

## FY2022 Sustainability Conference



## NSK Sustainability Initiatives

December 20, 2022  
NSK Ltd.



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Good afternoon, everyone. Thank you for attending NSK's Sustainability Conference today.



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1. Sustainability at NSK
2. Carbon Neutrality Initiatives
3. Create New Value  
with Bearings & Beyond

Today, I would like to explain NSK's approach to sustainability, with a focus on carbon neutrality initiatives. I will also elaborate on how we intend to create new value in this area through our "Bearings & Beyond" initiative. Next we will look at page 4.

# 1. Sustainability at NSK

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**Our business activities themselves, which are based on NSK's Corporate Philosophy, represents NSK's sustainability**

**NSK Corporate Philosophy** (established in 1991)

NSK contributes to a safer, smoother society and helps protect the global environment through its innovative Technology integrating Motion & Control™.

As a truly international enterprise, we are working across national boundaries to improve relationships between people throughout the world.

**NSK's business domain**  
**= Social role**  
**Contribution to the environment**

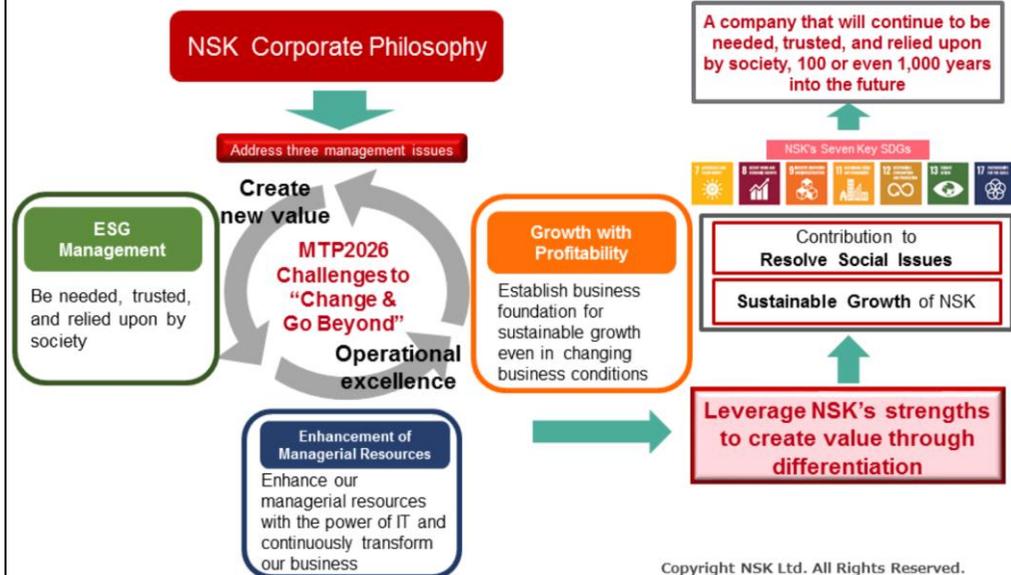


At NSK, to conduct business activities in line with our corporate philosophy is to pursue sustainability.

NSK's corporate philosophy states, "NSK contributes to a safer, smoother society and helps protect the global environment through its innovative technology integrating Motion & Control™. As a truly international enterprise, we are working across national boundaries to improve relationships between people throughout the world."

In other words, we aim to contribute to society and the environment through NSK's business activities, build partnerships to this end, and contribute to the sustainable development of society and the environment.

Under MTP2026, we address three management issues, and aim to be a company that is needed and trusted, and that contributes to the development of a sustainable society



This is an explanation of NSK’s approach to sustainability under Mid-Term Management Plan 2026 (MTP2026).

We are currently working on the three management initiatives of:

**1. Growth with Profitability**

- Establish a business foundation capable of sustainable growth even in a changing business environment.

**2. Enhancement of Managerial Resources**

- Continue to enhance managerial resources with the power of IT and continuously transform our business.

