Decarbonizing in progress

The SKF path to net zero emissions in operations and supply chain by 2050
SKF continues its quest to be a sustainability leader within the industry. Downstream, this is achieved through expanding our clean technology business and offering solutions that reduce customers’ environmental impact and energy use, as well as aiding their transition towards circular, carbon neutral business. We are also leading the way by improving sustainability in our own operations and throughout the supply chain.

Since the late eighties, SKF has been pursuing its sustainability agenda through increasingly tough targets and customer focus. We have been successful in reducing energy use and emissions in our manufacturing operations, whilst increasing turnover. In June 2020, SKF announced that all its manufacturing sites will be carbon neutral (net zero) by 2030. This will be achieved primarily through energy and material efficiency improvements and by switching to renewable energy. In July 2021, SKF joined the Science Based Target initiative. Membership of the SBTi commits SKF to climate targets that are in line with the Paris Agreement. This means achieving net zero global emissions by 2050, at the latest, to limit global warming to 1.5 °C.

SKF is now announcing its target to achieve net zero emissions, throughout the value chain (from raw material to finished product), by 2050. While 2050 may seem far off, this task is difficult to achieve, especially considering the significant carbon dioxide emissions caused by current steel production methods.

Our targets have been prepared, within the organization, by the people who will be responsible for achieving them. All targets will be aligned with the SBTi and include all greenhouse gases, not only carbon dioxide. SKF’s climate targets will, consequently, use the same definitions as those defined by the SBTi.

We estimate that SKF’s scope 1,2 and 3 (upstream) emissions amount to be approximately 1.8 million tonnes of CO₂e per year. The largest percentage is caused by sourcing direct material – primarily steel and steel components – followed by emissions from our own operations and logistics.

We have set a credible, transparent and bold path to reach net zero emissions in 2050. This is broken down into five-year, interim targets for each category. This enables us to adapt our targets, as new technology and government policy evolves. Even if the pathway to zero for a specific sub-target is not fully defined, we must find viable options to achieve them through direct means, advocacy or a combination of both. The transition of global steel production to carbon neutrality is a massive undertaking and there are limitations to how much change SKF can effect unilaterally. Therefore, we have joined with other industrial steel consumers to advocate for the necessary structural changes by joining the SteelZero and ResponsibleSteel initiatives.

Our targets are based on understanding the complete life cycle. This means we will prioritize action that makes the biggest impact, while avoiding unintended negative trade-offs. We will be aware of and address other risks – such as human rights, biodiversity and other ESG objectives that may be relevant.

This target is an important step in future-proofing the company, in the eyes of our investors, customers and employees.

Net zero emissions in operations and supply chain by 2050
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2 Scope of the targets
3 Carbon footprint and prioritity
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1 Introduction

Science tells us, unequivocally, that climate change caused by human activity presents an existential threat to life on this planet. Greenhouse gas emissions caused by humans need to reduce rapidly to net zero by 2050, at the very latest. For this to happen, the global economy needs to transform from being fossil fuel dependent to being carbon free, hyper efficient, circular, and clean.

The sixth report from the Intergovernmental Panel on Climate Change (IPCC), published recently, made clear the severity of the problem and the urgent need for profound action – defining this point in history as ‘code red for humanity’.

At SKF, we see it as a moral obligation to our customers, shareholders, employees, and future generations to do everything we can to help realize this transformation. We also see that by doing so, we are positioning the company to capitalize on the most important strategic prospect in many decades. By far, SKF’s largest contribution to this transformation lies in what we can do with, and for, our customers.

With our strategic focus on clean technology industries (at all stages of industrialization), we are developing products, solutions and services that help enable these technologies, making them competitive and supporting the need for rapid growth in the coming years.

We can enable significant energy and carbon savings for our customers, in all industries, by optimizing the design of our products. We are making them lighter, more efficient, longer lasting and repairable, as well as improving the performance of our customers’ products by optimizing system designs, through advanced modeling and simulation, for example.

Our Rotating Equipment Performance (REP) is fundamentally about the removal of waste from customer processes and value chains. REP contracts eliminate energy, material and transportation waste – by eliminating these, we also reduce emissions.

With a combination of these approaches, we have the potential to make a profound contribution to the transition to a carbon free world and, at the same time, drive innovation and growth for SKF and its customers.

But our moral and business obligations do not stop with our ability to enable transformations with customers. We must also address the carbon emissions of our own operations and activities, as well as those in our extended supply chain. It’s true that the scale of these impacts may be relatively small, compared to those of our customers’ products, processes and systems, but they are still significant. By addressing them, we set a positive example for our customers, suppliers and other stakeholders, and create long term competitive advantages by reducing costs and risks.

SKF has been measuring and acting on carbon emissions from our own production activities for more than 20 years. We have achieved sustained economic growth, while reducing our CO₂ impact in real terms. We have also been working, for several years, to understand and reduce the carbon impact of our suppliers, as well as other activities such as logistics and business travel.

In the last couple of years, there has been a clear increase in global understanding of – and action on – climate change. This is reflected in dialogue and input from our customers, suppliers, the investor community and from governments in almost all our markets.

Increased awareness is driving change in the business community and giving rise to new legislation that we believe creates new opportunities for SKF to make significant progress – not just in our own operations, but with our suppliers, business partners and throughout the value chain.

Net zero emission operations and supply chain

It’s from this perspective that we are announcing our target to achieve net zero emissions throughout SKF’s value chain (from raw material to finished product delivered to the customer). We intend to achieve this overall objective before 2050. We will reach some goals much sooner. We will, for instance, achieve net zero emissions in SKF operations by 2030.

We have applied a few basic principles in developing our overall objectives, along with the various sub-targets (each of which concerns a different area of activity).

1. The targets must be aligned with the most ambitious aim of the Paris Agreement and with what science dictates is necessary to reduce the destructive impacts of climate change. This aim is to reach net zero global emissions by 2050, at the latest, in order to limit global warming to 1.5 °C. The targets we have set will be verified by the Science Based Target initiative.

