



Sustainability report 2021





GEMINOR

#sustainability
#circulareconomy
#recycle

Photo: Unsplash

Sustainability report 2021



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Introduction

About this report



Geminor's goal is to provide the most sustainable resource recovery and safe waste treatment to our customers. A key part of this is providing our stakeholders with consistent and transparent reporting that clearly shows our achievements, goals, and progress towards reaching them. This report presents Geminor sustainability goals and KPIs, our progress so far, and the reporting methodologies applied. The report is structured according to three focus areas. Within each of them, the relevant SDGs and KPI results are presented.

Geminor has been reporting on environmental performance since 2016. In 2021, we issued our first sustainability report incorporating ESG principles and KPIs based on the United Nations Sustainable development goals. The report was well received both within the organization and by our stakeholders.

Photo: Unsplash



"This report presents Geminor sustainability goals and KPIs, our progress so far, and the reporting methodologies applied".

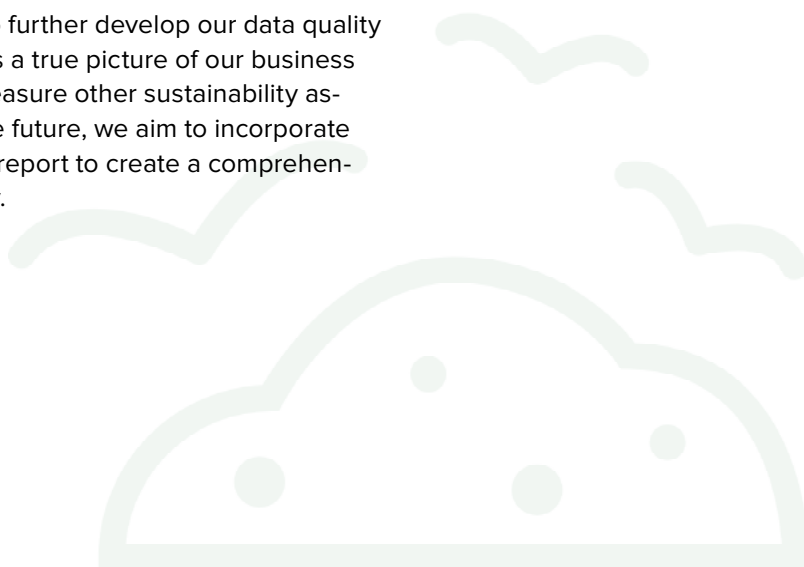
This year's report focuses on performance trends and builds on the previous one, as well as on the environmental reports conducted before 2020. The reporting method is based on the methodologies of the Greenhouse Gas Protocol (GHG Protocol), the Global Reporting Initiative (GRI), EU guidelines on non-financial reporting and the UN Sustainable Development Goals (SDGs). Other frameworks were also consulted in connection with the report development work, such as the Taskforce on Climate-related Financial Disclosures (TCFD).

To establish and prioritize focus areas for the company's ESG efforts, a materiality analysis was created in the beginning of 2020 using a stakeholder survey. In addition, Geminor's risks and opportunities connected to sustainability were initially identified through an internal workshop. This determined the areas with the greatest potential for positive impacts and reduction of negative impacts in our value chain. We are currently expanding our risk evaluation platform to further pinpoint where our efforts are best spent towards achieving our KPIs. This report gives us an opportunity to not only show how Geminor is operating, but to point out and raise awareness about the challenges faced by the recycling industry.

Reporting methods and development

As of 2021, the establishment of a common framework for ESG reporting is still a work in progress, and for smaller businesses like Geminor there have so far been few concrete requirements. However, the introduction of the EU Taxonomy classifying economic activity according to how they affect six established environmental goals, drives the need for more comprehensive reporting frameworks. The EU is replacing their current Non-Financial Reporting Directive (NFRD) by the Corporate Sustainability Reporting Directive (CSRD) from 2024. This will apply to more companies and set clearer expectations related to reporting methods. Hopefully, this framework will make it easier to know what to report on and how to do it so that incomplete or poorly balanced reporting no longer impairs comparability across different companies' sustainability performance.

This report is created based on the best available data accessible to us at the time of reporting. We are continuously working to further develop our data quality and accuracy to ensure that our reporting reflects a true picture of our business activities. We will also be adapting our KPIs to measure other sustainability aspects of our operations as time progresses. In the future, we aim to incorporate the sustainability report with the annual financial report to create a comprehensive document reflecting all parts of the company.



Words from the CEO

Photo: Geminor



Kjetil Vikingstad
CEO

Geminor's focus on ESG is being noticed by our partners and competitors, bringing us new opportunities for collaboration and product development. The market looks to Geminor for advice and inspiration on how to incorporate sustainability into the core business operations. Our first comprehensive sustainability report published in 2021 was very well received leading to our partners and customers contacting us to find synergies and draw on our experience in this area. We have even acted as an advisor on how to get started with ESG work using concrete KPIs, long term planning and reporting. This shows that we are on the right path and that we have gained considerable knowledge and experience in this area.

We also see increasing awareness and requirements on environmental considerations from our customers and municipal tenders. This ongoing shift from the former prevalence for price-only requirements makes it easier for us to develop and provide profitable solutions that lead to lower environmental impacts. However, our position in the market makes us particularly susceptible to fluctuations in the market and our customers' requirements. Our role is to advice and cater to our customers' needs, which means that the least costly solution is still often prioritized. The geopolitical events of the last year have not helped mitigate this trend, and we are therefore limited by the willingness and ability in the market to carry the cost that is often associated with greener solutions. However, regulations on emissions and waste treatment across Europe are putting pressure on the market, giving us more room to promote more sustainable and efficient use of resources.

"Geminor is constantly seeking to improve, and this naturally also applies to ESG".

Despite market limitations, we are determined to keep developing sustainable products and solutions. A prime example is the BIO RDF project where the goal is to offer a residual fraction with a reduced fossil content suitable for incineration plants who want to lower costs on ETS CO₂ quotas. We are also developing Gemisoft to cater to the increased demand for customer reports, especially regarding CO₂ emissions. Our goal is to build on the current customer portal to create a two-way forum for data sharing. In addition to inhouse development

projects we are involved in external R&D projects seeking to use waste in different industrial processes as well as for carbon capture and storage.

The results of this report show that we are reducing our scope 1 emissions, and the same is expected for next year's scope 2 emissions due to new guarantees of origin. We have also reached and exceeded our 200 000 tonnes recycling goal. As expected, improvements to our data quality resulted in increased scope 3 emissions. This shows the sensitivity of the calculation methods, and the importance of using appropriate estimates and emission factors.

Geminor is constantly seeking to improve, and this naturally also applies to ESG. This report is meant to provide transparency and insight into our efforts to our stakeholders, and hopefully some inspiration as well. I hope you will enjoy the read!



Geminor and Quantafuel meeting in Oslo.

Photo: Kjetil Vikingstad

Presenting Geminor

Geminor is one of Europe's leading resource management companies providing waste treatment and logistics services and solutions to the waste and recycling industries. In 2021, Geminor handled nearly 1.7 million tonnes of waste directed at energy recovery and material recycling. Geminor had 86 employees at the end of 2021 divided between its head office at Karmøy (Norway) and departments in the United Kingdom, Finland, Denmark, Sweden, Germany, Italy and Poland. In addition to these offices, Geminor currently has operations at 11 HUBs located in several countries where waste can be temporarily stored and treated before it is delivered to recycling or energy recovery.

In 2021, Quantafuel became part owner in the Geminor Group. Together, we aim to become the leading recycler of plastics in the Nordics. Quantafuel is a chemical plastic recycling company that develops and operates plants to produce versatile oil products from non-recyclable waste plastics. They currently have operations in both Denmark and Norway. The company is aiming to contribute to Europe's growing circular economy by supplying considerable volumes of sustainable recycled plastic feedstock. Quantafuel will be an important partner for Geminor in achieving its goals for increased recovery of materials and circularity, which is in line with company strategy.



Mission, vision and strategy

STRATEGY

Our long-term goal is to develop Geminor into one of Europe's leading waste handling companies with sustainability as our foundation. Our strategic focus is on increasing our volumes, developing less fossil carbon intense fractions and finding safe and profitable solutions for plastic recycling and treatment. Our goal is to achieve fossil free and net zero direct emissions from our operations by 2030 by replacing our equipment with electric or less emitting machinery depending on the available technology. The remaining emissions will be offset through carbon credits.

To address our indirect emissions, we aim to influence our value chain to make more sustainable choices. Through our purchasing power we can set environmental requirements to the services and equipment we acquired. Geminor's role has long been to find the most cost-effective solutions for our customers. Now we are working to create a tool that calculates the footprint of our services and enables us to offer our customers different solutions based on both costs and environmental considerations. This approach is meant to raise awareness and nudge consumption in a direction of lower environmental impact.

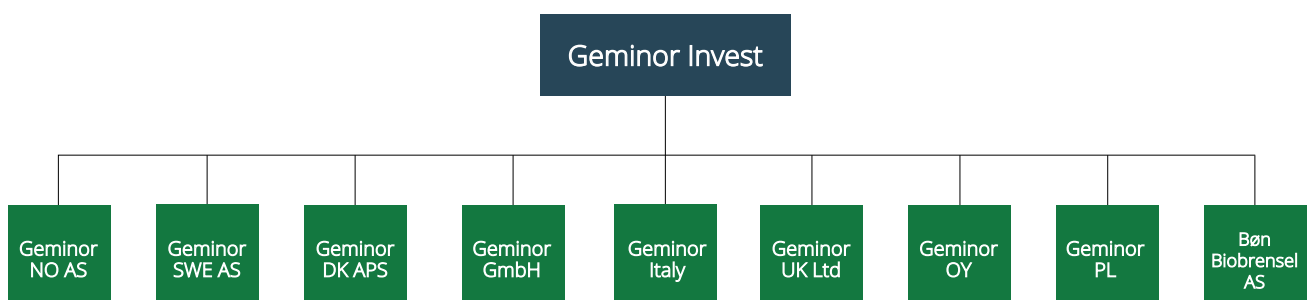
MISSION

Geminor shall deliver materials and energy recovery solutions for waste that are innovative, competitive, and practical achievable for our customers. We shall strengthen and develop our employees to provide increase value creation for the company and our customers both short and long-term. Geminor shall deliver results that allows the company to grow and prosper and continue developing its service for its customers.

VISION

To serve our customers and deliver the best waste to recycling and recovery solutions in the market.

Company structure





Barge transport of waste wood.

Photo: Geminor

HUBs and services

Geminor has established logistics centres, so called HUBs that allow us to optimize our logistics solution, as well as store and tailor the material to our customers' quality specifications. The HUBs are located in Norway, Sweden, Denmark, Finland, UK and Germany, and we are currently working to open a new HUB in Hull, UK. Six of the HUBs in Norway, Sweden, Finland and Denmark are run by Geminor Waste Treatment. We offer sorting, shredding and quality control of many different fractions – mainly paper, waste wood, SRF and plastics.

Quality systems

ISO CERTIFICATIONS

Geminor is committed to delivering quality services to customers and suppliers whilst driving innovation and continual improvement in all aspects of our business. We are certified within the ISO 14001:2015, ISO 9001:2015 and ISO 45001:2018 Quality Standards.



LANDAX

Geminor uses Landax, a web-based quality management system for systematic control of Quality, Health, Safety and Environmental activities in our business. The system is built in accordance with the ISO standards within environment, quality, health, and safety. Landax is used to keep track of internal processes, compliance, documentation, improvements, non-conformities (NCRs), risk analysis, protocols and more.

SUPEROFFICE

SuperOffice is Geminor's CRM system. Here, all customer, offtaker and other subcontractor information is filed together with relevant documentation like contracts, quality specifications, communication etc.

GEMISOFT

Gemisoft is a software developed by Geminor containing all relevant project data hence providing a detailed overview of all our projects. It is a database holding all contracts, notifications, logistic operations, and deliveries. Gemisoft generates and tracks movement documents for all deliveries, creates statistics for all tonnages collected and delivered, in addition to being used for invoicing and cost control. It is the heart of the business and a crucial tool for our organization to provide a reliable service of high quality to our customers.