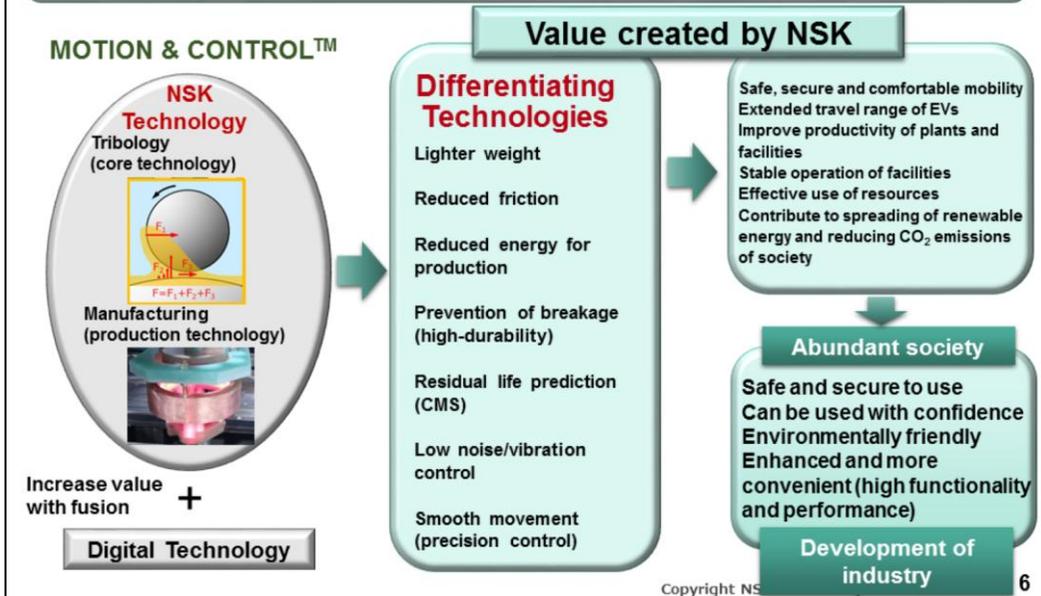
**3. ESG Management**

- Continue to be a company that is needed, trusted, and relied upon by society.

Through these initiatives, we aim to create value that will enable us to solve social issues and achieve sustainable growth by leveraging NSK's strength in tribology and manufacturing to achieve high-reaching future-oriented goals and “Change and Go Beyond.”

We hope to become a company that will continue to be needed, trusted, and relied upon by society for the next 100 and 1,000 years, and we have positioned MTP2026 as a period for rebuilding our corporate foundation to enable sustainable growth.

We contribute to the development of a sustainable society by creating new value through the fusion of tribology and digital technology



This page is a brief description of the value that NSK aims to create.

In short, we will create value by integrating our tribology and manufacturing technologies with digital technology to contribute to the development of industry and an affluent society.

In the current mid-term plan, MTP2026, we will use digital technology in particular to incorporate NSK's unique and proprietary technologies such as weight reduction, low friction, energy reduction, damage prevention, remaining life prediction, noise/vibration control, and precision control into our products, thereby contributing to safe and comfortable mobility that our customers and end users expect. We will contribute to extending the maximum range of EVs, improve productivity of plants and equipment, ensure stable operation of facilities, make effective use of resources, contribute to the spread of renewable energy, and achieve carbon neutrality in society. By fulfilling these expectations, we will contribute to the development of an affluent society and industry.

Setting new targets under MTP2026, we are accelerating and promoting various initiatives

 <p><b>Environment</b></p> <p>Achieve carbon neutrality by FY2035 (Scope 1+2) Provide environmentally friendly products and services</p>	 <p><b>Human Resources</b></p> <p>Maximize human capital value Diversity and inclusion Promote work-style reforms</p>	 <p><b>Quality</b></p> <p>Ultra-stable production Creating plants that never produce defective products, and are always in operation</p>
 <p><b>Governance/Compliance</b></p> <p>Improve Governance of NSK Group Deepening of dialogue with stakeholders</p>	 <p><b>Safety</b></p> <p>Creating a safe working environment Prevention of serious accidents</p>	 <p><b>Innovation</b></p> <p>Strengthen the product appeal of existing products Grow new products and businesses</p>

Under MTP2026, we will promote various sustainability initiatives, and here we describe the six pillars of our efforts.

The first is Environment: we will provide environmentally friendly products and services and reduce our own carbon emissions with the aim of becoming Scope 1 and 2 carbon neutral in fiscal 2035.