2. We will set interim targets (2025, 2030 etc.) for each of the main goals – defining our short and medium-term ambitions in alignment with the long-term goals. We will also review the scope and ambition as we go forward – taking any chance to increase the rate of achievement or expand the scope, as the global situation evolves, and new technologies emerge.

3. Even if the full pathway to zero for the specific sub-target may not be fully defined, we must seek viable options for SKF to address its achievement through direct means, through advocacy or with a combination of both.

1. To verify that our approach is based on climate science, SKF is committed to setting science-based targets, according to the Science Based Target initiative (SBTi).

2. SKF’s targets for its supply chain have been developed with a clear understanding of these requirements and we anticipate that they will be formally approved by SBTi, within the timeframe set by them.
4. Our targets are informed by understanding the complete life-cycle. This means our priorities are based on the degree of impact and the avoidance of unintended negative trade-offs. We should also be aware of, and address, any other risks – such as human rights, biodiversity and other ESG objectives that may be relevant.

5. We must have (or be confident that we can develop) credible methods to follow up and report on our progress, both internally and externally.

While these principles have been applied in the development of the targets which address all the material carbon impacts within the scope, the actions needed to achieve each target differ depending on the position in the value chain and what practical options SKF has to assert influence.

For example, the 2030 goal for our own operations will be achieved by improving energy and material efficiency and by switching to 100% renewable energy. We have direct influence and control on these matters.

A different approach is required for up-stream emissions associated with the production of steel (our most important material input). SKF is a relatively small end customer for steel producers and the possibility to exert unilateral influence is limited. While we will continue to express our requirements and expectations directly to our steel suppliers, and work collaboratively with them on decarbonization, a broader approach is also needed. Therefore, we intend to work with other like-minded industrial steel consumers to advocate for short, medium and long-term changes that will drive the transition to carbon neutrality within the steel industry. As part of these efforts, we have become active members of SteelZero\(^2\) and the Responsible Steel Initiatives\(^3\).

We see advocacy of this kind as an important part of our overall approach. The global transformation to carbon net zero emissions cannot be achieved by the business community alone – the market failures exposed by this crisis must be addressed through bold, coordinated policy initiatives by governments around the world. Through engagement in multi-stakeholder initiatives, such as SteelZero, RE100 and SBTi, we intend to advocate for positive and binding outcomes, for example from the UN climate negotiations. These outcomes should include policies and regulation which will internalize the true cost of carbon across all markets and will incentivize and support the industrialization and deployment of relevant clean technology solutions.

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2 Scope of the targets

**SKF is a complex, global industrial company.** The greenhouse gas emissions which result from its activities (either directly or indirectly) come from numerous sources and geographical locations. For many years, SKF has applied the Greenhouse Gas Reporting Protocol to define, report and follow up this aspect of the Group’s performance. The protocol defines 3 ‘scopes’ of greenhouse gas emissions, depending on how and where they occur.

**Scope 1** refers to direct emissions generated at SKF facilities, for example by burning fossil-based gas or oil.

**Scope 2** covers the indirect emissions generated by SKF’s electricity and district heat suppliers.

**Scope 3** covers all other indirect emissions which occur in our supply chain, both up and downstream.

The targets described in this document refer to scope 1 and 2 emissions, as well as scope 3 upstream emissions and scope 3 emissions resulting from SKF-controlled logistics (up to the point we deliver products to our customers).

Scope 3 downstream emissions, i.e. emissions occurring when SKF products are running in customer or end-user machines and systems, are not currently included in the scope of these targets. The reasons for this are summarized below.

SKF can significantly reduce direct customer emissions in three ways:

1. Providing products and solutions which enable clean technology industries, such as renewable energy generation.
2. Optimizing SKF products and/or customer systems – providing products and solutions that reduce weight and friction or assist customers to design energy and carbon efficient systems.
3. Applying Rotating Equipment Performance contracts that avoid energy and carbon waste and optimize the customers process performance.

Specific examples of the above can be found in appendix 1.
SKF has conducted numerous Life Cycle Assessments (LCA) and carbon footprint studies on our products and solutions over the years. This research shows that these approaches to reducing greenhouse gas emissions are often many times greater than those associated with our own and upstream operations.

However, to quantify and aggregate these savings as well as the emissions associated with the normal running of our products across more than 40 globalized industries in a meaningful way is extremely challenging. This is due to the nature of the SKF product offering and our position in the value chain. The same SKF product can typically be applied in multiple different applications. Each application has potentially very different energy use and associated greenhouse gas impacts – defined by factors such as the loads, speeds, and operating cycle as well as the energy source applied in the machine or system. On top of this, a large percentage of SKF’s products are sold via our globalized distributor network – and very often it is not possible for us to know where the product is applied (which customer, which industry).

It is for these reasons that we are not able to measure or issue a simple downstream scope 3 emissions reduction target. We are, however, working with the SBTi and others to find meaningful goals that will drive SKF’s ability to enable dramatic reductions in customer and end user emissions by applying the three approaches described above.

It is also important to note that, like many global industrial companies with a diversified customer base, SKF operates in sectors associated with fossil fuel extraction and energy generation. Specifically, the coal, oil and gas sectors. Our business in these sectors represents a small proportion of SKF’s overall business. Due to the nature of our distribution network, and as many of our OEM customer’s products can be used for different applications, it isn’t possible to avoid supplying these sectors. Unless Carbon Capture and Sequestration is widely adopted, we anticipate that these sectors will become gradually less relevant in the coming years.

SKF’s business in transportation sectors, such as automotive, rail, shipping, and air is significant and growing. Many of these sectors still use fossil fuels. However, a major part of SKF’s R&D work is currently supporting the transition to carbon neutrality in these sectors.