Key figures 2021



TURNOVER:
155 M EUR



TONNAGE:
1,7 M



PRODUCERS:
>360



OFFTAKERS:
>260



EMPLOYEES:
86



WOMEN:
29%



OFFICES:
8

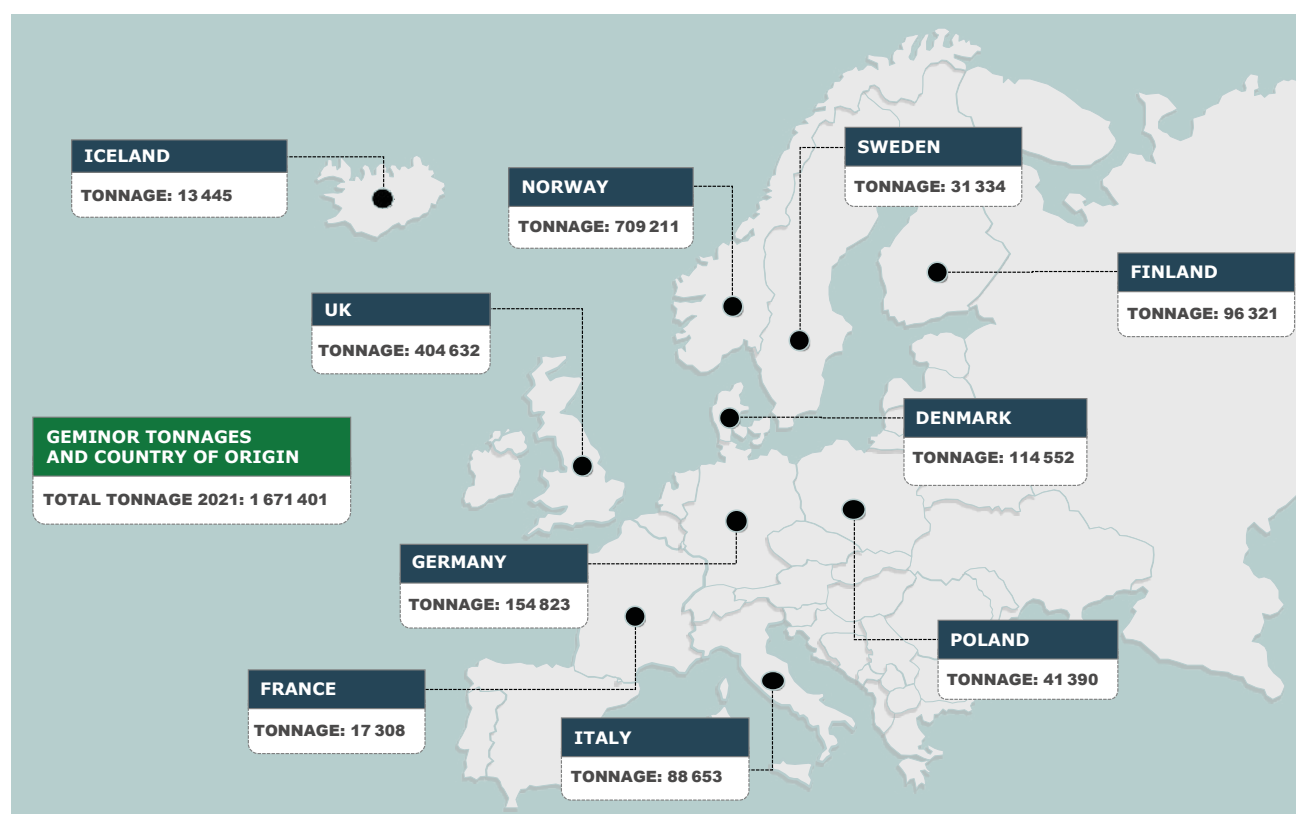


LANGUAGES:
10

TONNAGES AND TRENDS

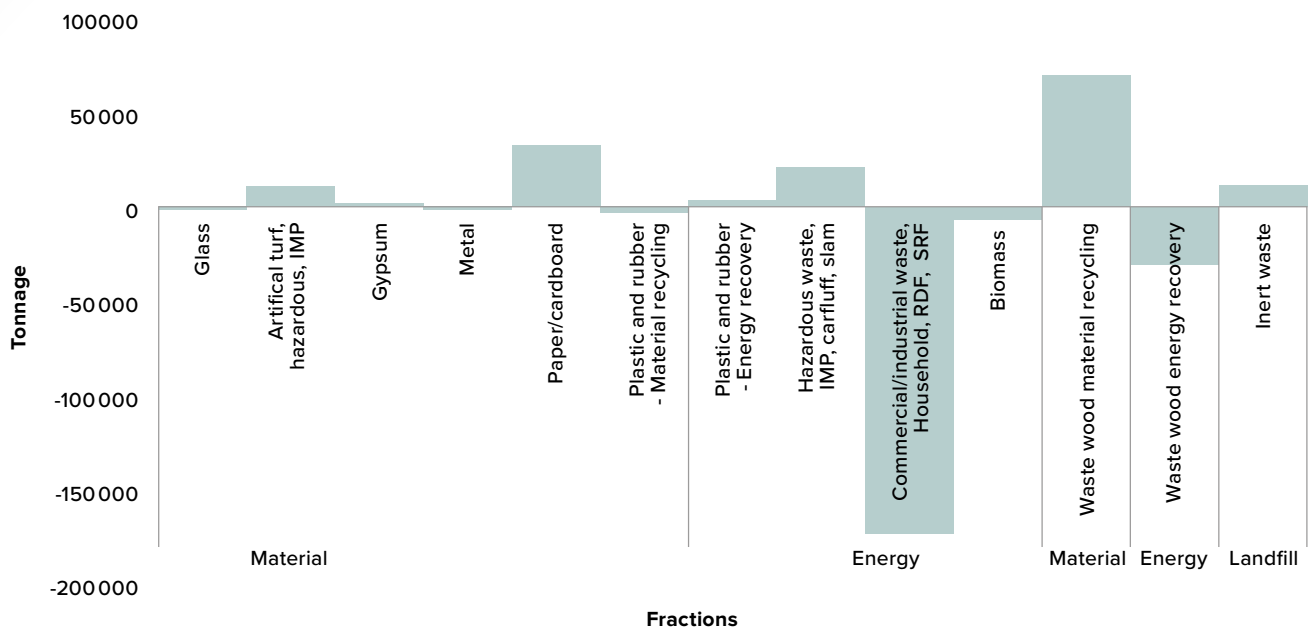
Geminor handled a total of 1,67 Mt in 2021, a slight decrease of 3% compared to 2020 (1,74 Mt). The market implications caused by Covid 19 affected most companies last year, and waste streams were still less than normal due to lower consumption and supply chain disruptions. Despite this we managed to keep our portfolio stable, and we continue to work towards our long-term strategy of increased tonnages. The distribution of tonnages handled across our offices is shown in the figure below. Norway, UK and Germany remain our largest market areas.

Geminor across Europe 2021



Even though the total tonnage remained stable, the individual fractions saw changes in magnitude. Notably, inert waste, hazardous waste and recycled waste wood saw the greatest relative percentage increases compared to 2020. This trend is reflected in the near doubling of recycled waste wood tonnages. Paper and cardboard also saw a significant increase of almost 60% compared to the year before. The greatest tonnage decrease occurred for residual waste (RDF, SRF, household and commercial), along with waste wood for energy recycling. This trend is expected following the focus on increased material recycling in the European market. The change in tonnage per fraction in 2021 compared to 2020 is shown in the figure below.

Tonnage difference - 2020 to 2021

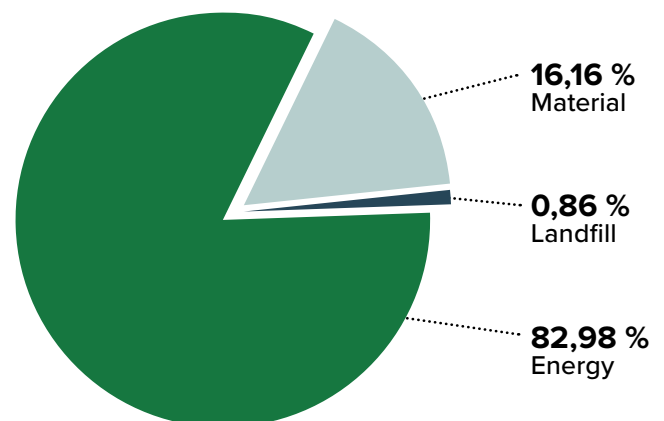


Tonnage difference between 2020 and 2021 per fraction.

RECOVERY METHOD

Approximately 16% of the waste handled by Geminor in 2021 was recycled. The rest was energy recovered apart from a small share of non-recyclable and hazardous waste that was safely landfilled. Compared to ca. 9% in 2020, the material recycling share has almost doubled, which is a considerable improvement towards our goal to increase material recycling in line with the EU's recycling goals. The main reasons for the increased recycling share are a combination of our material recycling portfolio increasing by around 100 000 tonnes, and a corresponding decrease of energy recycling fractions of similar magnitude while the total group tonnage stayed relatively unchanged.

Recovery method by tonnage 2021



MODE OF TRANSPORT

Despite the changes in tonnages and recovery methods, the distribution of tonnages by transport type did not change notably from 2020. Three quarters of the group tonnage were transported by truck and the rest by ship and rail, as shown in the figure below.

Share of tonnage by transport mode 2021



Truck: **76 %**



Ship: **23 %**



Rail: **1 %**

GREENHOUSE GAS EMISSIONS

The total emissions stemming from Geminor's activities in 2021 amounted to 1,034 Mt CO₂ equivalents (CO₂-eq.). That is an increase of 85,6 kt compared to 2020 and is linked to the increased share of material recycling which has higher emission intensities. Our emissions are grouped in three different scopes in accordance with the GHG Protocol methodology. The greatest emissions are found in scope 3 and originate from waste treatment and transport services. This is an expected outcome since Geminor mostly runs an office-based operation. The significant amount of waste being transported and treated at third party facilities is therefore generating the largest emissions. The following table shows the scope emissions by source in 2021.

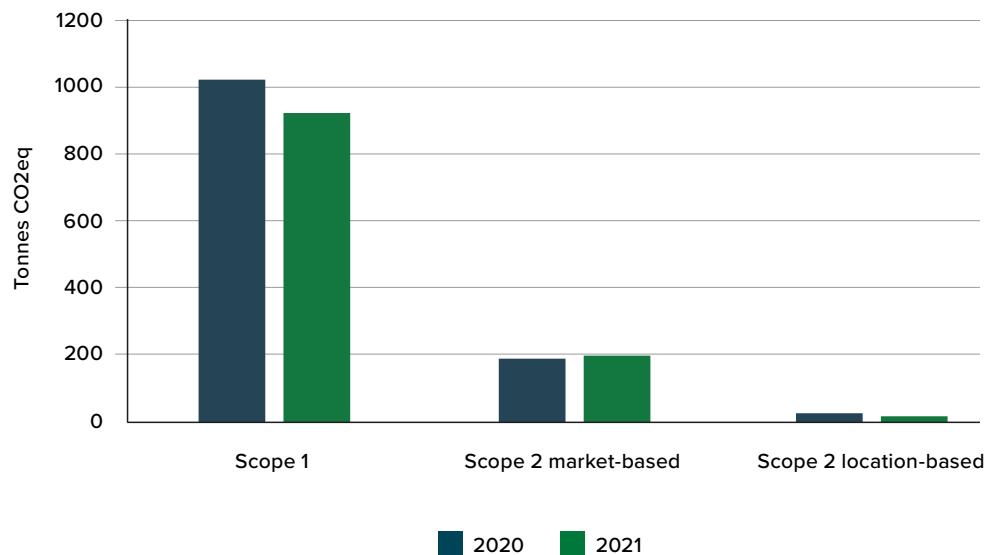
2021 scope emissions

	Scope 1	Scope 2	Scope 3	TOTAL
HUB machinery market	885	151,00	733	1769
Location		3,00		3,00
Company cars	38			38
Energy consumption - Market based approach		44,54		44,54
- Location based approach		18,16		18,16
- District heating		0,33		0,33
Transport			105 758	105 758
Waste treatment			926 619	926 619
Total - market based	923	196	1 033 111	1 034 230
Market based total in %	0,09 %	0,02 %	99,89 %	
Total - location based	923	21	1 033 111	1 034 056
Location based total in %	0,09 %	0,002 %	99,91 %	

Total emissions per scope shown in tonnes CO₂ equivalents.

Compared to 2021, there was a 9% decrease in scope 1 emissions due to a slightly decreased activity at our HUBs causing less fuel consumption. Scope 2 saw an increase of 6% likely contributed by people returning to using the offices more in between pandemic restrictions. From 2022 the Karmøy office and the HUB at Storøy will be run on green energy from Norwegian hydropower through guarantees of origin agreements. This should contribute to a decrease of around 30 tonnes of CO₂ emissions using the market-based approach. In addition, the scope 2 emissions from HUB machinery will be significantly reduced due to equipment that will no longer be used by Geminor.

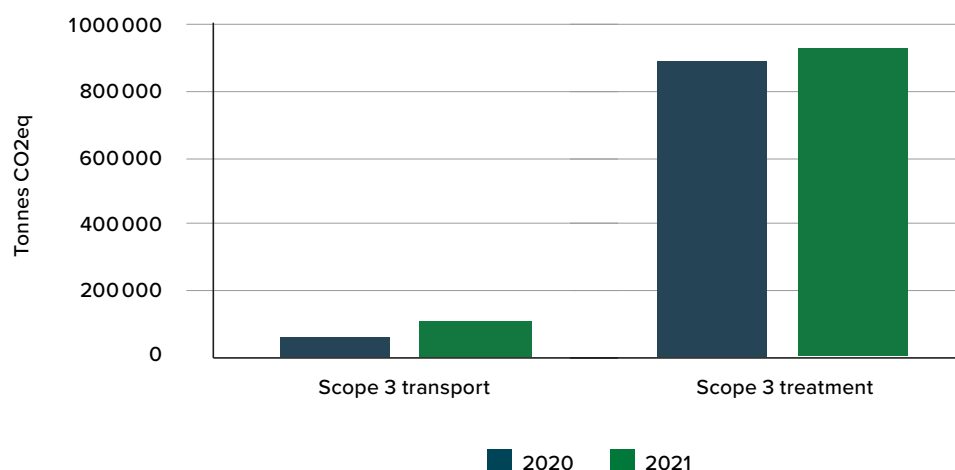
Trend scope 1 & 2 emissions



The increase in scope 3 is caused by two factors; increase in material recycling which involves processes that are more emission intense than energy recovery, and increased data quality related to transport emission estimates. In 2020, the distances were highly aggregated estimates using an average distance for all transports within each country.

However, for 2021 our Gemisoft database was connected with Google maps to provide more accurate distances for each individual transport. The distance estimates for 2020 proved both too short and aggregated when compared to the more accurate results from this year's data extraction. Hence, transport emissions increase by 80% from 2020. This is a normal consequence of increased data quality, and not a reflection of an actual increase in emissions, but rather of an underestimation in 2020.

Trend scope 3 emissions



SCIENCE BASED TARGET INITIATIVE

The SBTi is a partnership between CDP, the United Nations Global Compact, World Resources Institute (WRI) and the World Wide Fund for Nature (WWF). They drive ambitious climate action in the private sector by enabling organizations to set science-based emissions reduction targets. This will ensure that companies reduce their emissions sufficiently to contribute to either the well below 2 degrees goal or to the below 1,5 degrees target which is in line with the Paris agreement. Their tool provides yearly emission milestones towards 2030 for scope 1 and 2. Geminor's yearly targets are shown in the table below and are based on 2020 as the base year.

With a total scope 1 emission of 923 tonnes CO₂-eq in 2021 we are currently on track for both targets. For scope 2 we should also be able to reach next year's goal due to the acquirement of guarantees of origin and the change in machinery as previously described.

Absolute contraction / WB2C

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Scope 1 emissions (tCO ₂ e)	1017,0	991,6	966,2	940,7	915,3	889,9	864,5	839,0	813,6	788,2	762,8
Scope 2 emissions (tCO ₂ e)	185,0	180,4	175,8	171,1	166,5	161,9	157,3	152,6	148,0	143,4	138,8
Scope 1+2 emissions (tCO ₂ e)	1202,0	1172,0	1141,9	1111,9	1081,8	1051,8	1021,7	991,7	961,6	931,6	901,5

Absolute contraction / 1.5C

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Scope 1 emissions (tCO ₂ e)	1017,0	974,3	931,6	888,9	846,1	803,4	760,7	718,0	675,3	632,6	589,9
Scope 2 emissions (tCO ₂ e)	185,0	177,2	169,5	161,7	153,9	146,2	138,4	130,6	122,8	115,1	107,3
Scope 1+2 emissions (tCO ₂ e)	1202,0	1151,5	1101,0	1050,5	1000,1	949,6	899,1	848,6	798,1	747,6	697,2

Highlights of 2021

From the newsletter

Through our newsletter we communicate our most recent activities and achievements, and present and comment on waste market trends in Europe. A summary of the highlights from 2021 is given below. To stay updated on all Geminor stories, follow us on [LinkedIn](#) or visit our [website](#) to get our latest news.