In Human Resources, we will leverage our human capital to create a company where diverse human resources can gather and grow, and safe and healthy workplaces.

In Quality, we are focusing on the "ultra-stabilization of production" initiative in the current mid-term plan. This means not only quality, but also safety, productivity, CO<sub>2</sub> emission reduction, and work style improvement. Each plant in Japan has formulated a vision toward this.

In Governance and Compliance, we will strengthen group governance and promote the evolution of dialogue with stakeholders.

In Safety, initiatives for safe plants, work areas, and workplace environments are being managed under specific KPI/KGI.

In Innovation, especially in the mid-term, we will create new value through "Bearings & Beyond."

These efforts are supported by four committees under my direct supervision: the Core Value Committee, the Bearings & Beyond Committee, the Digital Transformation Committee, and the Human Resources Committee.

## 2. Carbon Neutrality Initiatives

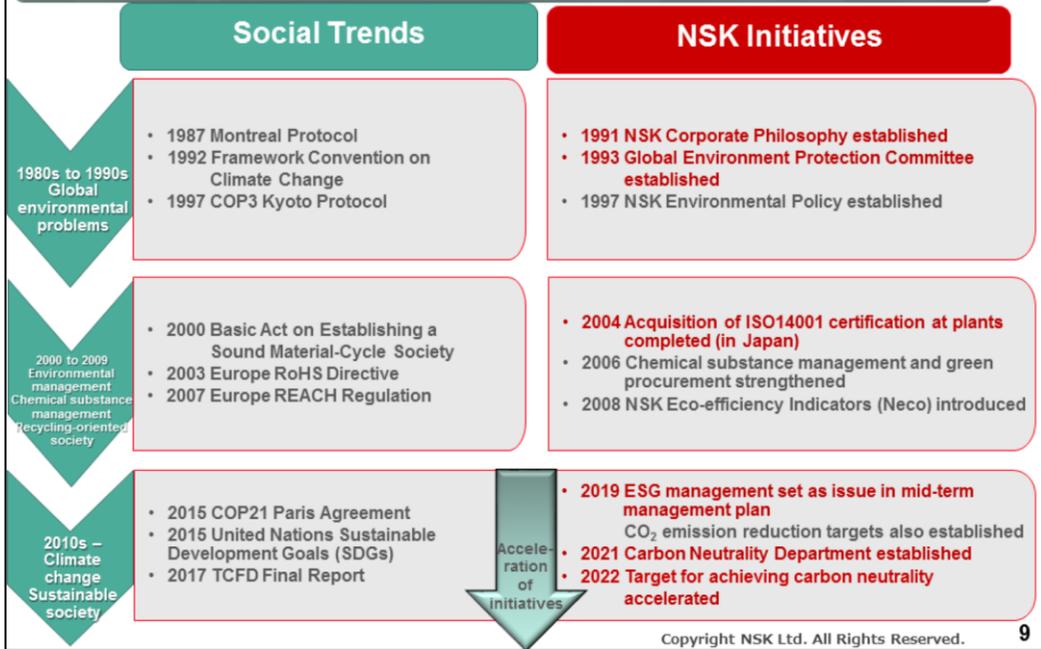


Next, I will explain NSK's carbon neutrality initiatives.

# History of NSK Environmental Initiatives



Promoting environmental initiatives ahead of social trends since the 1980s



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This page shows the history of NSK's promotion of carbon neutrality and environmental initiatives.

From the 1980s, global environmental issues began drawing significant attention, and NSK began cooperating to find solutions. Among other things, since 2010, there has been a significant increase in the expectation for companies to engage in environmental initiatives and to accelerate this movement.

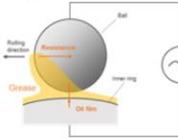
From 2019 onward, with its 6th mid-term plan, NSK began emphasizing ESG management initiatives, and in 2021, NSK established a Carbon Neutral Department ahead of the launch of MTP2026, to organize the goals and activities to be achieved in the mid-term.

**NSK promotes initiatives for reducing CO<sub>2</sub> emissions using the “Create and Utilize” approach**

### Environmental contribution using “tribology”

Deepen tribology technology to realize further energy savings  
For example, development of electrical impedance method\* using electrical circuit to visualize the inside of bearings

⇒ Contribute to reducing torque by making oil film as thin as possible



The oil film thickness is calculated by measuring the ease with which an electrical current flows.