With that said, figure one below visualizes the full value chain as well as the scope of these targets.

**Figure 1** Scope of the net zero emissions operations and supply chain target
SKF has worked with Life Cycle Assessments since the early 2000s and, over the years, we have conducted numerous studies on a broadly representative sample of SKF products and solutions.

The knowledge acquired by doing this, together with a recently executed organizational carbon footprint study, allows us to estimate the size of greenhouse gas impacts for all the potentially significant activities occurring within the Scope described above. These are visualized in figure 2 to the right.

In order to make the greatest impact on reducing global emissions, we need to prioritize. Therefore we focus on, and start with, those activities which make the greatest impact, meaning some relatively small impacts will not initially be included in our reporting. We will, however, find pragmatic ways to motivate our suppliers and other actors to measure, and more importantly, reduce their carbon impact. Eventually, we will make these commitments a requirement for SKF’s suppliers.

Based on this, we have established the following sub-targets and approaches.

3 Carbon footprint and priority

SKF operations scope 1
SKF operations scope 2
Indirect material
Direct material
ITC
Manufacturing equipment
Business travel
Employee commuting
Downstream transportation by SKF
Upstream transportation
All energy scope 3
SKF operations scope 2
SKF operations scope 1

Figure 2 Estimated CO\textsubscript{2}e impact of SKF operations and other activities in the scope. Source: SKF

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Direct material
This is the most significant element of upstream scope 3 emissions and covers the materials and components which we buy, and which are directly applied in our products. Most notably steel, but also materials utilized by SKF, such as rubber, where the embodied emissions are high and we purchase large volumes. It covers impacts that occur at all stages of the supply chain – from raw material extraction and scrap sourcing to steel production and subsequent processing (such as forging). Our detailed approach to addressing these emissions is described in section 5 of this paper.

SKF operations scope 1 and scope 2
This covers scope 1 and 2 emissions from electricity, gas, district heat and other energy sources used at SKF facilities. All SKF factories, testing and research centers, larger warehouses and offices, around the world, are included. Our detailed approach to addressing these emissions is described in section 4 of this paper.

Upstream and downstream transportation
SKF manages the transportation of around 80% of the volume of SKF products shipped to our customers and around 30% of the volume of incoming components and materials. We do this through a global network of contracted logistics providers. This scope 3 aspect includes the emissions resulting from all forms of transportation within this network. Some (mainly automotive) customers collect SKF products directly from our factories – these customer-controlled activities are not included in the scope, for the time being.

As we progress with our work in this area, we will increase the scope of reporting to include transportation not currently covered by SKF’s global logistics network – either by taking them over or by collecting data from the companies involved.

Our detailed approach to addressing these emissions is described in section 6 of this paper.

All energy scope 3
This refers to the GHG emissions resulting from the activities which occur pre-energy generation for the energy which SKF uses in our operations – such as the extraction, processing and transportation of fuels used in power stations or the embodied emissions which result from the construction of a power plants (such as a wind turbine or a combined cycle gas turbine).

The impact is significant – 140,000 tonnes – and we will contribute to reduce this in several ways.

Firstly, by moving away from fossil fuels, as described in section 4 of this paper. We will avoid the upstream impacts associated with their extraction, processing, and transportation (the largest part of this impact).

Secondly, we will help to address emissions from power generation equipment. We will do this, primarily, by working with SKF customers in the relevant sectors. For example, helping the Cement and Steel sectors to move towards carbon neutrality, with SKF offers and solutions that help avoid waste and emissions. Our engagement in multi-stakeholder initiatives like Steel-Zero and RE 100 will also promote and advocate for the necessary systemic changes in these industries.

ICT
SKF uses IT services, such as servers and cloud storage, through various arrangements. The emissions associated with providing these services are estimated to be around 20,000 tonnes a year. SKF will work with our network of suppliers to find low and, eventually, zero carbon solutions.

Employee commuting
This covers emissions caused by 40,000 SKF employees traveling to and from work and currently results in around 50,000 tonnes per year. SKF is already working on reducing this in different ways, such as the increasing use of digital workplaces, encouraging lower carbon transportation and providing bus services for employees. We will intensify this work, primarily through national management teams, as each country has different challenges and opportunities.

Business travel
This covers the emissions associated with business travel – flights and the use of company vehicles. Business travel includes visits to customers, suppliers, SKF facilities and other stakeholders. SKF works to reduce this impact in several ways, including virtual meeting tools, promoting lower carbon transportation (rail instead of air travel for example) and the provision of low carbon company vehicles.

Indirect material
SKF purchases indirect materials, such as work clothes, consumables (such as hydraulic oil and other process media), grinding wheels, as well as plant and machinery. Our LCA and carbon footprint studies have shown that the emissions associated with the production of these items are small in comparison to the other aspects listed above. Therefore, indirect material is not included in the scope of emission reporting. However, we will communicate our ambitions and requirements to these suppliers and include our requirements in our supplier selection criteria.
SKF has been measuring, reporting, and reducing greenhouse gas emissions associated with our own operations for more than two decades. By driving energy efficiency, waste elimination and increasing the use of renewable energy, we have been able to decouple business growth from emissions caused by our production activities. This is illustrated in the figure below.

In 2020, SKF announced its goal to achieve carbon neutrality (net zero emissions) by 2030 for all our operations. We are certain that this exceeds the requirements for this scope within the Science Based Target Initiative. This goal was announced in addition to the previously announced goal to achieve a 40% reduction in carbon intensity for bearing production, from 2015 to 2025. By 2020, we had already achieved a 37% reduction. Our performance in meeting the 2030 goal (both actual and projected) is shown below.