MARCH: New survey reveals why damaged products are not reused

Geminor entered a cooperation with the organization Restarters Norway – a subdivision of the international “[The Restarter Project](#)”. The purpose of the collaboration was to map attitudes regarding the repair and reuse of various types of damaged products, bringing focus on the option to reuse rather than waste products.

The survey was conducted by InFact on behalf of Geminor and Restarters. It reveals that the cost of repairs is the most important factor when Norwegians decide whether to reuse or buy new products. This is one of the biggest obstacles in reusing damaged electronics, textiles, machines, and other equipment today according to the then head of Restarters Norway.

The International Restarters Project is actively working to increase the focus on repairing electronics in Europe. To make repair more easily accessible to people they organize workshops called “Restart parties” where people can learn how to repair damaged electronics.

The survey emphasized the need for easy access to qualified repairers. This may also be the case for most consumers in Europe. In addition to cheaper repair costs, accessibility of repairers is an important factor in reducing the amount of waste. Norwegians, and Europeans in general, also need to gain more knowledge about repairing and reusing. New regulations, such as removing VAT on repairs, is just one of many measures that could lead us in the right direction. [Read more.](#)

APRIL: Canal transport radically cuts CO2 emissions

Since 2020, Geminor has been delivering A4 waste wood from Finland to Germany for material recycling and energy recovery. From the port of arrival at Lübeck, the total ship volumes of approx. 1,500 tonnes have been loaded onto trucks and then delivered to various off-takers by road transport. This amounted to around 85 trucks covering a total of 17 000 km on German roads.

In order to make transport more efficient, and simultaneously reduce road traffic and CO2 pollution, Geminor is now converting all transport of the waste wood involved in this project to inland shipping.

The 85 trucks transporting 1 500 tonnes of waste wood have a total estimated CO2e emission of 49,2 tonnes. In comparison, the exact same volumes transported by barges only causes an estimated 13,8 tonnes of CO2e emissions. That is a reduction of about 70 percent compared to road transport.

Photo: Geminor



Geminor's experience so far indicates that traditional canal transport is a sound alternative for waste transport in central Europe. [Read more.](#)

OCTOBER: Geminor launches recycled stretch film for baling

Every year, hundreds of thousands of tonnes of stretch film are used for the baling of animal feed on European farms. The agricultural plastic used for baling is a so-called Linear Low-Density Polyethylene (LLDPE) – a recyclable and very durable type of plastic. Geminor takes part in the production of a new type of stretch film developed from 100 percent recycled plastic feedstock based on this waste plastic from agriculture. The agricultural waste plastic is collected and sent to a production plant where it is quality checked and run through a washing and preparation process. The plastic is then granulated, ground up and ends up as raw material in a production process of new stretch film.

Photo: Geminor



Baling with Geminor stretch film from Folgos.



The new and recycled plastic film has been tested in terms of UV resistance, tensile strength, puncture resilience, and handling. We have also tested it in a production climate from -20 degrees Celsius to +30 degrees Celsius, and together with our partners, we have managed to develop the strongest product possible. In terms of quality, our recycled bale plastic is not far from virgin plastic. [Read more.](#)

DECEMBER: Pyrolysis is becoming the EfW industry's best friend

The development of new pyrolysis projects - a thermochemical treatment converting plastics into new chemical feedstock - is speeding up in Europe, and the UK is turning out to be a preferred region for the building of plants and facilities for the chemical recycling of plastics. At present, there are several different pyrolysis projects either being planned or already in the construction process. Tax incentives, financial opportunities and stable access to waste plastics are some of the most important reasons for this development in the UK. Secondary hydrocarbon raw materials made from waste plastic is expected to be in high demand in the future and will be an important part of European environmental management.

Positive side effects include better sorting and recycling of plastics resulting in lower carbon content and a proportionally higher biogenic content in secondary fuels such as RDF. At present, the average plastic content of RDF is between 17 and 40 percent. By removing much of this plastic, RDF volumes can be reduced by as much as 25 percent, a milestone Geminor is currently working with our partners to achieve.

De-carbonized RDF alleviates the EfWs' need for allowances through the EU's Emissions Trading System Scheme (ETS) reducing the tax burden on the thermal recovery sector. Secondly, the Calorific Value (CV) is reduced with less plastic content, resulting in better combustion, more stable operation, and less maintenance for the EfW plants. [Read more.](#)

Oil derived from plastic waste through pyrolysis. The oils will be used to produce as feedstock for virgin plastic products.



Photo: Quantafuel

Collaborations and partnerships

Through 2021 Geminor took part in several collaboration projects continuing from 2020. These projects align with Geminor's strategy to uncover new ways of utilizing different waste fractions, increase material recycling, reduce our carbon footprint, and explore alternative markets for our services.

KLIMAPARTNERE – COLLABORATION FOR GREEN VALUE CREATION

Geminor joined "Klimapartnere Rogaland" in November 2020. This is a network arena with over 300 businesses where green innovation and knowledge is shared. Klimapartnere's ambition is to make Norwegian businesses and municipalities commit to the climate goals needed to stay below 1,5 degrees of global warming.



The partnership gives opportunities to collaborate with other partners as well as gaining insight into how others are managing and reaching their climate goals. All partners are held to the same principles; be environmentally certified, become fossil free and cut all direct emissions by 2030. The network also requires the partners to prepare an annual overview of their scope 1, 2 and 3 emissions. Asplan Viak provides the calculation tool for the emission accounting, and their emission factors were also used for this report.

SUSTAINABILITY HUB NORWAY

Sustainability Hub Norway (S-HUB) is a non-profit corporate knowledge network, founded in 2017, aiming to accelerate the work of sustainable business in Norway. The network is one of Norway's leading corporate sustainability networks, with more than 120 member organizations across many different sectors (from energy to food) and leadership functions (from the CFO to the CSO), where sustainability professionals come together to learn and share best practices.



The S-HUB community offers its members access to regular meetings of sub-networks, organised across different company functions and roles, as well as leading annual events and informal peer to peer gatherings, with an emphasis on strategic and practical sustainability.

S-HUB has several networks focusing on strategic and practical sustainability objectives and facilitate workshops and webinars on relevant topics for their members. Geminor was introduced to S-HUB in 2020 and allowed to join their sessions as guest members. In 2021 we became full members and got the opportunity to reach out to other members to gain knowledge on each other's sustainability journey. This led to an inspiring meeting with Fjordkraft to learn from their work and get tips on how to integrate sustainability strategy into the organization.

Innovation and R&D projects

Geminor is constantly seeking to expand our expertise and knowledge within waste handling solutions. By participating in research and development projects we acquire valuable insights into both existing and future value chains and business opportunities. In 2021 we were involved in a number of R&D projects, including our own “Skattefunn” project funded by The Research Council of Norway. In this project, the goal is to optimize the SRF fraction for industry and energy production facilities that currently are unable to use it as fuel.



CLC-SRF / LOUISE

Geminor was part of the Borg CO₂ carbon capture and storage (CCS) feasibility study which ended in June 2021. In the autumn of 2020, Geminor joined another carbon capture and storage project called CLC-SRF led by SINTEF^[1]. The project uses chemical looping combustion (CLC) technology to capture CO₂ from waste provided by Geminor. An extension of this project is the LOUISE^[2] project led by the Technical University of Darmstadt, Germany where a larger scale pilot and demo plant is being made. By contributing towards such projects, we gain knowledge about alternative uses for our waste streams, and what qualities are most beneficial for CCS purposes.

So far, tests have been carried out on smaller test samples provided from a UK supplier. However, to do a longer test run, a larger volume was needed. Due to strict size limitations on export of test samples for research projects, an export permit was required. Unfortunately, this proved to be a longer and more arduous process than anticipated and highlights the need for more flexible regulations on waste export for research purposes. According to the Norwegian environmental agency, this is being looked into, but will not be in effect by the time this project is finalized. We are looking forward to the results of the testing, and to learn to what degree the CLC technology is an efficient method for removing CO₂ directly from this waste combustion process.

CO₂ CALCULATION TOOL

This internal project aimed to create a tool that would allow us to estimate the fossil CO₂ emissions from residual waste based on the material composition of the waste. Using waste composition analysis from different waste streams and estimations of fossil carbon content of the material types, we are now able to estimate the fossil CO₂ emissions of the waste based on material composition. This offers useful information about the waste, especially for the treatment facilities subject to the EU ETS system and national carbon taxes.

GEMISOFT

Gemisoft is constantly under development to improve functionality for the different parts of the organization. Our customers are increasingly demanding data on emissions from their waste streams. Therefore, we are working on expanding the existing Gemisoft portal with a functionality that generates reports that include carbon footprint. We equally want to enable our customers to make more sustainable choices by providing more environmentally friendly solutions. One way we can do this is by illustrating the climate impact of different solutions, and give the customer the option to choose, even though it might be more costly.

[1] <https://www.sintef.no/en/projects/2020/efficient-co2-capture-from-waste-derived-solid-fuels-using-clc-technology-clc-srf/>

[2] <https://www.sintef.no/en/projects/2021/louise-low-cost-co2-capture-by-chemical-looping-combustion-of-waste-derived-fuels/>



Photo: Geminor

Reporting methodology

The methodology and process behind this report builds on the principles of the previous report. The UNs SDG's as well as risks and opportunities related to ESG aspects were evaluated in an internal workshop to map opportunities and threats facing the company. In addition, a materiality analysis was conducted to understand what topics our stakeholders found most important. The GHG protocol methodology is used for emission classification. 2020 is our base year for measuring trends and progress in our sustainability reporting.



Risks and benefits often mirror each other in the sense that a risk can be turned into an opportunity when tackled the right way. In our case the biggest risks identified were related to market changes due to increase recycling requirements, increasing energy and CO2 prices, changes in legislation and an expected introduction of CO2 taxes on energy recovery in several countries.

Sustainable Development Goals and KPIs

The UN SDGs for 2030 provide a framework for how the global community must focus its efforts to reach these common goals. There are 17 goals, each with their own set of specific targets and indicators that we use as a guide to determine the areas where we as an international business organization can contribute to reaching them.

By analysing each SDG and its related targets, seven of them were deemed most relevant to Geminor based on our business model, value chain and the risks and opportunities the company is exposed to. The materiality analysis was also used in the SDG selection process by asking the respondents which SDG's they found most relevant to Geminor.

Based on the inputs from the materiality and risk analysis, the following focus areas and related SDGs were chosen:

- **Green growth and circular economy - SDG 8, 11, 13**
- **Environmentally sound solutions - SDG 7, 12, 13, 14, 15**
- **Positive contributor to people and communities - SDG 8, 12**

Geminor has committed to seven goals as our diverse and extensive value chain causes our business to touch upon a broader spectre of the UN SDGs. According to the PWC Sustainable 100 report for 2020^[1], most companies in Norway report on SDGs 13, 8 and 12 in that order in terms of number of companies reporting on each goal.

The most relevant targets within each of these SDGs were adapted to fit Geminor's business and operations to create our own goals and KPIs towards 2030. To monitor our progress towards reaching our goals, milestones are set for 2023 and 2026 to ensure we stay on track to reach them as planned.



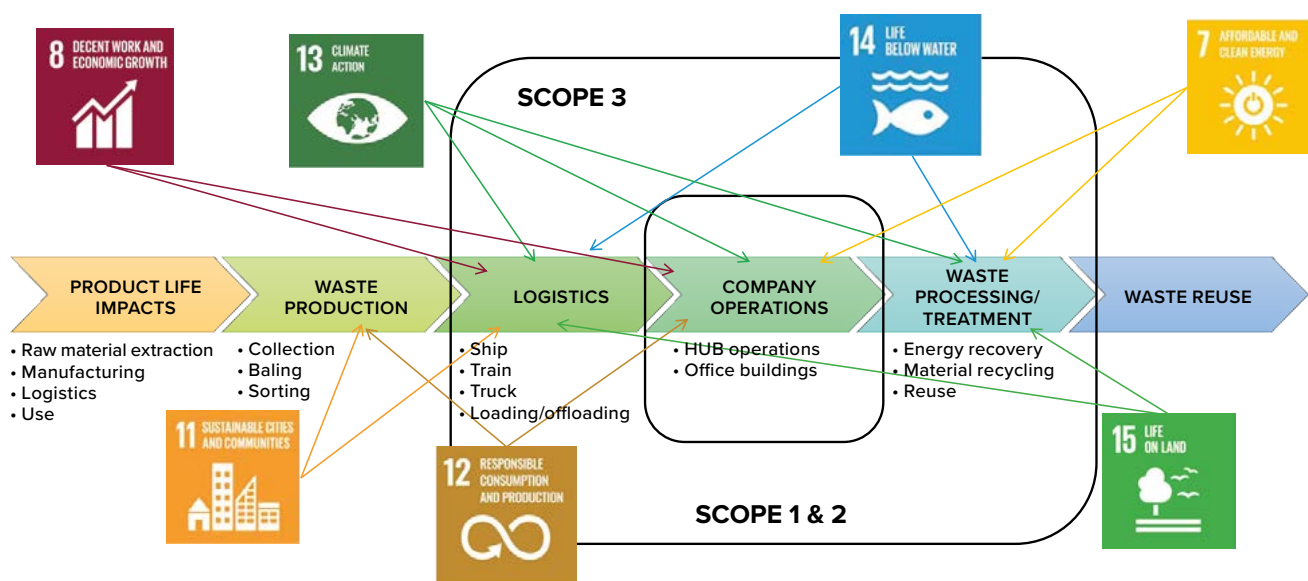
Photo: Geminor/Johan Olå

[1] <https://www.pwc.no/no/publikasjoner/baerekraft-100.html>

System boundaries and the Greenhouse Gas Protocol Scope methodology

Geminor's extensive value chain makes it necessary to set a system boundary for our ESG reporting. The figure below shows our value chain and corresponding activities. The figure below shows where the seven SDGs are connected to the relevant parts of the value chain. Our reporting system boundary is set along the line where Scope 3 is indicated. The system boundaries for scopes 1 & 2 are also indicated on the figure. The scope division is in line with the GHG Protocol scope methodology for categorizing and allocating emissions by source.

