

## COMPLIANCE DUE DILIGENCE SCREENINGS

The number of completed compliance due diligence screenings performed by Topsoe on relevant third parties during the reporting year. Compliance due diligence screening is required for third parties from or involving certain countries and for certain third-party types in accordance with internal Topsoe policies.

## COMPLIANCE HOTLINE REPORTS

The number of reports submitted via Topsoe's Compliance Hotline (link: <https://topsoe.whistleblownetwork.net/>) which were 1) within the scope of reportable issues and 2) pointed out a concern, or allegation, which was true, and needed to be corrected.

## DONATIONS SPEND

Annual realized spend related to global and local philanthropic purposes.

## EMPLOYEE ENGAGEMENT SCORE

Consolidated engagement score from our internal engagement survey, Topsoe Voices, covering all Topsoe employees with more than two months of seniority, excluding student assistants. A participation rate of more than 75–80% is needed for data to be representative. Shared PCs are made available for employees with no/limited access to a Topsoe system via a PC.

## EMPLOYEE TURNOVER

The percentage of employees who retire or resign from Topsoe in the course of one calendar year.

## ENERGY CONSUMPTION

Total energy consumed by our production sites, R&D, administrative locations and regional offices. Data is obtained from invoices and readings of meters at production sites.

## ENVIRONMENTAL NON-CONFORMITIES

Refers to breaches of regulatory terms and conditions specified in local environmental permits, where separate notification to the environmental authorities is required, or where a notice of violation is received from the environmental authorities. →

## FATALITIES

Number of work-related fatalities to employees.

## FINANCIAL PERFORMANCE DATA

Accounting policy is described in the audited Annual Report 2021 of Haldor Topsoe A/S. → [Annual Report 2021](#)

## GENDER DIVERSITY

Calculated as the percentage of headcounts based on a yearly average by the end of the calendar year. The headcounts figure does not include student workers or senior employees on part-time agreements. Management positions cover all positions including and above team leader level. For the Senior Leadership Team, the number is calculated as the percentage of each gender out of the total number of members at year-end. For the Board of Directors, the number is calculated as the percentage of each gender out of the total number of shareholder-elected members at year-end.

## GREENHOUSE GAS EMISSIONS

Carbon dioxide equivalent, i.e. CO<sub>2</sub>e, is the metric used to compare the emissions from greenhouse gas emissions on the basis of their global warming potential. Total CO<sub>2</sub>e have been measured for scope 1, 2 and 3 in accordance with the Greenhouse Gas Protocol, using an operational control principle. Location and market based emission factors are provided for scope 2 emissions.

## GREEN PATENTS

Defined as patent applications in the EPO data that have received a CDC patent classification code starting with Y02, including all subclasses. These classes are allocated by the patent authorities, i.e. EPO. Patent applications are published 18 months after their filing date. 'Published' is defined as earliest publication date for the patent family. Data is extracted from EPO's patent register.

## NEW COMMERCIALIZED SOLUTIONS

New solutions offered to customers covering all product categories in Topsoe's commercial portfolio: catalysts, technology, combination of catalysts and technology, hardware and service. Not related to sales.

## NEW ISSUED PATENTS

Refers to new patents granted by national and regional patent authorities during one calendar year. Data is extracted from Topsoe's internal IP management system.

## PRODUCTS TO MARKET

Products to market account for all catalysts, alumina and potassium nitrate sold within a calendar year. It excludes hardware, engineering services and licensed products.

## R&D SPEND-TO-REVENUE RATIO

Accounting policy is described in the audited Annual Report 2021 of Haldor Topsoe A/S. → [Annual Report 2021](#)

## SPILLS AND RELEASES

Spills are defined as contained environmental incidents which are not emitted to land, air or water. Releases are defined as environmental incidents which result in a substance being emitted to land, air or water. Minor or major spills and releases are defined in compliance with local operational permits, the nature and amount of the referenced substance. Incidents which exceed predefined thresholds will determine the categorization.

## SUPPLIER CODE OF CONDUCT

Refers to the percentage of all relevant suppliers who have accepted to adhere to the Topsoe Supplier Code of Conduct or their own Code of equivalent standard. A relevant supplier is one that we currently source from, where the annual spend is above DKK 10,000, and where we have been able to influence the choice of supplier for the purchase order.

## TOTAL RECORDABLE INCIDENT FREQUENCY (TRIF)

Total recordable incident frequency (TRIF) is defined as: Number of injuries (fatalities, lost time accidents, restricted work cases, medical cases) divided by total number of hours worked by all employees and multiplied by 200,000. Hours worked refers to actual working hours as reported by employees. Covers Topsoe's employees, including temporary workers. Excludes employees diagnosed with COVID-19.

## TUNGSTEN SMELTERS CONFORMANT WITH RMAP

Percentage of tungsten smelters in Topsoe's supply chain that are conformant with the Responsible Minerals Assurance Process (RMAP) for the reporting year.

## WASTE

Covers both hazardous and non-hazardous waste. US waste data is collected from the annual waste tracking of invoices with attached waste manifests and Danish waste data is collected from invoices from third parties. Hazardous waste has properties that make it dangerous or capable of having a harmful effect on human health or the environment. Non-hazardous waste causes no harm to human health or the environment.

## WATER CONSUMPTION

Water sources include municipal water supply, ground water or water from Topsoe's own well. Data on water consumption is obtained from invoiced data from our providers and from readings of meters at production sites.



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