\* Received Best Paper Award, Japanese Society of Tribologists

### Reduce CO<sub>2</sub> emissions from business activities

Reduce CO<sub>2</sub> emissions from business activities through three measures: energy saving, technological innovation, and renewable energy

Coating plant roofs with thermal insulation paint



Improving efficiency of heat treatment

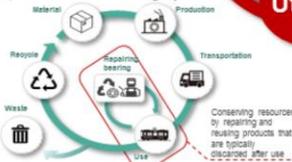


Adopting renewable energy



### Environmental contribution utilizing CMS/reconditioning

Improve reliability and conserve resources by utilizing product lifespan diagnostics, condition monitoring system (CMS), and repair



**Create**

R&D

Production

Customer Support

Product

**Utilize**

### Benefit the environment through our products

Contribute to reducing CO<sub>2</sub> emissions of society as a whole by providing environmentally-friendly products



Low-friction hub unit bearings



Ultra high-speed ball bearings for EV motors



Bearings for wind turbine gearboxes

NSK's efforts to reduce carbon emissions are promoted under a "Create" and "Utilize" framework.

“Utilize” is about contributing to the realization of a carbon neutral society through NSK products and services, while “Create” is about manufacturing and producing such products and services in carbon neutral plants and technical divisions.

In “Create,” we are working on how to utilize NSK's tribology technology in environmentally friendly products. One example is the development of the electrical impedance method shown on the top left. This is a technology to reduce friction by visualizing the oil film to make it as thin as possible, which can be applied not only to bearings but also to other mechanical parts and equipment.

As shown in the top right, we will continue to reduce carbon emissions through three initiatives: energy saving, technological innovation, and renewable energy. The products that emerge from these efforts will contribute to the reduction of energy consumption by customers and everyone else in the form of lower torque and higher efficiency compared to existing bearings and linear motion products.

As shown in the bottom left, we would like to develop NSK's business domain as a carbon neutral initiative, not only by increasing the value of our products, but also by ensuring that our products are used skillfully and for a long time, and that they can be repaired and used again.

# NSK CO<sub>2</sub> Emission Reduction Targets and Progress



**Aiming to achieve carbon neutrality in Scope 1 + 2 by FY2035**  
**Promoting initiatives for targets using the “Create and Utilize” approach**

	Main initiatives	Targets (for FY2026)	FY2021 results
<b>Create</b> Reduce CO <sub>2</sub> emissions emitted by NSK	Energy conservation activities	<p><b>Reduce Scope 1 and 2 emissions by 50% (compared with FY2017)</b></p> <p>■ Reductions in CO<sub>2</sub> Emissions from Business Activities (Scope 1 and 2)</p> <p>Results FY2017 FY2026 FY2030 FY2035 FY2050 Targets</p> <p>Expansion of CO<sub>2</sub> emissions avoided by using environmentally friendly products</p> <p>CO<sub>2</sub> emissions avoided: More than 3 million t-CO<sub>2</sub> (exceeding the total of Scope 1, 2, and 3 CO<sub>2</sub> emissions for the NSK Group in FY2017)</p>	<p>Progress: As planned</p> <p>Reduced 25.1% from FY2017</p> <p>FY2017: 1.02 million tons</p> <p>FY2021: 760,000 tons</p>
	Technology innovation		
	Renewable energy use		
<b>Utilize</b> Contribute to reducing CO <sub>2</sub> emissions by incorporating NSK products into customer equipment and facilities	Contribute to CO <sub>2</sub> emission reductions through products and services	<p><b>CO<sub>2</sub> emissions avoided: 3 million tons</b></p> <p>(1,000 t - CO<sub>2</sub>)</p> <p>Legend: Indirect contribution (green), Direct contribution (blue)</p> <p>2017: 1,349 (Direct: 1,020, Indirect: 329)                  2018: 1,363 (Direct: 1,020, Indirect: 343)                  2019: 1,448 (Direct: 1,020, Indirect: 428)                  2020: 2,320 (Direct: 1,600, Indirect: 720)                  2021: 2,335 (Direct: 1,610, Indirect: 725)</p>	<p>Progress: As planned</p> <p>Reduced 2.34 million tons</p> <p>(Breakdown)                      Direct contributions: 1.61 million tons</p> <p>Indirect contributions: 730,000 tons</p>
	CMS + bearing repair ⇒ Realize product lifecycle management (PLM) business and contribute to recycling-oriented society		

This page describes our progress in fiscal 2021 and our goals for fiscal 2026, divided into "Create" and "Utilize."