Connecting SDGs to the value chain

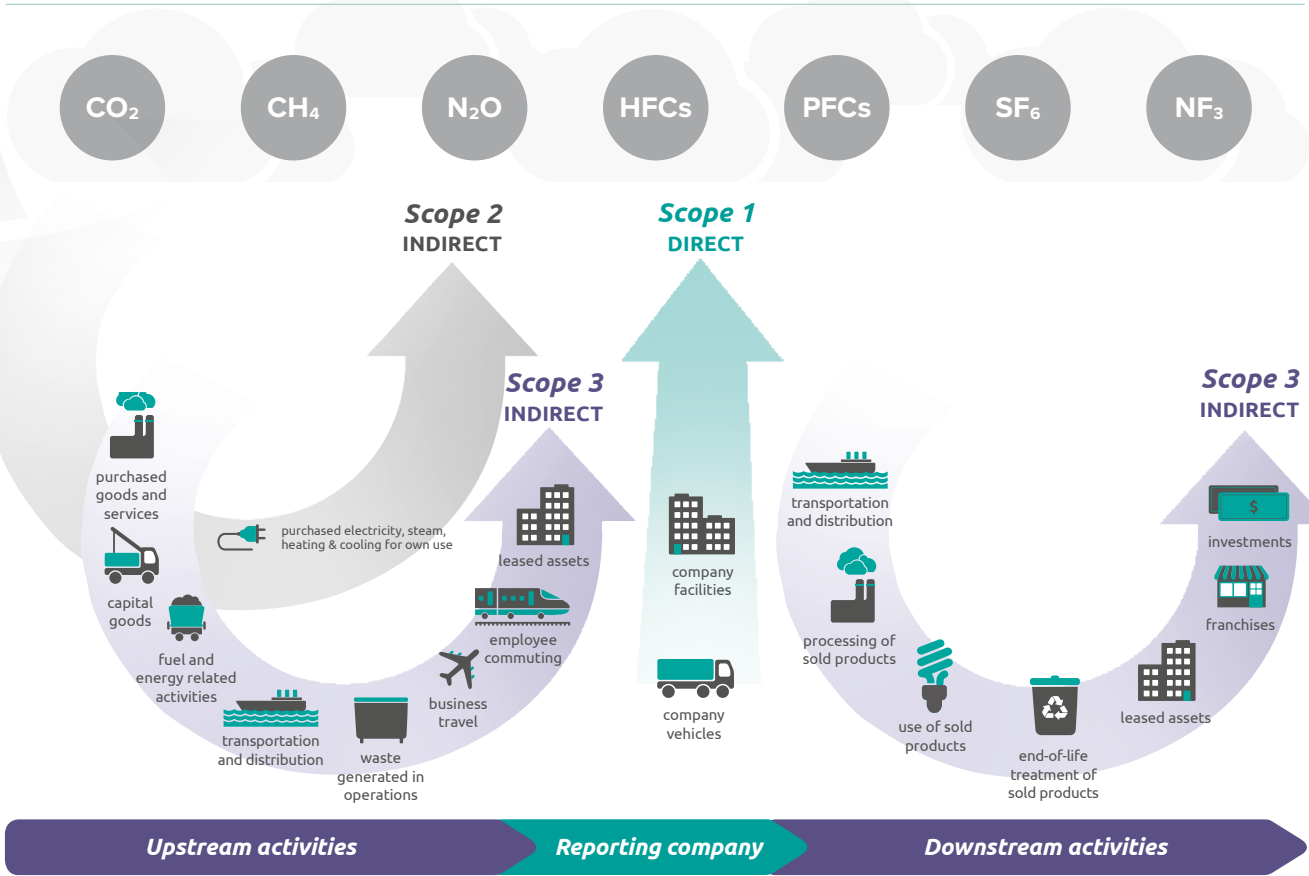


According to their website the GHG Protocol provides the world's most widely used greenhouse gas accounting standards for companies. This report uses their standards and guidance to measure, manage and report the greenhouse gas emissions from our operations and value chains. Identifying our emissions sources and their magnitude we can determine where to focus our efforts.

The three scopes are defined as follows and illustrated with examples of emission sources in the figure below:

- **Scope 1** are direct emissions from the reporting company's own facilities and/or equipment
- **Scope 2** are indirect emissions from the reporting company's energy consumption
- **Scope 3** are indirect emissions from the reporting company's upstream and downstream activities

Overview of GHG Protocol Scopes an emissions across the value chain



Overview of GHG Protocol Scopes and emissions across the value chain.
Illustration by the [Greenhouse Gas Protocol, Corporate Value Chain \(Scope 3\) Accounting and Reporting, Standard](#)



Photo: Geminor

Focus areas

In the following, the SDGs and KPIs for each focus area are defined and described in terms of methodology and results. A complete overview of the SDGs and their related KPIs is available in the appendix.

Focus area:

Positive contributor to people and communities

RELEVANT SDGS: 8, 12

SDG 8: DECENT WORK AND ECONOMIC GROWTH

Work related injuries

Geminor's employees are our most important assets. Ensuring worker satisfaction, health and safety is paramount to the success of the business. We expect our subcontractors and partners to meet these standards throughout the value chain. We have systems and documentation in place to audit our service providers making sure they operate in line with our quality requirements. This includes a "start-up pack" issued to hauliers and waste suppliers, credit check, Geminor code of conduct, our NCR procedure, terms and conditions, ESG compliance, HSE requirements, and check for necessary licences and permits.

All NCRs related to health and safety are logged in our quality system Landax so that we can learn from them and take measures to avoid similar occurrences and risks in the future. Landax also allows us to document improvement suggestions so we can avoid potential NCRs before they occur. To track our performance handling NCRs, the number of NCRs for 2021 are counted and categorized. In the following, NCRs are counted both if an occurrence or situation led to actual harm or injury and if it is registered as a potentially dangerous situation, even if the situation was addressed and corrected before it occurred. In the last report, potentially harmful situations that did not lead to harm were not included.

In 2021, a total of 579 NCRs were logged, 186 more than in 2020. This result may reflect the increased activity compared to 2020 as covid restrictions were starting to lift during 2021. It may also be a result of increased focus on better operations and documentation of NCRs. All but seven of the NCRs were processed, mitigated, and closed off during 2021. The open NCRs are typically registered late in the year and therefore still being processed at the start of 2022. 17 of the NCRs were related to health and safety violations concerning hazardous substances in the waste, fire at HUB, non-compliance with safety regulations and lack of PPE use, 11 more than in 2020. The majority of the two latter types of NCRs are in most cases caused by transport workers who may lack training in safety standards and procedures. We always report these incidences back to the service provider to ensure this is followed up by the subcontractors. Less than 17 such instances is relatively low compared to the substantial number of deliveries carried out each day by Geminor. However, any injury is one too many, and our goal is always to



have zero incidents connected to personnel. We are continuously working to implement measures to lower risks as much as possible.

See SDG 14 and 15 under Focus area: Environmentally sound solutions for a graphic display of the NCRs by type.

Modern slavery compliance

The UK's Modern Slavery Act 2015 requires organisations with an annual turnover of at least £36m to make a public statement on steps they are taking to identify and prevent modern slavery in their operations and supply chains.

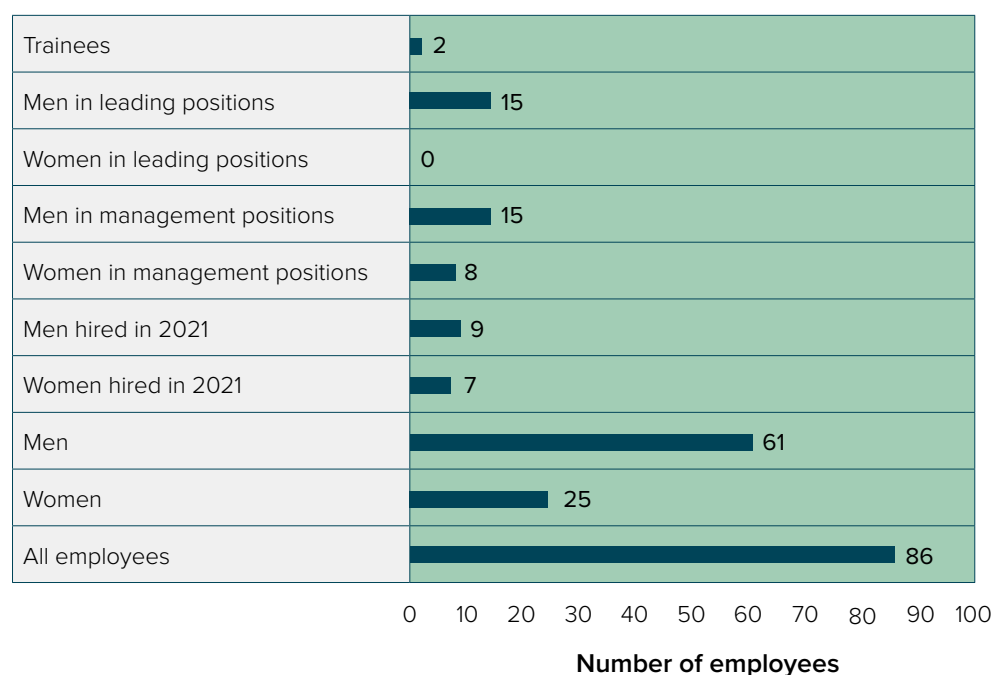
Geminor Group produces an Annual Statement on Modern Slavery describing how, as a group, we audit our businesses and our supply chains to identify and prevent modern slavery and human trafficking. Our Code of Conduct reiterates our stance on modern slavery, human trafficking and forced labour and we expect the same standards within customer and supply chain organisations.

The Norwegian government introduced the Transparency Act in July of 2022 requiring business of a certain size and turnover to make sure their supply chain is adhering to labour rights and fundamental human rights. This is meant to put additional pressure on actors in the market whose staff are not operating under satisfactory conditions to be held responsible and made to make the necessary improvements. Geminor will develop our efforts in this area to meet the legislative requirements through risk analysis of our value chain, and training of staff members in charge of customer contact and contracts. In case of non-compliance, we will evaluate measures in conjunction with the relevant supply chain companies.

Employment and workforce

Geminor's workforce reached 86 employees by the end of 2021, increasing our staff by 16 new colleagues. Geminor's staff was distributed as follows.

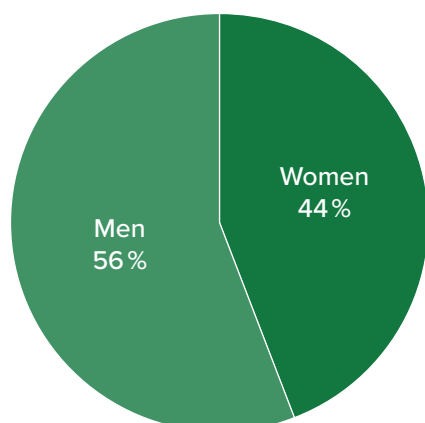
Employee statistics 2021



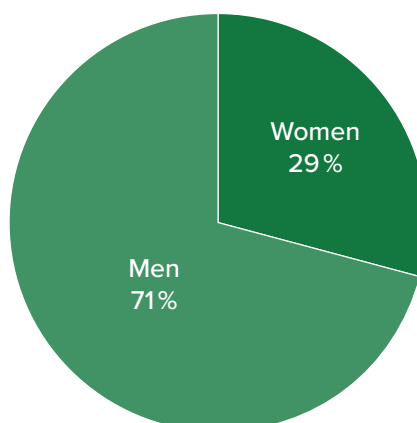
Geminor had a female share of 29%, and no women in leading positions in 2021, with leading position indicating the board, CXOs and country managers. Gender diversity in new hires increased from 37% to 44% women. The waste industry has long been a male dominated work force, but the increased focus on circular economy, recycling and more diverse and technical solutions is diversifying the pool of potential employees. This is a driver for more people with academic backgrounds to enter the waste business, which may also contribute towards increasing the share of female employees. A diverse workforce is considered positive for development, innovation and attracting the best candidates. During 2021 we had two trainees employed in our German and Polish offices respectively.

Gender diversity

New hires in 2021



All employees 2021



Promoting sustainable consumption

As previously mentioned, Geminor has partnered with a polish company, Folgos, to recycle agricultural plastic wrapping to use it for waste wrapping. The foil has been tested and proved to hold the necessary qualities for this purpose while also preventing virgin plastic being used one time, only to be incinerated together with the wrapped residual waste during energy recovery. It is a good example of a solution that is beneficial both economically and environmentally, which are the necessary ingredients for a viable circular economy.

The development of a CO2 calculation tool is intended to produce less fossil carbon intense waste streams. By offering a waste product containing less fossil material, mainly plastic, the energy recovery plants can avoid costs connected to fossil CO2 emissions, while the plastic that is extracted can be used for other purposes as recycling technology advances.

SDG 12: RESPONSIBLE CONSUMPTION AND PRODUCTION

Amount of hazardous waste safely treated

Safe treatment of hazardous waste prevents harm to both people and environment. The amount of hazardous waste safely treated in 2021 was 83 kt. From 2019 to 2021 we saw an almost threefold increase in tonnage treated. Between 2019 and 2020 there was a strong increase due to artificial turf being categorized differently in 2019. However, the graph below shows that the hazardous waste fraction that caused the 2020 increase reduced in 2021 and was replaced by a significant increase in impregnated wood. In addition, we see hazardous waste also being recycled and landfilled. The total hazardous waste tonnage increased by 180% from 2019 to 2021.