SKF’s plan to achieve this by 2030 is based on continued measures in two main areas.
1. Improving energy and resource efficiency within our operations
2. Switching to renewable energy sources

We aim to avoid buying carbon offsets to achieve our goal, as much as possible. We will only do this towards the end of the target period, after we have exhausted all options within energy efficiency and renewable energy. We are confident that these measures will get us most of the way there. However, it’s highly likely that we will need to purchase a small number of credible offsets to reach net zero. Our current estimates indicate that offsetting a few thousand tonnes will be required, which corresponds to a small proportion of the total emissions in this scope.

Improving energy efficiency in our operations
SKF has a good track record in energy efficiency improvement. The company was one of the first to adopt the ISO 50001 energy management standard. Currently, 44 factories, which account for more than 90% of SKF’s total energy use, are third party certified, in accordance with the ISO 50001 standard.

The energy performance of each facility is monitored on a monthly basis. Units are required to develop and execute yearly plans.

SKF will continue to invest in making its operations more energy efficient. In 2019, SKF issued a Green Bond of 300 million Euros. At the end of 2020, nearly 200 million Euros had been invested – around 35% of that amount has been used for measures that will improve the energy efficiency of SKF operations. The rest is related to investments which improved the energy and carbon efficiency of our customers.

Energy efficiency measures range from large projects – adopting new technology – to smaller incremental improvements. When consistently planned and prioritized we are confident that these measures will continue to deliver significant savings in energy, cost, and greenhouse gas emissions.

Step change solutions
At SKF, we firmly believe that further step changes in energy efficiency can be achieved within our manufacturing operations through innovation.
Measuring real energy performance

The energy performance of a factory is not easy to measure. Energy usage is influenced by many factors – of course the effectiveness of the energy saving actions at the unit, but also by other parameters such as production volume changes and the weather. Since the energy performance is heavily influenced by these other factors, absolute energy use is not a good way to understand performance. Simplistic indexed energy use (dividing energy use by some measure of output) is also fairly meaningless – typically such KPI’s will show a good development if production increases and a poor one when it drops – and this tells us nothing about how well energy efficiency measures are being applied.

For these reasons, SKF uses historical data of energy use vs. output to establish an ‘energy signature’ of each factory or unit. We then compare each new month’s performance to this signature – if real improvement in energy efficiency is being achieved we can see that the unit performs better than the signature predicts, and conversely if more energy is used than anticipated by the signature for the given output – we know something is wrong which triggers further investigations.

SKF Magnetic Spindle Technology promises major improvements to energy efficiency within SKF’s core manufacturing process

An example of a step change solution, currently under final development, is the use of SKF magnetic bearings, which replace conventional super precision bearings in grinding machine spindles. Tests indicate efficiency gains of around 30%, compared to the old set-up. SKF has more than 1,000 of these machines around the globe. If successful, the deployment of this innovation will result in significantly lower CO₂ emissions, as well as quality and efficiency improvements.

Innovation in heat treatment reduces energy demand by 85%

Heat treatment is required to achieve the functional characteristics of bearing steel. In some cases, part of this process requires quenching the bearing components in molten salt. After this step, the residual salt must be washed off the components with water. In order to recycle the water and salt it must be reconditioned by distillation.

Conventionally atmospheric vaporizers are used to do this, but SKF is using Green Bond investments to fund the replacement of these vaporizers with state-of-the-art vacuum vaporizers. As well as other process improvements, this technology reduces the energy need for the water distillation by around 85%.

At SKF, we can identify and implement many step changes of this kind.

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The widespread deployment of other innovations, such as ‘near net shape’ manufacturing – producing raw components that require very little machining – will play an important role in improving SKF’s energy performance and reduce up-stream impact.

SKF’s program to consolidate manufacturing operations into fewer, larger facilities whose locations and capacity match our customers’ footprint will also make a significant contribution to energy efficiency and carbon reduction.

Incremental improvement solutions
Below are some typical examples of, recently executed, incremental energy efficiency.

Energy savings also result from measures that reduce or avoid other forms of waste. Reducing scrap and re-work, for example, will save not only the energy and emissions that would have been generated within SKF’s operations, but also those upstream in the supply chain. As SKF drives continual improvement in our process quality, this also translates into improved energy and greenhouse gas performance.

Outdoor temp 0 °C

Roof insulation at the Luechow facility in Germany

Often, energy efficiency measures are not complicated – it just takes focus. The picture below shows the impact of improved roof insulation. An investment of 85,000 Euros produced annual savings of 270 MWh over 5 years (both roofs are completed now!).

Heat recovery from oil quench in Poznan, Poland

The team in SKF’s Poznan factory designed a simple heat recovery system to capture the heat from oil quenching which was previously lost. It is now used in other parts of the process, as well as heating the showers. This saves 450 MWh a year and reduces CO₂ emissions.

Eliminating non-productive energy use in grinding machines – SKF Pune in India

With simple software changes, machine spindles can be stopped when the machine is waiting for the next component. This may seem obvious, but many industrial machines do not have this feature. It leads to annual savings of 10 MWh per machine.
Switching to renewable energy sources

Figure 5, to the right, shows the energy sources used within SKF during 2020.

Electricity accounts for around 75% of the total energy use within SKF. We have been working to source or generate an increasing share from renewable sources for several years. In 2020, around 40% of the electricity used by SKF was from renewable resources.

SKF secures renewable energy in several ways. We are supported by our third party global energy service provider (Schneider Electric), who advise us on when and where to switch to renewable energy, in accordance with the Green House Gas Protocol scope 2 reporting guidelines.

Within the EU, the company currently buys Guarantees of Origin (GO’s), covering its energy use in all facilities in Germany, Italy, Sweden, Spain, Belgium, and Poland. We also buy GOs to cover the electricity use in our UK operations.

In the USA, we are currently working on a major power purchase agreement, which we intend to cover the demand from all SKF operations in America. We also see important developments in the Chinese market, which we intend to utilize.

In India, we have made extensive use of power purchase agreements for both on-site and off-site solar installations. SKF also makes direct investments in renewable electricity generation – mainly solar PV. See the examples below.