In “Create,” we are aiming to achieve carbon neutrality in Scope 1 and 2 by 2035, and to halve our CO<sub>2</sub> emissions by 2026 compared to 2017 levels. In fiscal 2021 we fulfilled 25% of our goal, and in fiscal 2022, we expect to reach nearly a 30% reduction in emissions.

In “Utilize,” our goal is to contribute 3 million tons of CO<sub>2</sub> emission reductions, which is equivalent to the amount of CO<sub>2</sub> emissions from NSK’s Scope 1, 2, and 3 emissions in 2017. We will continue to reduce CO<sub>2</sub> emissions by contributing to low fuel consumption and improved energy efficiency with new products and technologies. Currently, we have reduced 2.34 million tons of CO<sub>2</sub> emissions, and we are on track to achieve our 2026 goal.

**Energy Conservation**

- Air-conditioning improvements (introduce highly efficient equipment, thermal insulation paint)
- Reduce air usage in production processes
- Production energy visualization
- Upgrade energy management

**Example: Air-conditioning improvements**

● **Improve energy efficiency of air-conditioning equipment**

Switch air conditioning heat source from gas to electricity (air-cooled heat pump)



Air-cooled heat pump

● **Adopting thermal insulation paint**

Switch from barrier paint to thermal insulation paint  
Optimize air-conditioning efficiency in both summer and winter



Example of thermal insulation paint

**Standardize demonstration results at model plants and share them with plants in and outside Japan**

**Technological Innovation**

- Improve efficiency using high-frequency induction heat treatment
- 50% increase in productivity by engaging digital technology in all areas and super-stable production

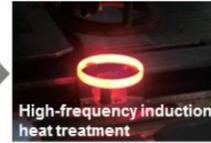
**Example: High-frequency induction heat treatment**

Heat treatment processes account for 22% of total energy consumed in production processes. Heating the target parts only without heating the entire furnace **dramatically reduces energy consumption.**



Conventional heat treatment furnace

Heating the entire furnace



High-frequency induction heat treatment

Heating the target part only

**Expand applicable products and gradually roll out to global plants**

Next, let's look in detail at “Create.”

Looking at Scope 1 and 2 from the perspective of “Create” we will address heat treatment, machine operation, and air conditioning, which account for a large portion of our emissions.

In terms of energy conservation, our main focus in 2021 and 2022 will be on improving air conditioning.

Improving the energy efficiency of air conditioning equipment will have a significant impact on the energy consumption of the entire plant. In addition, devising heat-insulating coatings and other measures is also having a positive effect. Of course, energy-saving technology is advancing globally, and technology is evolving, so after seeing the results of each plant's efforts, we will choose the most effective methods to adopt widely.

On the right is technological innovation. Heat treatment is not only advancing through electrification, but we are also developing new technologies to further increase its efficiency.

### Renewable Energy Use

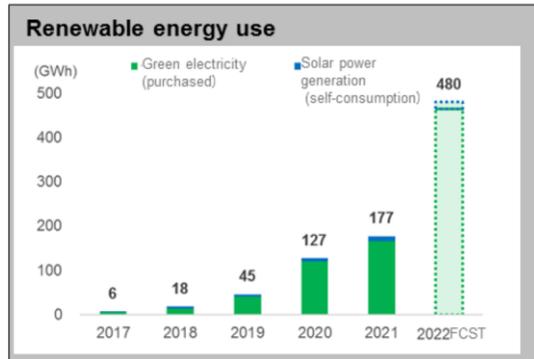
- Actively promote renewable energy procurement: Expand use of green electricity
- Expand installation of renewable energy facilities

#### <Expand use of green power>

- Switch to 100% green electricity completed at all production sites in Europe
- Accelerate introduction in Japan

#### <Install solar power generation facilities>

- Gradually expand installation of solar power generation facilities at global production and business sites



Under “Create,” we are also promoting the use of renewable energy.