Hazardous waste - Trend

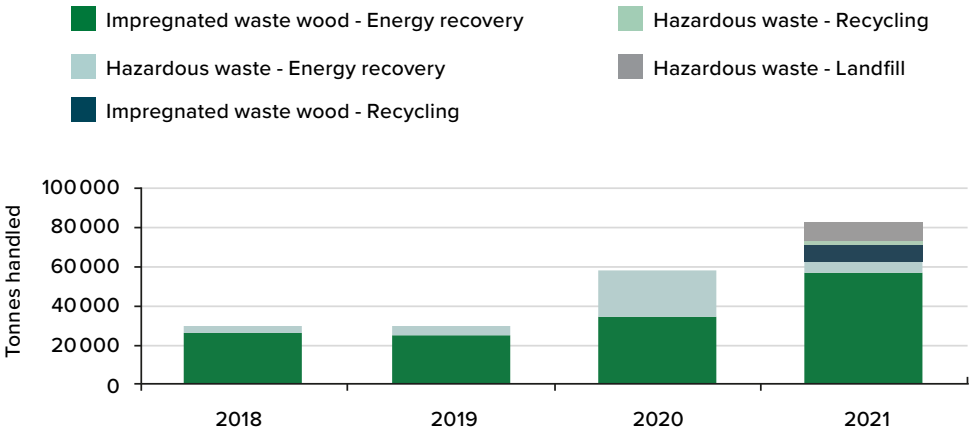


Photo: Geminor

Focus area:

Green growth and circular economy

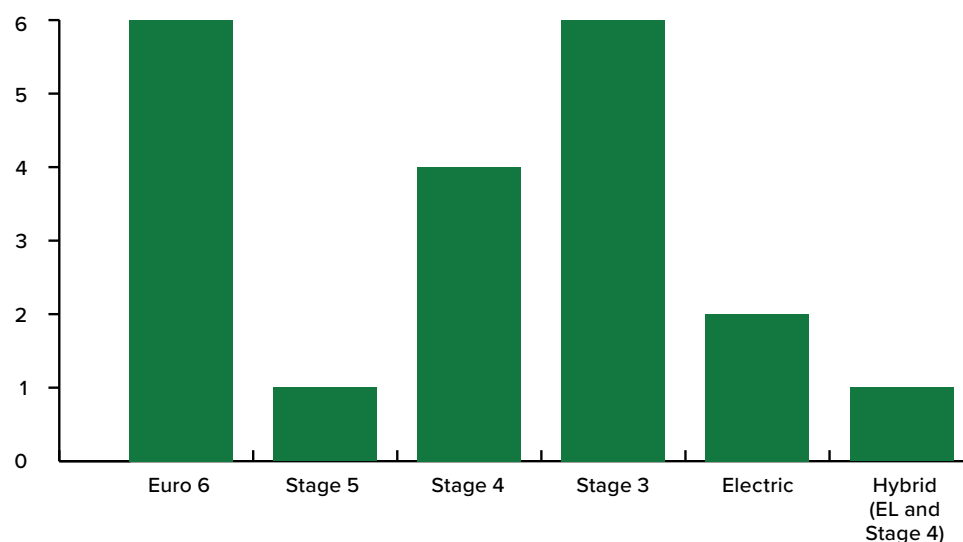
RELEVANT SDGS: 8, 11, 13

SDG 8: DECENT WORK AND ECONOMIC GROWTH

Sustainable procurement

Sustainable procurement is key to reducing direct emissions. By requiring higher environmental performance from the services and investments we acquire it benefits our goals, while simultaneously encouraging producers to offer greener products. Our machine park currently consists of mainly diesel-powered equipment in addition to electric and hybrid machinery.

Geminor owned vehicles – Engine type



To cut fossil emissions we aim for a 100% renewable machine park by 2030. This will require investments in new equipment, preferably done through leasing agreements to ensure flexibility when new technology becomes available. Currently, many types of equipment are not available as electric versions. Investments in new equipment rely on the market demanding more sustainable solutions and a willingness to pay for it. Therefore, we welcome regulations and market mechanisms that can make sustainable choices more competitive, and profitable. Longer running contracts with our customers also contribute to making larger investments possible.

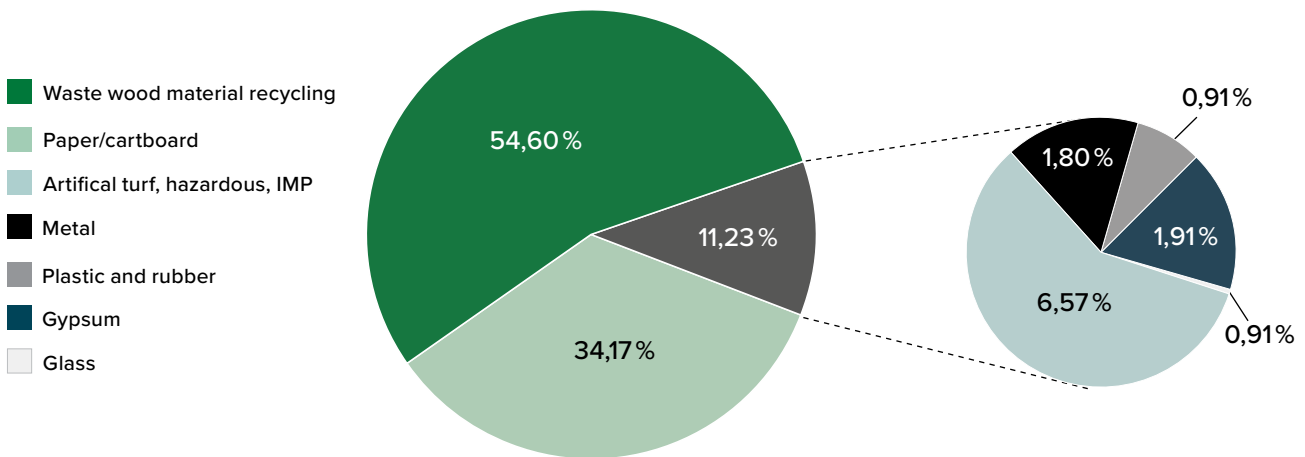
SDG 11: SUSTAINABLE CITIES AND COMMUNITIES

Share of material recycling

In 2021, 258 435 tonnes of the waste handled by Geminor were material recycled. This equates to 16% of the total portfolio and is close to a doubling from 2020. This also means that we have managed to reach the recycling goal set in 2019 of 200 000 tonnes of waste to recycling each year. In 2020, we aimed to double our recycling share to 20% by 2025. We are well on our way to reaching this goal.

The distribution between the different fractions is as follows:

Recycled fractions 2021



The EU's ambitious recycling goals for municipal waste and packaging by 2030^[1]: 60% of all municipal waste and 70% of all packaging. Geminor is contributing to achieving these goals by offering our customers different material recycling options across Europe. We also see an increased demand from customers, especially municipal waste producers who are subject to stricter regulations.

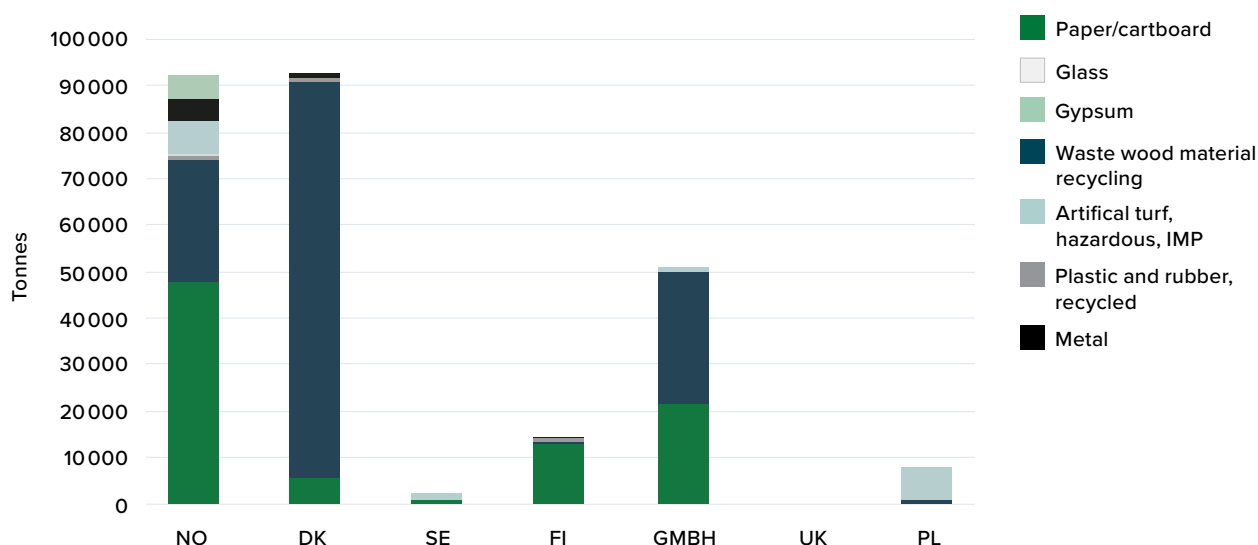
For wood, plastics, glass, and paper & cardboard the recycling goals for 2030 are 30%, 55%, 75% and 85% respectively. Waste wood and paper & cardboard are already important fractions for Geminor, as shown by the figure above. Glass has so far been a small fraction for Geminor, along with plastic. However, our partnership with Quantafuel is expected to enable us to significantly increase our plastic portfolio to around 300 000 tonnes by 2025.

According to the European Environmental Agency's 2019 statistic^[2] on recycling shares, only Germany has reached the EU's 60% goal and is close to reaching 70%. Denmark had reached the 50% mark and Sweden, Finland and Norway had reached the 40% mark. The graph below shows the recycled tonnages handled by Geminor in each country we operate in.

[1] <https://www.europarl.europa.eu/news/en/headlines/society/20170120STO59356/the-circular-economy-package-new-eu-targets-for-recycling>

[2] <https://www.eea.europa.eu/ims/waste-recycling-in-europe>

Recycled fractions by country



SDG 13: CLIMATE ACTION

CO₂ intensity per revenue

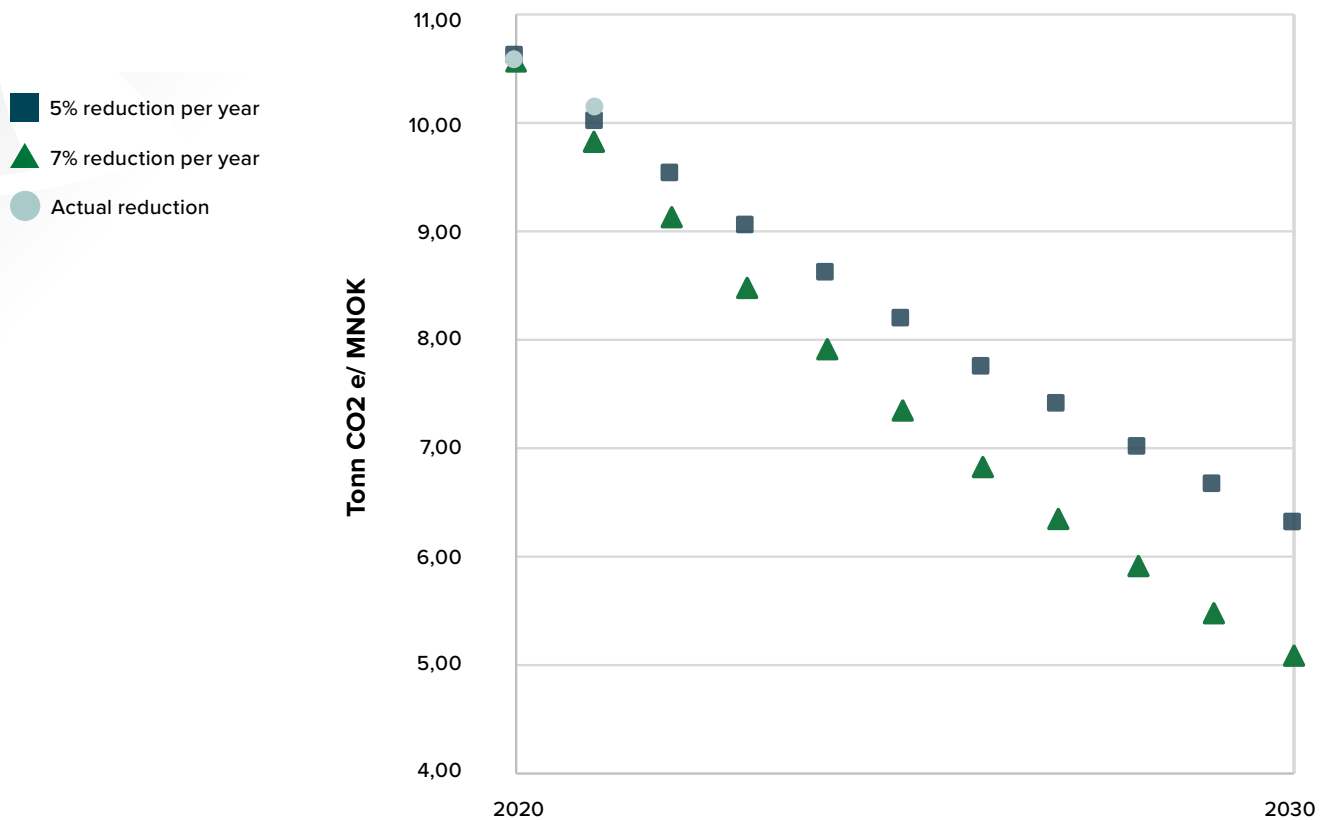
Measuring CO₂-emissions in absolute terms is useful and is one of the methods used by the Science based Target initiative. Sometimes it is however more relevant to look at emission intensity per ton of waste, fraction, or unit of revenue to name a few examples. Under this focus area the latter is the most relevant and is known as CAPRO. This indicator measures real green growth, which means that the direct emissions (scope 1) from a business are decoupling from its economic growth. In other words, economic growth without growth in emissions.

To have green growth and reach the Paris agreement target of not exceeding 1,5°C of global warming it has been derived that a company needs to have an average carbon productivity of more than 7% per year over until 2050. One needs at least a CAPRO higher than 5% on average per year over a 30-year period to achieve real green growth. CAPRO is calculated by dividing the change in EBITDA + salary costs by the change in total Scope 1 emissions^[1]. It can also be expanded to calculating a separate Scope 2 and 3 CAPRO. This indicator is also adopted by the Klimapartnere/Climate partner reporting.

The Scope 1 emissions for 2021 are derived from the available data on direct emissions from HUB machinery and company cars. This results in a group level carbon intensity of 10,14 tonnes CO₂eq/MNOK for 2021. The figure below shows the trend lines Geminor should be following to achieve a CAPRO of 5% and 7% per year, respectively. The green dots represent the actual CAPRO for Geminor in 2020 and 2021. Geminor has achieved a reduction, but still not quite hitting the goal for 2021 of a CAPRO of 10,03.