Photovoltaic Solar Energy

SKF’s Indian factories in Bangalore and Mysore have made solar power purchase agreements and are now using more than 80% renewable energy. The investment led to an annual reduction in CO₂ emission of, approximately, 15,000 tonnes and reduced energy costs. SKF India has also installed solar panels on the roofs of its facilities.

Direct investment at SKF’s factory in Busan, South Korea

In South Korea SKF is finalizing a direct investment in a 1 MW Photo Voltaic array, mounted on the roof of its Busan factory. This investment will have recouped costs in 7 years and will provide around 10% of the total energy needs for the factory, as well as reducing annual CO₂e emissions by around 700 tonnes.
As part of our wider goal to promote the decarbonization of the global power sector, SKF joined the multi-stakeholder initiative RE100 in 2020. RE 100 was established by the Climate Group and is a global initiative bringing together hundreds of businesses committed to using 100% renewable electricity.

After electricity, natural gas represents the second largest energy source in SKF operations. This is typically used for building and process heating, although there are two combined cycle gas turbines (tri-generation – electricity, heating, and cooling) at SKF factories in Italy.

Substituting energy coming directly from combustion of fossil based natural gas with renewable energy sources is often more challenging than switching electricity sources because it often requires a change of technology at the unit. However, SKF has already done this at several facilities (see below examples). We are convinced that it will be possible to deploy these types of approaches across the Group to achieve our 2030 goal.

**District heating** consists of steam or hot water, provided by local utility companies, and represents around 8% of SKF’s total direct energy use. Typically, the system uses excess heat from local electrical generation facilities. By using it at our factories, we help electricity generators achieve far higher energy efficiency.

SKF also uses this heat for cooling via absorption chillers (for example, in Gothenburg, Sweden).

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**Geothermal Heating at SKF Jinan in China**

The Jinan facility has a geothermal heating and cooling system. 300 boreholes were drilled, 100 meters deep, to drive a heat pump system. This drastically reduces greenhouse gas emissions related to building heating and cooling.
SKF Tudela in Spain became carbon neutral by 2021, without carbon offsetting

SKF Tudela has improved its energy efficiency by at least 25% over recent years. The facility uses 100% renewable electricity from on-site solar power generation and the purchase of renewable electricity.

In order to reach net zero, without carbon offsetting, it was necessary to find an alternative to the natural gas used to heat the building, which generated around 600 tonnes of CO₂ annually.

This was achieved by the innovative use of geothermal energy. This energy is used for heating in the winter and for cooling, via absorption chillers, in summer.

Biomass heating at the St. Cyr facility in France

Since 2011, most of the energy needed for building and process heating at SKF’s facility in St. Cyr has been provided by an on-site biomass boiler, which reduces annual CO₂ emissions by 35%. The biomass material comes from locally sourced agricultural waste.

Use of biogas derived district heat in Luechow, Germany

SKF Luechow has formed a partnership with a local CCGT operator that use biogas from agricultural waste to generate renewable electricity. SKF is supplied with excess heat from its gas turbine, for building and process heating. Annually, this reduces CO₂ emissions by around 400 tonnes and saves 300,000 Euros.
Purchased steel and steel components represent by far the most significant volume of material sourced by SKF, in terms of weight and value. This is because most of our products are primarily made from steel.

In 2020, SKF purchased around 460,000 tonnes of steel and steel components. In comparison, SKF purchased around 4,000 tonnes of rubber in the same period. Rubber is the second most important material sourced by SKF, as it is used in finished seals or as a raw material to produce our own seals.

We know from numerous product carbon footprint studies that the embodied carbon in the steel materials and components we buy represents between 60 and 90% of the total emissions generated in our value chain from raw material extraction to finished product delivered to the customer. Figure 6 below illustrates the carbon footprint of an SKF product. In this case, an automotive wheel bearing.

For these reasons, we have prioritized decarbonizing the upstream value chain for steel. Most of the measures defined in our short and medium-term plans, in this area, are related to steel. As we progress with our work on steel, we will expand the scope of our activities to other significant purchased materials and components.

SKF targets for scope 3 direct material emissions
Our long-term target is to achieve net zero emissions by 2050 for our direct material sourcing. To help achieve this, we have defined interim targets and measures that will be completed by 2025, 2030, 2035 and 2040. We firmly believe that these goals are aligned with the Science Based Target initiative and aim to have this verified within the timeframe stipulated by them.

The further into the future our interim targets are, the more uncertainty there will be about the options available. Therefore, we will continually review these targets and, where possible, increase the level of ambition, for example if this is made more feasible due to policy implementation or technological deployment. In all cases, the base year for reduction targets is 2019.

Before going into detail about the interim goals and actions, it is worth reflecting on the nature of this challenge and the measures available to achieve them.

Steel is by far the biggest source of scope 3 emissions in SKF’s direct material supply chain. Steel production is highly energy and carbon intensive, using existing technology. Steel processing (forging, for example) is also energy and carbon intensive.

The complexity of steel decarbonization varies significantly, depending on the production method used. For example, it is far easier to decarbonize steel produced primarily from scrap than it is steel produced from iron ore. The decarbonization of scrap-based steel production primarily requires a source of renewable electricity to run the foundry, whereas carbon neutral ore-based steel production requires an entirely different process. It is widely acknowledged, within the steel industry, as well as by organizations such as the United Nations and the International Energy Agency, that decarbonizing global steel production will require the investment of trillions of euros and take several decades. Indeed, 2050 is seen as a highly ambitious and bold timeframe within which to achieve this.
One could argue that SKF could speed up the decarbonization of its steel supply solely by sourcing scrap-based steel (which has less than half the embodied carbon, compared to ore-based steel), but this would lead to sub-optimization.

This is because global demand for steel far exceeds available scrap levels and will continue to do so. Much of the infrastructure needed to achieve carbon neutrality requires steel as a fundamental material, therefore, demand is projected to increase significantly.