NSK aims to achieve carbon neutrality in Scope 1 and 2 by 2035, and in “Create,” we will reduce CO<sub>2</sub> emissions by approximately 50% through the use of renewable energy and the remaining half through energy-saving activities and technological innovation.

With regard to the use of renewable energy, in fiscal 2021, in Europe, we switched to 100% green power at all of our production sites. This year, we are accelerating the introduction of renewable energy at worksites in Japan.

As shown in the graph on the right, in fiscal 2021, 177 GWh, or about 12% of the electricity used at our plants, was switched to renewable energy sources, and in fiscal 2022, we aim to take this even further and increase the percentage to nearly 30%.

- Develop and provide products and services to contribute to reducing CO<sub>2</sub> emissions
- CMS + repairing bearing

<Direct contributions: Develop environmentally friendly products>

- Further pursuit of tribology

<Indirect contribution: Contribute to reducing CO<sub>2</sub> emissions by incorporating NSK products into customer equipment and facilities>

- Focus on **growth sectors** in a post-carbon society and launch NSK products and services that contribute to the environment with Bearings & Beyond

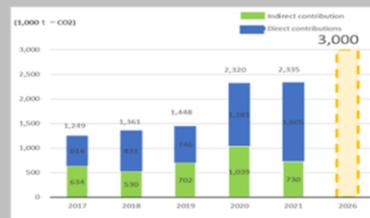
Disclose growth sectors which are “opportunities” identified through TCFD

2020: Announced endorsement

2021: Disclosed scenario analysis (risks and opportunities)

2022: Disclosed financial impact

CO<sub>2</sub> emissions avoided during the use of NSK products



**Direct contributions:** Direct contributions to CO<sub>2</sub> emissions reduction through individual NSK product performance\*

Contribution calculation formula: CO<sub>2</sub> emissions avoided by a single NSK product × sales volume × years of operation

**Indirect contribution:** Indirect contributions through CO<sub>2</sub> emissions avoided by incorporating NSK products into customer equipment and facilities

Contribution calculation formula: CO<sub>2</sub> emissions avoided per unit × rate of contribution of NSK products × sales volume × years of operation

\*The method for calculating contributions to reductions (direct contributions) follows the “Guidelines for Quantifying CO<sub>2</sub> Emissions Avoided by Use of Bearings” published by the Japan Bearing Industry Association.

Next, looking at “Utilize” initiatives.

The “direct contribution” is the amount of CO<sub>2</sub> emission reductions achieved by NSK products in terms of low torque, low friction, etc., compared to conventional bearings and their system products, multiplied by unit sales volume.

“Indirect contribution” indicates the amount of indirect contribution made by NSK's products through customers' equipment and facilities.

The CO<sub>2</sub> emission reduction contribution figures shown in the graph were calculated based on the quantification guidelines being developed by the Japan Bearing Industry Association.

At a minimum, by 2026, through this direct and indirect contribution, we will be reducing the same amount of CO<sub>2</sub> emissions as the amount produced in the creation of our products.

Naturally, beyond that, we will aim to become carbon neutral, including up to Scope 3 in real terms, but we are currently discussing how to develop this as a first-year initiative of MTP2026.