[1] <https://docplayer.me/65299507-Gronn-ledelse-og-klimakommunikasjon.html>

Scope 1 CAPRO projection for Geminor, 5% and 7% pathways



Focus area:

Environmentally sound solutions

RELEVANT SDGS: 7, 12, 13, 14, 15

Measuring environmental performance using CO₂-emissions as an indicator is an internationally recognized way of quantifying climate impact. Geminor applies the GHG Protocol's methodology to classify Geminor's using three scopes according to the emissions' origins. In the following, scope emissions are presented under SDG 7 and 13.

However, this indicator alone does not provide a complete picture of our impacts. Geminor therefore considers additional indicators to quantify our environmental impact for 2021. These are described under each SDG heading in the following.

Towards 2030 we plan to include additional KPIs to the reporting to further disclose relevant environmental impacts, not only caused by Geminor onto the environment, but also impacts on Geminor caused by the environment e.g., extreme weather obstructing transport or HUB activity.

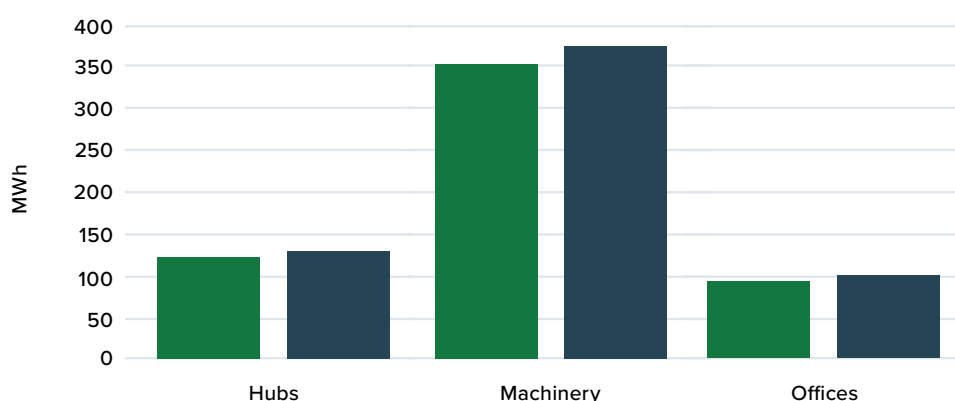
SDG 7: AFFORDABLE AND CLEAN ENERGY

Scope 2

Energy consumed per year for electricity and heating

Geminor consumes energy for electricity and heating at its offices, HUBs, and electric HUB machinery. In 2021, Geminor consumed a total of 606,9 MWh of power for heating and electricity. This is an increase of around 37 MWh compared to 2020, which was in part likely due to the shift back to working in the office after months of working from home during covid.

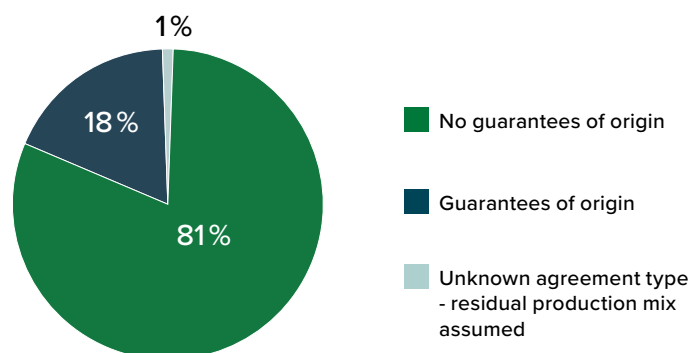
Electricity and heat consumption



Most of our offices already got their power through guarantees of origin (GOs)^[1] in 2020, and from 2022 the Karmøy office and Storøy Hub will be included and use energy supplied by Norwegian hydro power.

GOs make up 18% of our total energy consumption, an increase of 7% since 2020. The rest is either from regular residual mix agreements or unknown agreement types. The latter are therefore assumed to be from the residual mix. Energy consumption and emissions from machinery that is rented out to third parties are not included here. The distribution of energy consumption between the agreement types is shown in the pie chart below.

Energy consumption per agreement type

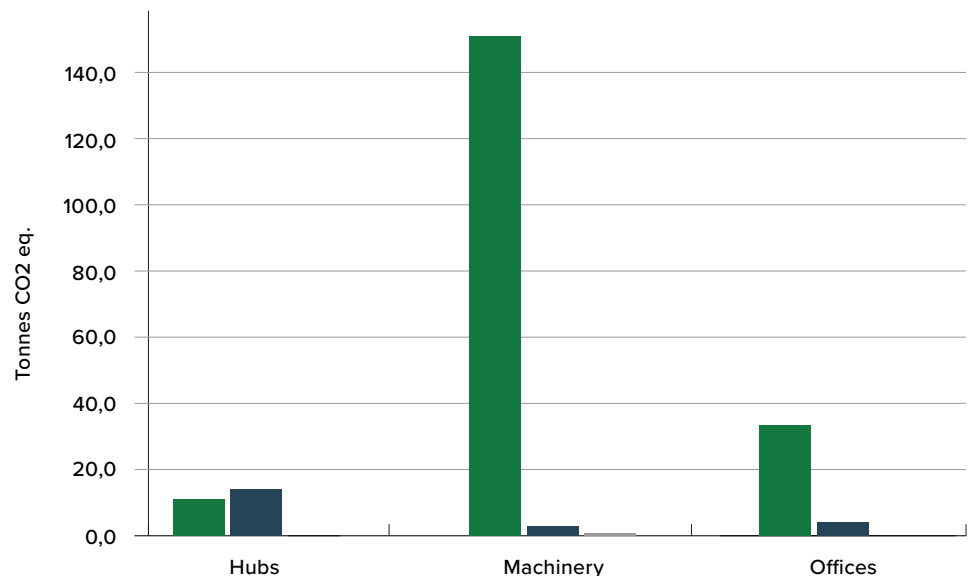
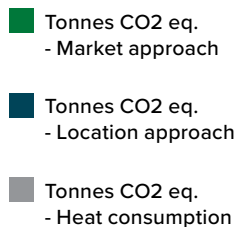


[1] The power is generated by renewable sources and emissions from this consumption can be assumed to be zero.

The large share of energy consumed without GOs is mostly due to machinery operated by Geminor but situated at a third-party location. This will no longer be in use from 2022 and will bring us closer to our goal to be in line with Science Based Targets recommendation: at least 80% of our electricity consumption should be renewable by 2025, and 100% by 2030. With current measures we will be at 70% by 2023.

According to the GHG protocol methodology, Scope 2 emissions are to be reported using two different methods: a market-based and a location-based approach. The first method uses an emission factor based on the residual energy mix in the grid, and the latter uses an emission factor based on the local energy production mix in each country. In Norway, this information is provided by NVE, and since most of the Norwegian energy production is renewable, the location-based factor is low compared to the residual mix (8 gCO₂/KWh and 402 gCO₂/KWh respectively)^[1]. The residual mix data for the other countries is provided by AIB – Association of Issuing Bodies^[2] and is based on data from 2020, as the 2021 were not yet available at the time his report was created. Location based emission factors for the other countries (EU28+NO) are provided as an average value for the last three years and expected development towards 2075^[3]. The UK location-based factor is provided by the UK Department for environment, food & rural affairs (DEFRA)^[4] dataset for 2021. For the energy consumption from district heating, the emission factor is provided by the energy supplier. The energy consumption and CO₂ emissions are shown in the graphs below. The Danish district heating consumption is not included due to data uncertainty.

Scope 2 - emissions from energy consumption



[1] <https://www.nve.no/energi/energisystem/kraftproduksjon/hvor-kommer-strommen-fra/>

[2] <https://www.aib-net.org/facts/european-residual-mix/2020>

[3] https://www.fjernkontrollen.no/uploaded/files/2020_06_01_klimaregnskap_for_fjernvarme_2020.pdf

[4] The DEFRA dataset for 2021 is used to calculate transport and energy emissions in this report: <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

The biggest contributor to our Scope 2 emissions is machinery where the energy is provided through a third party owned facility with power supply agreements Geminor does not directly influence.

SDG 12: RESPONSIBLE CONSUMPTION AND PRODUCTION

In 2021 we handled 4607 tonnes of plastic, where roughly half went to material recycling. This is a decrease of around 1100 tonnes total compared to 2020. Plastic pollution is a pressing global issue that requires durable and robust solutions. The negative effects of improperly treated plastics are becoming increasingly apparent, posing a risk to both our ecosystems and our health. The need for adequate treatment methods and capacity is urgent.

Due to the complexity of plastic products in circulation, finding an efficient recycling process is demanding, both in terms of technology and plastic feedstock. We are expecting that our partnership with Quantafuel will enable us to contribute to mitigate this global problem. The technology breaks down low-grade plastic and turns it into liquid components that can be reused as feedstock in new products. By combining this with our knowledge of waste providers and qualities we have an ambitious goal to treat 300 000 tonnes of plastic waste by 2025.

SDG 13: CLIMATE ACTION

To reach the Paris agreement goal of staying below 1,5 degrees of global warming, governments as well as companies need ambitious goals and dedicated measures to reduce GHG emissions within this decade.

The EUs goal is to reduce net emissions by 55% compared to 1990 levels by 2030. A key tool to achieve this is the EU ETS which is finally starting to make an impact in the market. The CO2 price has had a sharp increase in the last three years, nearing 90 € per ton CO2 in December of 2021 and has remained above 80 € for most of 2022.

The EUs proposed legislation Fit for 55 suggests additional measures like including the shipping sector in the ETS and requiring a gradual reduction in shipping fuel emission intensities. Similar fuel requirements also affect vehicles, practically ending sales of new fossil fuelled vehicles from 2035.

The introduction of the EUs taxonomy is expected to further influence the market, as companies are required to report on their performance related to six environmental goals according to technical screening criteria established for each goal. To be classified as sustainable, companies are expected to contribute significantly to at least one of the goals, while simultaneously doing no significant harm to any of the remaining five goals. In addition, they need to fulfill minimum requirements related to social standards.

The taxonomy serves as a framework allowing financial institutions to classify economic activities according to their environmental impact, and subsequently make investment choices based on the results of this classification. Although the taxonomy does not yet apply to companies of Geminors size, the ripple effect is sure to be felt, indirectly requiring smaller companies to adhere to the taxonomy. By having a solid reporting foundation, Geminor is well prepared to meet these requirements when they come into effect.

Total emissions and trends

In the following, direct emissions are referred to as Tank-to-Wheel (TTW) e.g., emissions from a running engine, while indirect emissions are referred to as Well-to-Tank (WTT). Indirect emissions represent the impact of extracting, producing, and transporting the fuel before it is used. Direct emissions are accounted for in Scope 1, while indirect emissions are accounted for in Scope 3.

Scope 1

Geminor's scope 1 emissions stem from our non-electric HUB machinery and consist of both TTW and WTT emissions. The total direct emissions in 2021 amounted to 923 tonnes CO₂ eq., a reduction of 9% from 2020. The hybrid eddy current machine was run only on diesel in 2021 and is therefore included here. Emissions from electric equipment are accounted for in Scope 2. Emissions from Geminor owned machinery being leased to third parties are excluded.

Our goal is for all company owned machinery to be fossil free, and to reach net zero direct emissions by 2030. To achieve this, we will lease equipment to ensure the newest technology that provides the least environmental impact. This also relieves transitional risks related to investments in machinery that could be surpassed technology-wise in a few years. We aim to replace as many of our existing machines with electric versions as possible, but this technology is currently unavailable for some of the larger machine types. The remaining emissions caused by such vehicles that we cannot fully cut will be compensated for through emission offsets provided by the Gold Standard initiative.

Scope 3**Company travel emissions**

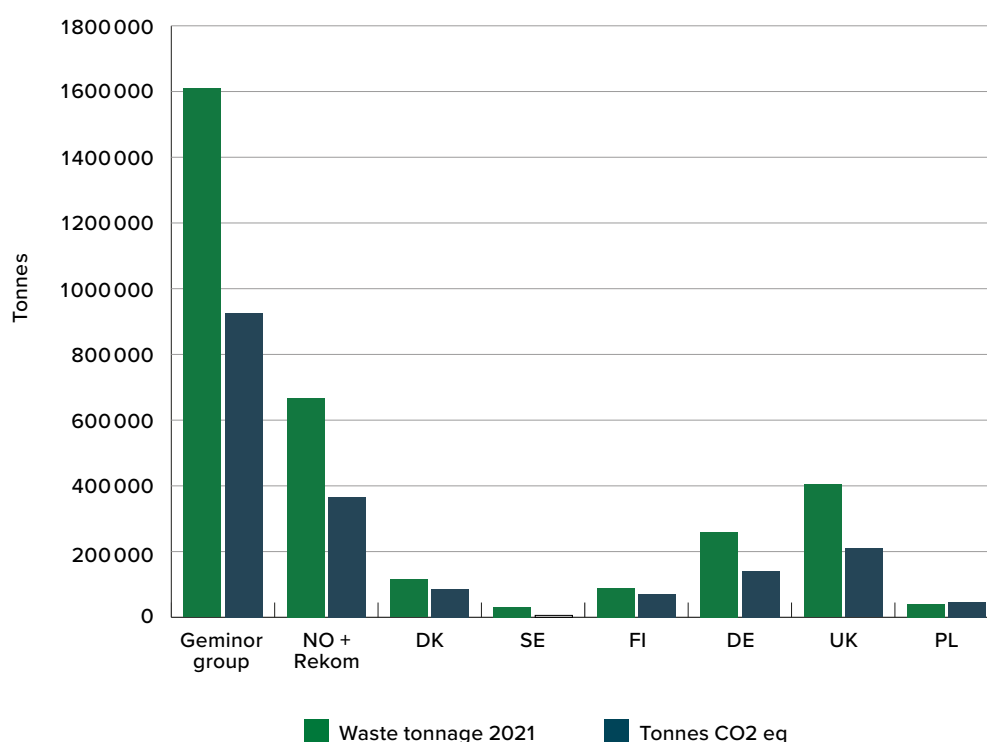
Geminor is an international company with customers and offices spread across Europe. One of the positive effects of the covid-19 pandemic was the shift towards digital communication tools, proving that many business travels can be replaced by digital calls, reducing both costs and emissions. Travelling is still an important part of maintaining existing business relations and forging new ones, but our employees are expected to plan efficient travel routes that includes as many meetings as possible ensuring less emission intense traveling. We have developed a feature in our ERP-system to enable documentation of company travel by car, rail or plane to enable monitoring of travel emissions and meeting yearly reduction goals. 2022 will be the first year with complete data set and will be included in next year's report.