If SKF (and other companies) were to source only scrap-based steel, it would lead to an increase in its price. This would negatively impact our competitiveness. The need for ore-based steel would remain the same but SKF would, effectively, be opting out of exerting an influence on this part of the sector.

From both an environmental and commercial perspective, we consider that the responsible course of action is to promote decarbonization throughout the steel industry in pragmatic and effective ways.

It is important to be realistic about how much influence SKF, as a single company, can have on this global challenge.

We are already working with our suppliers to improve energy and carbon efficiency and will, as part of our overall supplier selection and development approach, give preference to those suppliers who take a proactive approach. However, SKF represents only a small percentage of total demand for our steel suppliers. There are limitations to our influence on the supply chain by working unilaterally with our suppliers and sub-suppliers.

Addressing these issues, therefore, must include working with other industrial steel consumers to advocate for short, medium and long-term structural changes that will decarbonize the steel industry. In practical terms, we will do this by becoming active members of SteelZero and the Responsible Steel Initiatives.

SteelZero is a global multi-stakeholder initiative formed by the Climate Group with a similar concept to RE100 for renewable electricity. It brings together leading organizations to speed up the transition to a net zero (carbon neutral) steel industry. The overall aim of the initiative is to achieve this before 2050.

The Responsible Steel initiative is a global multi-stakeholder initiative which works to address overall sustainability challenges within the steel industry (including climate change) through the development and deployment of certification standards for the various actors in the steel supply chain.

The SteelZero initiative was established in 2020. SKF was one of the first global industrial companies to join. We intend to use our influence to encourage both customers and suppliers to consider joining – thus taking the lead in advocating for a decarbonized steel industry.

While the aim of SteelZero is to achieve net zero global steel production by 2050, companies signing up to the initiative must also commit to interim 2030 goals. These are included in SKF’s interim goals, as defined below.

**2025 Interim goals**

SKF has been working to improve energy and carbon efficiency with its energy-intensive suppliers for several years. For example, we require major, energy-intensive suppliers to adopt the ISO 50001 energy management standard. Our target is to build on and accelerate this work so that, by 2025, we can achieve an absolute reduction of 13%, in comparison to 2020. This will be achieved by the following measures.

1. Between now and 2025, all SKF suppliers with an annual energy use over 10 GWh at the site (or sites) delivering to SKF will be required to have an emissions reduction plan.
2. SKF will review these plans and incorporate its evaluations into the overall supplier selection and development process. Suppliers in the scope that do not provide an adequate plan will risk deselection.
3. We aim to reduce embodied CO$_2$e by, at least, 15% in the forgings, rings and rolling elements that SKF purchases (with 2019 as a base). This will primarily be achieved through the increased use of renewable energy by our suppliers.

It is encouraging to note that several progressive steel producers are pioneering the development of technology to decarbonize steel production, as illustrated by the case on the next page.
Ovako – A Swedish steel producer pioneering carbon-free steel production

Ovako is a major steel supplier and has been SKF’s trusted partner for many years. The company is taking a leading role in the transition to low-carbon steel production. It has recently carried out successful full-scale trials using fossil free hydrogen as a heat source in their steel production process. In combination with other innovations, they are making carbon neutral steel a viable option for SKF and our customers.

SKF in collaboration to speed up development of fossil-free bearing steel

In October 2021, SKF announced its collaboration in the development of fossil-free bearing steel with Luleå University of Technology’s CH2ESS initiative. As part of the collaboration, SKF will participate in and fund research within hydrogen use in industrial processes and energy systems, speeding up the development of fossil-free bearing steel.
As the number of customers seeking to reduce their up-stream (scope 3) impact increases, we will support them and create added value by quantifying the CO$_2$e embodied in the finished products we deliver to them.

SKF has created a tool which allows us to calculate steel-related, upstream embodied CO$_2$e, as well as that resulting from our own operations. This is described in the text box below.

We use this tool and the data it generates to help customers design and specify lower embodied carbon products. We see that our longstanding focus on climate results in lower embodied carbon products, compared with those of our competitors. This gives SKF a competitive advantage, lower scope 3 emissions for the customer and lower emissions overall.

The software executes CO$_2$ calculations, based on data input and connected databases.

The databases incorporate the supplier’s emission data (according to energy source), relevant machine operation (and their power source) and a short list of furnaces, (with their climate footprint).

The algorithm takes into account the mass of steel utilized, process performance and energy use, which enables SKF to work with our suppliers and drive down emissions.

On top of manufacturing emissions, the software includes the possibility to calculate transportation emissions for:

- Road
- Rail
- Sea
- Air

by using the algorithm provided by SLS (SKF Logistic Service).

**2030 Interim goals**

By 2030, we aim to reduce direct, material-related greenhouse gas emissions by 32%. We will use the following measures to achieve this:

1. We aim to achieve a 40% absolute reduction, at least, in the embodied CO$_2$e from the forgings, rings and rolling elements that SKF purchases (with 2019 as a base year). Primarily, this will be achieved through the increased use of renewable energy by our suppliers.
2. All major SKF direct material suppliers (not just steel and forgings) will be included in our scope 3 reporting and will have submitted an emissions reduction plan, which will be evaluated in the sourcing plans.
In accordance with the SteelZero initiative, we will ensure that at least 50% of all sourced steel is either:

1. Responsible Steel Certified,
2. coming from steel companies with approved SBTi targets or
3. low embodied carbon steel – see figure 7 below. This can be achieved by each criteria or by a combination of them.

Adopting the SteelZero criteria allows us to promote the use of the Responsible Steel standard, throughout the supply chain and thereby also address other environmental issues, as well as broader sustainability issues, such as human rights, throughout the value chain.

By encouraging suppliers to follow our lead, and have their climate targets approved by the Science Based Target Setting initiative, we will be helping our steel supply chain to reach net zero global emissions by 2050, at the latest, in order to limit global warming to 1.5 °C.