**3. Create New Value  
with Bearings & Beyond**

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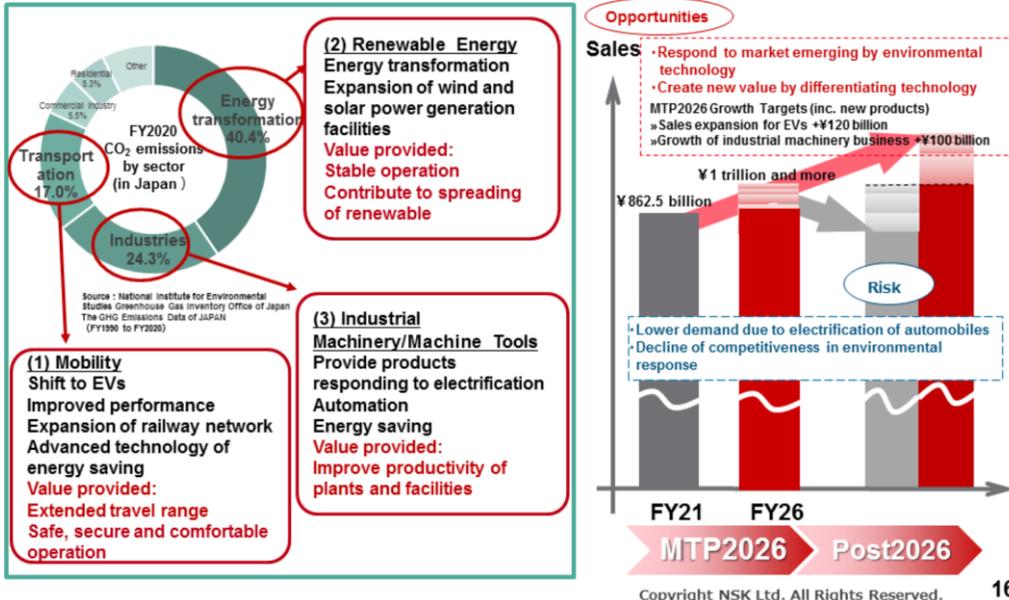


Finally, let's talk about Bearings & Beyond.

# Expanding Growth by Contributing to a Decarbonized Society with Bearings & Beyond



**Transition to a decarbonized society is a growth opportunity for NSK**



This page illustrates how contributing to a decarbonized society is an opportunity for growth with profitability for NSK.

The pie chart on the left shows domestic CO<sub>2</sub> emissions broken down by sector: energy sector, industrial sector, transportation sector, etc. It also shows how our products and services related to each sector contribute and provide value.

As you can see on the right side, we laid out anticipated risks such as a decrease in demand due to the shift to EVs, a decline in reputation if we were to fall behind in carbon neutrality, which could in turn cause a decline in our competitiveness due to being excluded from supplier panels. In this environment, we will turn risk into opportunity over the medium term by transforming our contribution to the environment into value, thereby increasing sales.

**Support for EVs**



Low-friction hub unit bearings



Ceramic ball bearings

**Differentiation:**

Reduced friction, Reduced size and weight, High-durability, High output, High-speed, Low noise  
**Value provided: Extended travel range of EVs**

Ball screws for electric-hydraulic brake systems

Ultra-high-speed ball bearings



Single pinion EPS for EVs



Traction drive speed reducer



**Railways**

Vibrator control actuator for railcars



Wheelset bearings



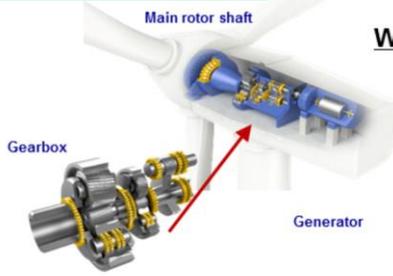
**Differentiation:**

Low noise/vibration control, Reduced friction, High-durability  
**Value provided: Safe and secure operation, Comfortable ride**

On page 17, we show how we will differentiate ourselves with the technologies I mentioned earlier and strengthen our product capabilities in areas where we expect to be recognized by the world, such as EVs and railways, and on page 18, contributions to renewable energy and machine tool equipment.

Next, we will look at page 19.

**Renewable Energy**



**Wind turbines**

Provide a variety of high functional bearings that meet the needs for enlarged size and long-term suitable operation

**Wave power generator**

A system to capture the power of waves on the ocean. The nuts of the ball screws built into the device move up and down with the motion of the waves, generating power.



Images provided by Ocean Harvesting Technologies AB

**Differentiation:**

Reduced friction, Prevention of breakage(High-durability)