Emissions from waste treatment

Geminor handled a total of 1, 671 Mt in 2021. Handling includes final treatment, transport services and shredding. 1, 609 Mt were either energy recovered or recycled for use in new products. By moving waste away from landfills and over to energy or material recovery, Geminor helps avoid methane emissions from landfills while providing fuel for district heating. Our waste streams from UK and Italy are examples of this. 13,8 kt were landfilled in 2021, which represents a relatively large increase compared to 2,5 kt in 2020. Some waste materials can only be safely treated by landfilling, and this is what constitutes the 2021 increase.

Total recovery emissions in 2021 amounted to 927 kt CO₂ eq., resulting in an average CO₂ intensity of 0,57 tonnes CO₂ eq. per ton waste treated, an increase of 0,4 compared to 2020. This is due to more material recycling which has higher emission intensity than energy recovery. The emission factors used are developed by Asplan Viak. Most of the material we handle, and their connected emissions, originate from Norway, UK and our German branch which includes Italian and French waste.

Recovery emissions 2021



The emission intensity by treatment method in 2021 was as follows.

Recycling method	Tonnes waste	Tonnes CO ₂ eq	Tonnes CO ₂ eq/Ton Waste
Energy	1 336 723	758 062	0,567
Material	258 435	168 450	0,652
Landfill	13 842	108	0,008



Photo: Unsplash

The most emission intense treatment methods according to Asplan Viak are energy recovery of hazardous waste and energy recovery of plastic and rubber. Incidentally, the emission intensities from material recycling of these fractions are relatively low in comparison. For each ton of plastic that is material recycled we save 2,25 tonnes CO₂ eq. For hazardous waste it is even higher at 2,5 tonnes CO₂ eq. per ton waste. This knowledge is important when evaluating the environmental footprint of our services and which treatment methods to offer our customers.

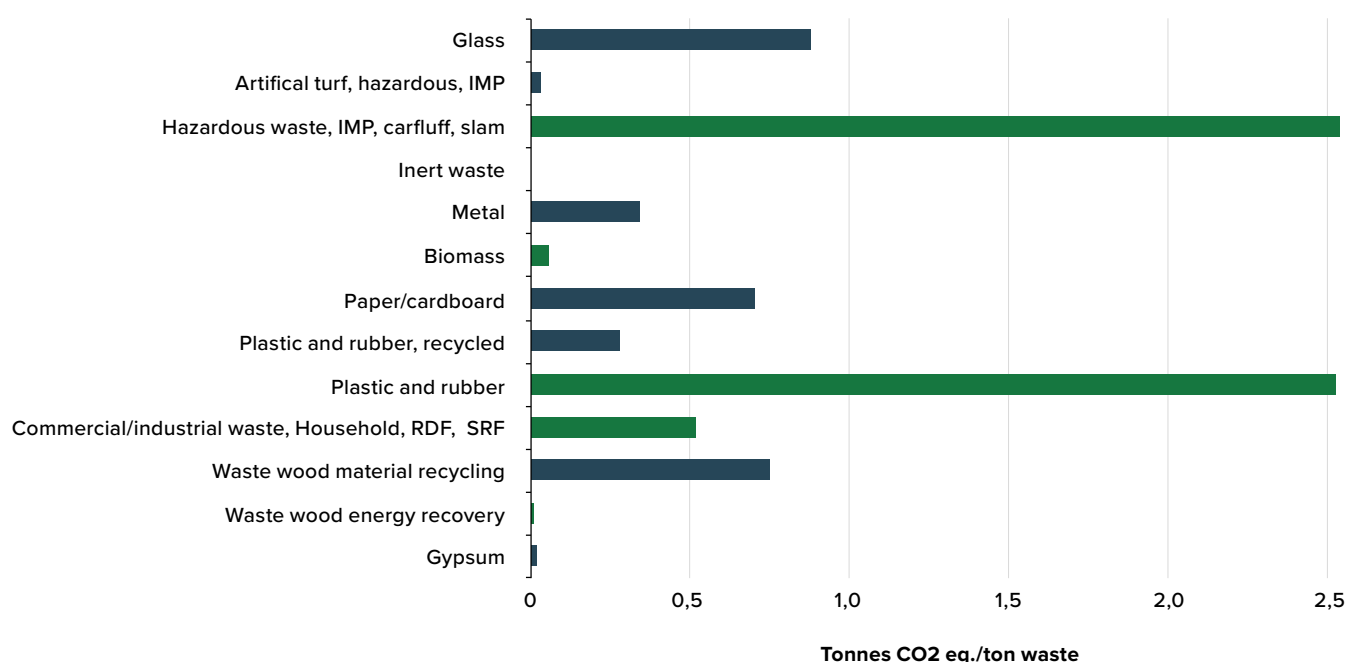
The opposite is true for waste wood due to how biological material is accounted according to the GHG protocol. Biomass is defined as having net zero emissions because biogenic materials are part of the short-term carbon cycle. This means they do not add to the earth's existing carbon mass balance the way fossil carbon does. Burning waste wood is not emission free, but in climate accounting it is set to zero compared to fossil CO₂ which is part of the long-term carbon cycle.

CO₂ emissions from material recycling are higher because it involves more processing and use of chemicals. According to Asplan Viak's estimates, energy recovery is only marginally better than recycling. With the current European energy demand outweighing the supply, and waste wood in shorter supply, the need for energy production may drive waste wood volumes back towards more energy recovery.

The largest fractions by tonnage are commercial waste followed by energy recovered waste wood, recycled waste wood, paper and cardboard, and hazardous waste. The largest fractions by emissions are commercial waste, energy recovered hazardous waste, recycled waste wood, and paper and cardboard in that order.

The next figure shows the CO₂ intensity of recovery for each fraction. Green bars signify energy recovery, blue bars material recycling and grey signifies landfill.

Recovery CO₂ intensity per fraction



Using emission data from each recovery facility would yield more accurate results, especially since the emission factors are estimated using data from Norwegian plants which may not be accurate for plants in other European countries. However, we are confident that these estimates still provide an acceptable level of data quality. Moreover, the material composition affects the final treatment emissions, which would make estimates prone to uncertainty even if obtaining plant specific data were a realistic option.

Emissions from waste transport

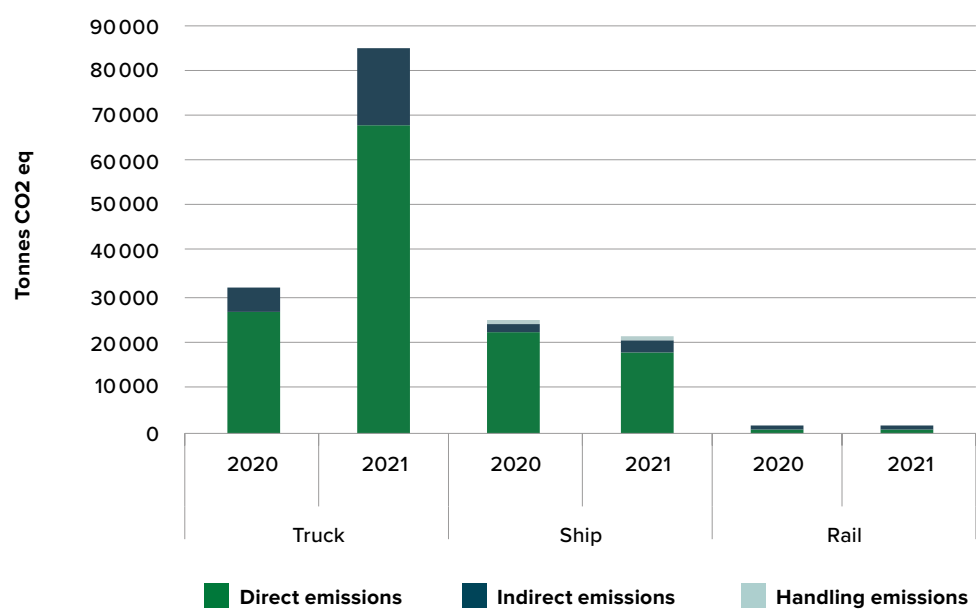
Compared to 2020, total emissions from transport and handling almost doubled in 2021 and amounted to 105 kt CO₂-eq. This is due to the improved data quality related to distance estimates and indicates that the emissions estimate for 2020 was too low. There was no substantial difference between tonnage transported, so this should only have a marginal impact on the emission estimates.

The data were obtained using data from Gemisoft, distance estimates from Google maps and online nautical distance calculators, emission factors provided by DEFRA, and actual fuel consumption and emission factors made available by our transport providers. Handling emissions refer to the loading and unloading of vessels and are based on data from one of our shipping providers. This data was extrapolated to estimate handling emissions for all tonnage transported by ship.

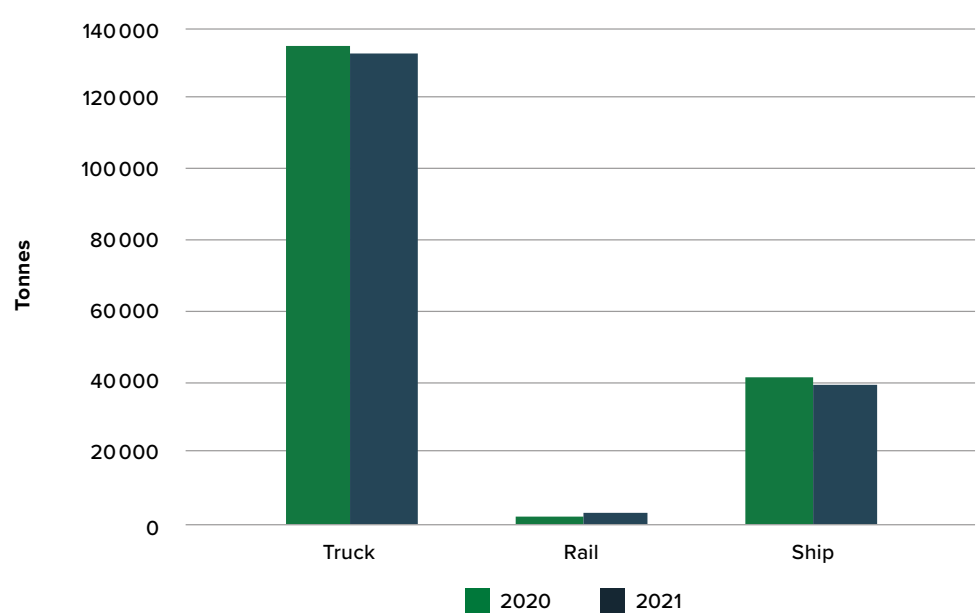
Geminor’s logistics rely almost exclusively on return transport. Approximately 95% of all truck transports in 2021 were returns. By filling vehicles that would otherwise return empty, our logistics solutions add value to emissions that would be emitted anyway. The remaining 5% are transports carried out over short distances where return loads are not available, e.g. between a port and a treatment facility.

The figures below show each transport type with corresponding waste tonnage and emissions (direct (TTW), indirect (WTT) and handling).

CO2-eq emissions by transport type



Total tonnage transported per transport type



As previously discussed, the accuracy of distance estimates has greatly been improved compared to 2020. The effect of this is clearly shown by the figure “CO₂-eq emissions by transport type” where the total emissions from truck transport have drastically increased since 2020 and are 75% higher than ship transport. The difference in tonnage transported was marginal, and thus did not cause the difference in emissions. This result underlines the effect of improved data quality and the benefit of using ship transport.

The apparent benefit of ship transport is further supported by comparing the emission intensities of the different transport types. Compared to 2020, truck transport now proves to be slightly more emission intense than shipping. A decrease in use of Ro-Ro shipments contributes to a lower emission intensity for shipping, than in 2020. Ro-Ro ferries have a relatively high emission factor compared to the other vessel types we use. Around 20% of our total shipped tonnage was transported using this vessel type, compared to 40% in 2020.

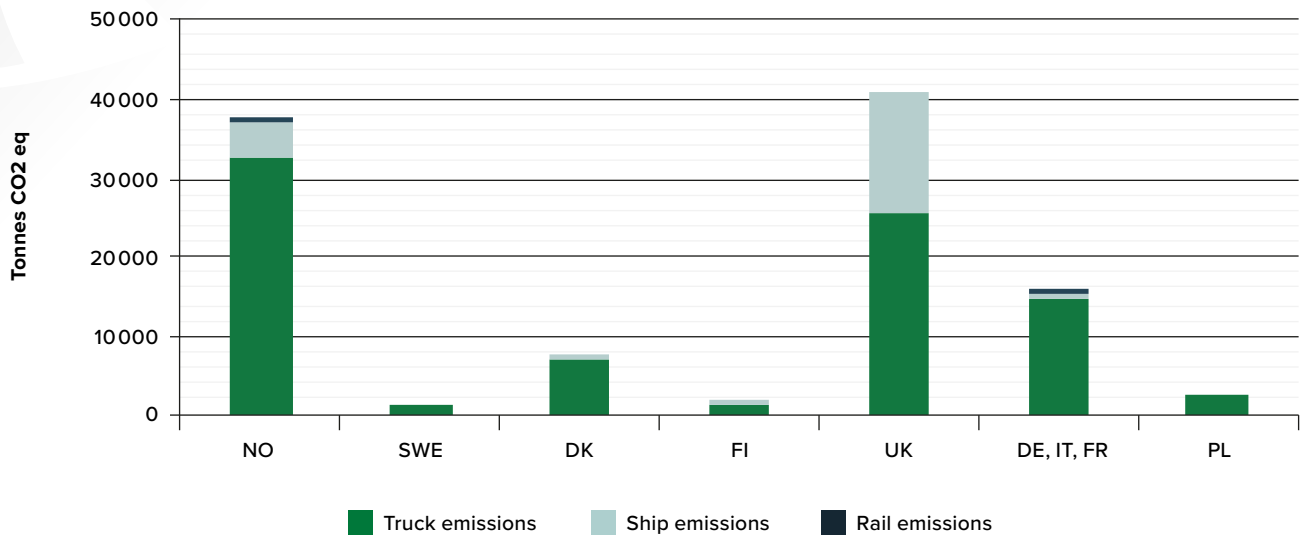
However, it is important to view this data with some criticism, as these intensities are calculated based on total emission estimates that are calculated using both fuel consumption and tonne.km. The actual emissions from the truck transport are likely lower, since the tonne.km method is prone to overestimate the emissions compared to the more accurate fuel consumption method. Nevertheless, the same method of comparison was used in the 2020 report and indicates that moving less tonnage by truck is beneficial. Rail transport is still the least carbon intense and should be prioritized whenever possible. By choosing transport services with the lowest fossil carbon footprints and using our HUB network to optimize logistics, we can provide customers with more sustainable solutions, while reducing Geminor’s Scope 3 emissions.