By applying the SteelZero definition of low embodied carbon steel (figure 7 – below), we acknowledge the complexity of decarbonizing the steel sector and signal our aim to promote the use of best-in-class steel suppliers – from companies producing scrap based steel and those producing mainly from ore.

2035 interim goals
Our target is to reduce this scope’s emissions by 43% before 2035. This is based on the assumption that the global infrastructure to produce low carbon steel will grow at a significant rate.

We aim to achieve a 60% reduction in the greenhouse gas emissions associated with our purchased forgings, rings and rolling elements.

By 2035, we will also require a minimum reduction of 20% in embodied carbon from our steel and rubber suppliers.

2040 interim goals
By 2040, we expect to have reduced this aspect of our greenhouse gas emissions by 60%. In order to achieve this, at least 40% of the steel sourced by SKF must come from carbon neutral steel plants. Emissions related to forging, ring and roller suppliers should be reduced by 80%, and by 70% from our plastic and rubber direct material suppliers.

Figure 7 The SteelZero initiative definition of low embodied carbon steel (taking into account the percentage of scrap use). Source: SteelZero.
6 Logistics (scope 3)

**Greenhouse gas emissions** caused by SKF’s logistics activities represent the third most significant impact (throughout the value chain), after scope 3 emissions related to direct purchased material (mainly steel) and scope 1 and 2 emissions from our own operations.

SKF has been measuring, publicly reporting and working to reduce these emissions since 2011.

As with direct materials, SKF’s goals to reduce this aspect of our impact can be achieved through direct SKF action, as well as industry-wide changes, which SKF will advocate and promote.

SKF controls around 80% of its downstream logistics activities (delivering our products to our customers) and around 30% of its upstream (incoming materials) logistics activities. Our efforts, between now and 2025, will be focused on these directly controlled aspects. Beyond 2025, we will broaden the scope to include all significant logistical activities into and out of SKF (upstream and downstream).

**Our direct measures will accelerate in three main areas**

**Production and sourcing on a regional basis**

SKF has already embarked on a major strategic initiative to re-balance our manufacturing and supply chain footprint, so that our factories and warehouses are closer to our customers, and our suppliers are closer to our factories. We do this to increase speed and flexibility, reduce costs and minimize the carbon impact of transportation. SKF has made good progress with this strategy in the last five years but there is still more to do.

**Optimizing modes of transportation**

Mode of transportation significantly affects environmental impact. For example, air freight generates, at least, 30 times more greenhouse gas emissions than rail. Within each mode of transportation it is possible to select environmentally sound technology – for example, trucks with efficient engines and lower greenhouse gas emissions or zero carbon, electrically driven trucks (see example below). SKF will continue to work with our logistics providers on modes of transportation with lower and, eventually, zero carbon impact, where possible.

**Optimizing logistics efficiency**

Having selected the most effective transportation mode, optimizing its use from a cost and emissions perspective is integral to our approach. For example, ensuring that fill-rates (the percentage of available capacity) in trucks and shipping containers are as high as possible, lowers transportation emissions.

The GHG impact of SKF transportation in 2020 is illustrated below in figure 9.

SKF will continue to take unilateral action, such as minimizing airfreight, increasing railfreight and avoiding long-distance transportation, by being closer to our customers and suppliers. However, these measures will not achieve net zero emissions on their own. Transformations must occur throughout the logistics industry. The decarbonization of land, sea and air transportation is a major challenge. Major investment and a complete overhaul of the current infrastructure will be required. Few specialists think the aviation sector can be fully decarbonized by 2050, without extensive carbon offsetting.

By setting goals for our logistics partners, SKF will be signalling our support for transformation but, as with the steel industry, our voice must be combined with other businesses and stakeholders in order to drive the necessary changes.

SKF is a member of The Network for Transport Measures. The NTM promotes and develops environmental work in the transport sector and supports a common and widely-accepted method for emissions calculation, use of natural resources and improvements to goods and passenger transportation.

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**CO₂e per transport mode**

- Air, 36%
- Road, 26%
- Ocean, 37%
- Rail, 1%

**Total weight of goods transported by different transport modes**

- Air, 1%
- Road, 72%
- Ocean, 26%
- Rail, 1%

*Figure 9* Split of GHG emissions for SKF controlled transports in 2020
SKF pioneers the use of electric trucks at our factory in Gothenburg, Sweden

In partnership with Einride, SKF has started to use fully electric trucks, charged with 100% renewable electricity, to transport products and components around the factory. This completely eliminates the emissions that would have been caused by using petrol or diesel power. This is an exciting, if small, example of what’s possible in decarbonizing logistics.
2025 Interim Goals
SKF has been working to reduce greenhouse gas emissions caused by logistics for many years. In 2017, it issued its current target – to reduce CO$_2$, per tonne km (for all SKF-controlled logistics) by 40% by 2025 (with 2015 as a base year). This equates to around a 20% reduction in absolute terms, compared to 2019.

This has proven to be a very challenging target in recent years. A volatile global market has led to increased demand for airfreight (to resolve urgent transportation needs) and inter-regional transition is taking longer than anticipated.

We are committed to the following measures in order to get us on track to achieving the 2025 target.

1. **Airfreight avoidance.** We will improve approval processes and work closely with customers and suppliers to shift from airfreight to sea and rail transportation.

2. **Decrease transport work.** We will accelerate our inter-regional activities and thereby lower the need for global transportation work.

3. **Decarbonizing transportation.** We will set up new directives for transport procurement and cooperate with our suppliers to find new low-carbon solutions and possible cost-sharing development projects.

4. **Optimizing transportation.** We will further reduce emissions by deploying adaptive routing, using new software applications.

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SKF has entered a five-year agreement for two E-trucks with our partner GLC. GLC carries out on-site transportation in Gothenburg, for goods between our factories and warehouses.