**Value provided:**

**Stable operation, Contribute to spreading of renewable energy**

**Machine Tools**

**ROBUSTGRD™  
 seizure-resistant grease for  
 machine tool spindle bearings**



**Ball screws for next-generation  
 high-accuracy machine tools**



**Differentiation:**

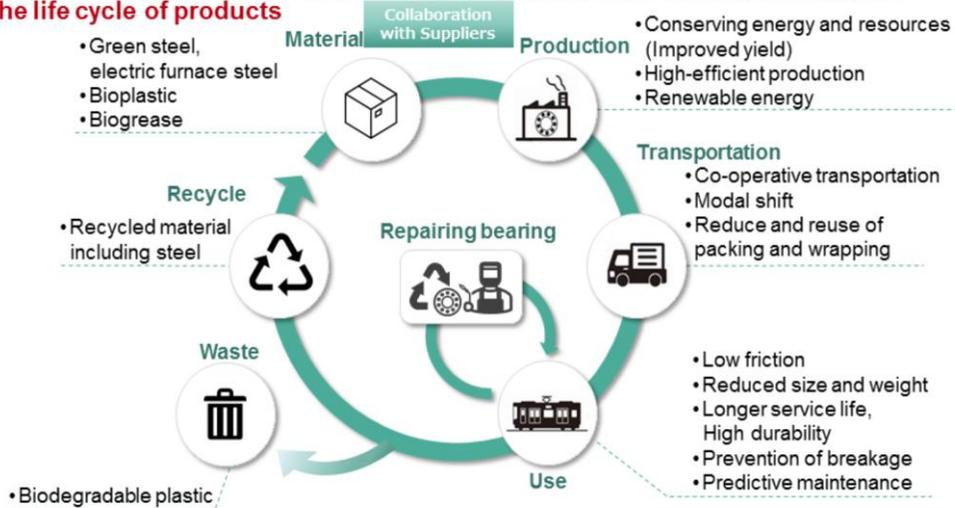
Reduced friction, Low noise,  
 High-durability,  
 Reduced energy for production,  
 Smooth movement (precision control)

**Value provided:**

**Stable operation of facilities,  
 Improved productivity**

## NSK provide solutions throughout the life cycle of products and help to create a sustainable society

**Value Provided: Contribute to reducing CO<sub>2</sub> emissions of society throughout the life cycle of products**



This diagram includes all of Scope 1, 2, and 3, and is the model that NSK ultimately hopes to achieve.

In “Materials,” NSK is developing products using plant-derived materials such as biogrease and biomass plastics. We will also deepen cooperation with suppliers, including the use of green steel materials, to achieve carbon neutrality, including Scope 3.

“Production” includes not only our own activities but also collaboration with many suppliers who support our activities. We are making progress in sharing our goal of becoming carbon neutral with our suppliers. In the current mid-term plan, we have incorporated the strengthening of cooperation with suppliers as an issue, and we will promote collaboration by sharing examples of each other's activities.

In “Transportation,” there are many issues to be addressed to reduce CO<sub>2</sub> emissions, including Scope 3, such as improvement of transportation efficiency and measures for packaging materials.

In “Use,” in addition to the contribution of products as explained in the previous section on “Create,” we are also working to create a cycle that goes beyond that by monitoring the condition of products to ensure that they are used effectively and that they are repaired and reused or recycled for longer periods of time.

We would like to expand our model to fully include “Waste” and “Recycling,” aiming to contribute to the reduction of CO<sub>2</sub> emissions throughout the entire life cycle and supply chain of our products.

# New Value Provided with Bearings & Beyond



Creating new value to resolve social issues, we aim to achieve sustainable growth of NSK

## Industrial Machinery Business

Spread of automation, electrification, and predictive maintenance technologies

Acceleration of energy transition



Active casters

Electric Actuators  
Construction/agriculture etc.



Food oil deterioration suppression filter



"Broaden CMS"  
Synergies with BKV

Expand hydrogen-related businesses

Sales target:  
¥50.0 billion

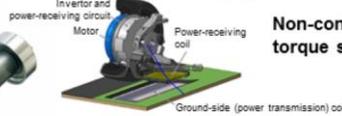
FY2026

Post2026

Expand sales of ball screws for electric-hydraulic brake systems: 10 million units/ year



In-Motion wireless charging



Non-contact torque sensor



Traction drive speed reducer



## Automotive Business

Spread of HEVs/EVs

Shift to EVs

Improved EV driving performance

Including the activities on the previous page, we will continue to propose new products to the world that contribute to the environment. In this mid-term plan, we are aiming for sales of 50 billion yen from new products and new businesses, and our activities in MTP2026 are to nurture these products to become the next pillar of our business.



Based on the idea of giving shape to new motion by "Changing and Going Beyond," the NSK Group will share the vision of NSK's goal of carbon neutrality not only with employees working for the Company, but also with suppliers, and promote initiatives with the participation of all.