Year	Tonnes CO ₂ eq/tonnes waste	
	2020	2021
Truck	0,0241	0,0637
Rail	0,0263	0,0281
Ship	0,0608	0,0524



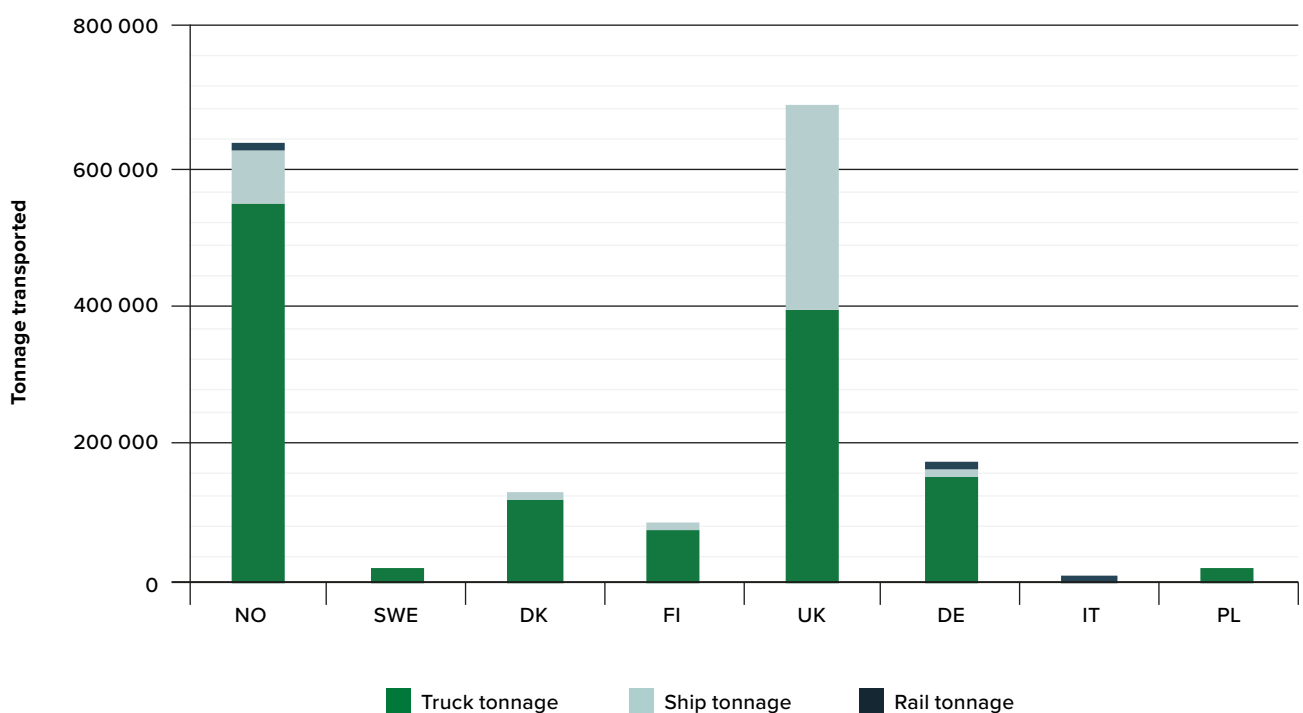
Emissions and tonnage per country and transport type are shown below.

Transport emissions per country and transport type



The UK has the largest transport emissions followed by Norway and Germany. The magnitudes of emissions align well with the amount of waste transported, and this is due to the emission intensities of truck and ships being quite similar in magnitude.

Tonnage per country and transport type



SDG 14 AND 15: LIFE BELOW WATER, LIFE ON LAND

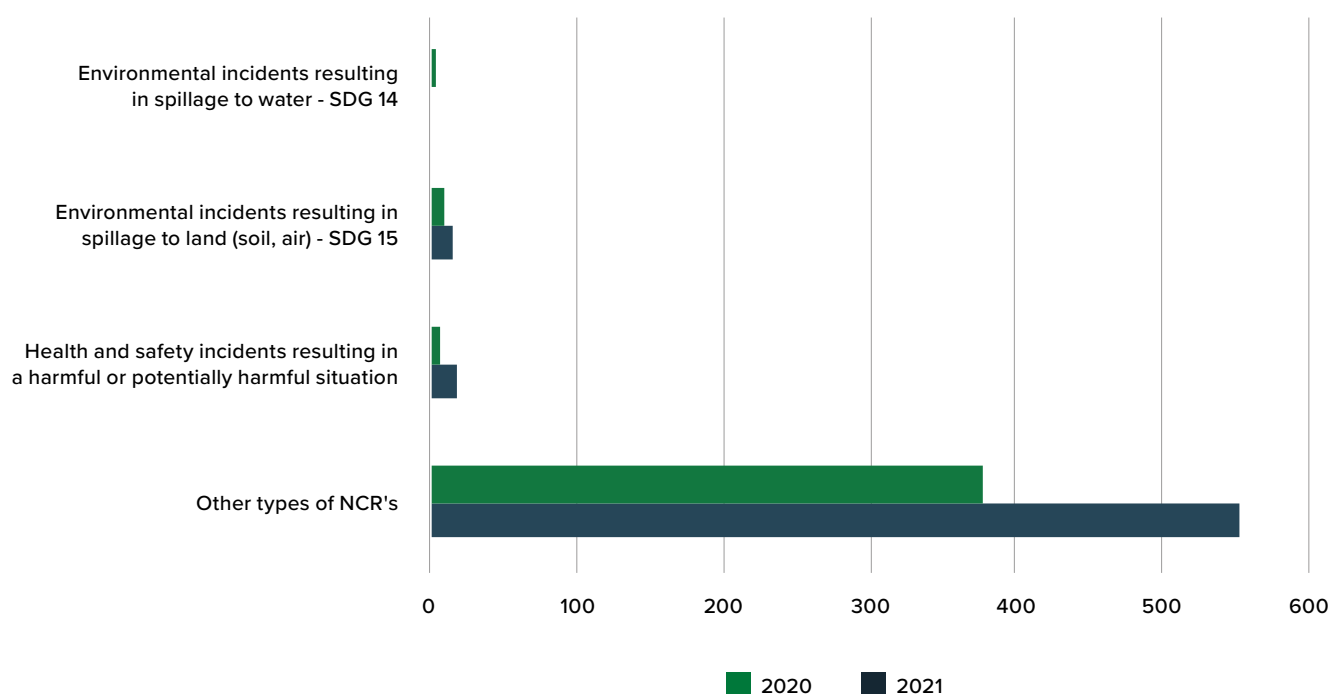
The environmental NCRs are being registered in Geminor's quality system Landax to address issues, mitigate consequences and above all prevent future incidents. The number of NCRs is used as a measure of how well Geminor is managing environmental risks and impacts. Our goal is to reach zero incidences related to spillage, emissions or other events impacting water, air or land. By measuring how we are performing we can implement necessary measures to reach this goal.

NCRs are counted if an occurrence or situation led to actual harm, spillage, or emission. If an NCR is registered as a potentially dangerous situation, but the situation was addressed and corrected before it occurred, it is not included here.

In 2020, there were 14 NCRs linked to SDG 15, and none related to SDG 14. That is an increase of five incidents compared to 2020. The environmental NCRs concern fire in waste piles during storage, spillage during transport, oil spillage at a HUB and debris being spread by the wind from HUB areas. All the incidences were addressed and corrected according to established procedures.

The graph below shows the distribution of types of NCRs during 2021 compared to 2020.

Non-conformances by type 2021



Appendix A

SDG and KPI overview

SDG	Target description	KPI measurement	Result 2021	Result 2020
7	Energy consumed/year (electricity and heating)	MWh/year	606,9	570,8
8	Responsibly influencing consumer and consumption patterns and promoting sustainable consumption and lifestyles through, for instance, product development and marketing	Number of partnerships/ projects promoting sustainable consumption	4	4
	Sustainable procurement	Number of Stage 5 machines owned	1	1
		Number of electric machines owned	3	3
	Job oriented training programs	Number of trainees in company	2	3
	Employment and workforce	Female share in total and in leading position	29%, 0%	31%, 0%
	Irradicate forced labour and modern slavery	Modern slavery act - compliance	In compliance	In compliance
	Work related injuries	Number of non-conformities resulting in a harmful or potentially dangerous situation	17	6
11	Share of material recycling	Tonnes/year	16,2 %	8,9%
12	Amount of hazardous waste safely treated	Tonnes/year	83 323	57 565
	Amount of plastic sorted and recycled	Tonnes/year	2360	5719
	Total emissions per year and trend	Million tonnes/year	1, 034	0, 948
	CO2 intensity, emissions per revenue Scope 1	Tonnes CO2 eq/MNOK	10,14	10,56 (correction from last report)
14	Zero incidents of spillage to ocean and water ways	Number of non-conformities	0	1
15	Zero incidents of spillage to air and land	Number of non-conformities	14	9

Appendix B

CALCULATION METHODS – TRANSPORT EMISSIONS

This report uses the same method as the 2020 version. A shorter summary of the methodology is provided here. For further details, please consult the 2020 report available at our website.

Transport emissions were calculated using activity data like tonnage, distance, fuel consumption and vehicle type in combination with corresponding emissions factors provided by DEFRA. DEFRA's dataset was recommended by an external consultant and is one of few comprehensive datasets publicly available. It is also in accordance with the GHG protocol's Scope methodology^[1]. Note that it is based on UK emission data and may not be accurate for all transport activities outside of the UK. However, it was deemed applicable to all European transport emissions assuming the margin of error is within a reasonable range.

The most accurate emission estimates are obtained using actual fuel consumption data provided by our shipping service providers, strengthening the quality and accuracy of our results. If fuel consumption is unknown, transport distances, load factors, tonnages, and emission factors per transport type are used instead. Emission factors are found in the Scope 3 sheets of DEFRA's 2021 factor set, providing the direct and indirect emission factors respectively. The sum of direct (TTW) and indirect (WTT) emissions yields the total emissions from a given transport activity.

EMISSION FACTOR - KG CO₂ EQ./TONNE.KM

A commonly used factor is kg CO₂ eq./tonne.km which is multiplied by the total tonnage and the one-way distance travelled. DEFRA's methodology states that if emissions of different modes of transport are to be compared, this is the preferred method. The emission estimates for train and ship freight are only available in tonne.km, so to compare the emissions on the same basis, this method is used to calculate our truck emissions. However, this emission factor tends to yield results of higher magnitude than the fuel consumption method, which is important to keep in mind when using the data for decision making purposes.

The emission factor varies with the loading factor of the vehicle. This is explained in further detail in the next chapter.

TRUCK TRANSPORT

Transport emissions by truck are calculated according to the methods described in the previous section. Actual fuel consumption was only available for Finnish domestic transport. The fuel consumption method does not consider the return load, thus the resulting emissions are not perfectly comparable to those calculated using the tonne.km method.

[1] https://ghgprotocol.org/sites/default/files/standards_supporting/Chapter4.pdf

Emissions from the other countries were calculated using the tonne.km emission factors. The emission factors for each vehicle type vary with the load factor. DEFRA provides three precalculated load factors: 50%, 100% and a UK average^[2]. Using linear interpolation^[3] specific emissions factors for Geminor's average load factors can be determined. The load factor represents the average between the delivery and the return transport load factor. As an example a truck carrying the maximum load both ways has a load factor of 100%. If a truck has a 100% load on the delivery, but returns empty, the DEFRA load factor is $(100\% + 0\%) / 2 = 50\%$ ^[4]. For Geminor transports, an average load factor of around 75% is assumed both ways for most of our transports. For loads on shorter distances where the vehicle returns empty the assumed load factor of 29%. In some countries, larger trucks with a max load of 40 tonnes are used. In this case the average load factor of 87% was applied.

Transport distances were estimated through a link between Gemisoft and Google maps which provides a distance in km. for each registered transport. This way the tonne.km can be calculated directly and applied to the emission calculation.

RAIL TRANSPORT

Rail emissions are calculated using DEFRA's TTW and WTT tonne.km emission factors for rail. Distances were derived using Google maps. Load factor considerations are not relevant for this emissions factor.

SHIP TRANSPORT

Ship emissions were calculated using both DEFRA emissions factors for the different vessel types and fuel consumption data supplied by our shipping service providers. All the Norwegian vessels and some of the UK ones are calculated using fuel data. The rest use DEFRA factors.

Fuel calculations are based on marine gas oil (MGO) emission factors (both TTW and WTT emissions), tonnes of fuel consumed per hour, and hours spent while at sea and during loading and offloading. Emissions from handling were provided by one of our shipping service providers.

Distances were gathered from <https://sea-distances.org/>.

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- [2] DEFRA 2020 Methodology: 6.5 Table RFS0125 (DfT, 2019c) shows the percent loading factors are on average between 33-64% in the UK HGV fleet. Figures from the ARTEMIS project show that the effect of the load becomes proportionately greater for heavier classes of HGVs. In other words, the relative difference in fuel consumption between running an HGV completely empty or fully laden is greater for a large >33t HGV than it is for a small 17t rigid HGV emits 18% more CO₂ per kilometre when fully laden and 18% less CO₂ per kilometre when empty relative to emissions at half-load
- [3] DEFRA 2020 Methodology: 6.8. (...) Because the effect of vehicle loading on CO₂ emissions is linear with load (according to the ARTEMIS data), then these factors can be linearly interpolated if a more precise figure on vehicle load is known. For example, an HGV running at 75% load would have a CO₂ factor halfway between the values for 50% and 100% laden factors.
- [4] DEFRA 2020 Methodology: 12.31. Road vehicles are volume-limited rather than weight limited. For all HGVs, an average loading factor (including return journeys) is used based on the HGV factors provided in the 2020 Conversion factors. Waste vehicles leave a depot empty and return fully laden. A 50% loading assumption reflects the change in load over a collection round which could be expected.

Photo:
Olav Vikingstad



Photo: Unsplash



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