1. E-truck from Scania, with bearings from SKF.
2. Range: 250 km
3. Zero emissions. Batteries charge from renewable, on-site energy sources
4. Customized according to customer requirements

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Switch from road to rail transportation, from SKF Gothenburg to SKF’s warehouse in Tongeren, Belgium.

This replaces 600 Trucks, saving around 200 tonnes of CO$_2$ emissions per year.

Switch from road to rail transportation, from SKF Poggio Rusco in Italy to SKF’s warehouse in Tongeren, Belgium.

SKF set up a fixed rail schedule to replace existing road transportation between these two locations. This reduced greenhouse gas emissions by 60%.
2030 Interim goals
By 2030, we aim to have made a 35% reduction in transport-related greenhouse gas emissions through the following measures:

1. Completion of our region for region project (in order to reduce global transport work)
2. To make 50–60% of all road transportation carbon neutral. This will require replacing short and mid haulage with less carbon-intensive transport solutions, such as rail or short sea, which uses energy sources other than diesel.
3. Increased use of decarbonized air (SAF) and sea transportation (see decarbonization plan). We aim to have 10% of our total airfreight volume powered by SAF and 20% of our sea volume powered by biogas.
4. Carbon neutral on-site transportation – electric trucks.

2035 Interim goals
By 2035, we aim to have made a 55% reduction in transport-related greenhouse gas emissions through the following measures:

1. Increased usage of rail freight in Europe and between Asia and Europe; mainly replacing air freight, but also ocean freight as energy sources for the rail develops.
2. Fossil-free transportation at all SKF sites (Gothenburg pilot). A specific plan will be established.
3. 50% reduction of emissions for in all last mile deliveries.
4. 50% of all ocean freight to be carbon neutral.
5. Increased use of Sustainable Aviation Fuel (SAF).

2040 Interim goals
By 2040, we aim to have made a 77% reduction in transport-related greenhouse gas emissions through the following measures:

1. Full decarbonization of last mile transportation globally (FTC)
2. 70% of all ocean freight will be carbon neutral
3. 40% of all air freight will use SAF

Sustainable Aviation Fuel
At SKF, reducing our greenhouse gas emissions by minimizing air freight is a top priority. However, the challenges of the global transport market mean that some air freight will be a necessity for the foreseeable future. In addition to air routing optimization and finding alternative modes of transportation, we are working on a more sustainable air freight concept. Using Sustainable Aviation Fuel (SAF) would significantly reduce our emissions. The availability of SAF is currently limited (<1% of the global airplane fuel), and it’s expensive but we expect supply to increase, in the coming years, as demand rises.
7 Follow up and reporting

Internal drive and follow up
At SKF, we have been working with sustainability in general and climate change in particular for more than two decades and with good results. Our aim is always to find an integrated way to manage the numerous topics within this wide and strategically important area.

We do this by ensuring that people in the relevant functions and processes understand the challenges in their context and take ownership for delivering on the goals defined.

So, while SKF does have a quite sizable sustainability and EHS organization with detailed competence who support in the development and realization of targets and strategy, in the end our governance is set up so that responsibility to deliver the results sits within the line organization – with the factory manager, the manufacturing cluster director, the commodity purchasing director, the regional sales director and so on.

This means the various KPI’s which we already follow (and those new ones which we will develop as part of this initiative) will be used in the various operational and strategic governance processes and bodies within SKF.

For example, the Group Management members responsible for manufacturing in SKF (Bearing Operations and Industrial Technologies) will continue, via their normal operational review meetings and twice yearly EHS and Sustainability reviews follow up on the energy and CO₂ performance of the factories and logistics operations. Similar meetings will then occur at cluster (group of similar factories) and factory level.

External transparency and detail
SKF has been reporting scope 1 and 2 greenhouse gas emissions since 2001, and has provided unit-by-unit and country-by-country data, in conjunction with the Annual Report, since 2005. As we have progressed and increased the scope of our activities for scope 3 emissions, we have added this into our external reporting. We will continue with this approach – publishing data that proves our performance.

All this data will continue to be reviewed and checked (for accuracy and completeness) by the Group’s Auditors. In addition, SKF will continue to respond to the CDP (Carbon Disclosure Project) Climate Change Questionnaire and the results will be made publicly available.

8 Conclusion and next steps

At SKF, we have focused on addressing climate change for more than two decades and made significant contributions in two fundamental ways.

Through the business we make – enabling our customers’ transition to a carbon-free world

and

Through the way we make business – relentlessly driving the climate impact of our own operations to zero.

The goals set out in this paper describe the next step in our journey – defining, in detail, how we will drive carbon emissions to net zero by 2030, for our own operations, and by 2050, for the significant parts of our supply chain the overall trajectory to zero is summarised in the graph below.

None of this is easy. It will require focus and a huge effort from our staff and suppliers throughout our value chain. It will require change and innovation at a scale and speed never seen before. It will not only require cooperation between customers and suppliers, it will take coordinated action from policy makers to put a realistic cost on carbon emission and support the development and deployment of technology.

At SKF, we are determined to do our part – to help steer the world away from catastrophic climate change and strengthen our company at the same time.

TFK decarbonization trajectory – net zero by 2050
9 Enclosures

Appendix one – Customer Examples

Providing products and solutions that help enable clean technology industries, such as renewable energy generation and electrification.

https://orbitalmarine.com/orbital-marine-power-teams-up-with-skf-for-its-power-train-supply-on-worlds-most-powerful-tidal-turbine/

https://www.skf.com/uk/industries/wind-energy


Optimizing SKF products and/or customer systems – providing lower weight or lower friction SKF products, or helping customers’ design energy and carbon efficient systems.

https://skfgroup.sharepoint.com/sites/cs-new-market-offers/SitePages/Low-friction-HBU-3.0.aspx

Applying Rotating Equipment Performance contracts that avoid energy and carbon waste and optimizing customers’ process performance.