



Products that Contribute to the Environment

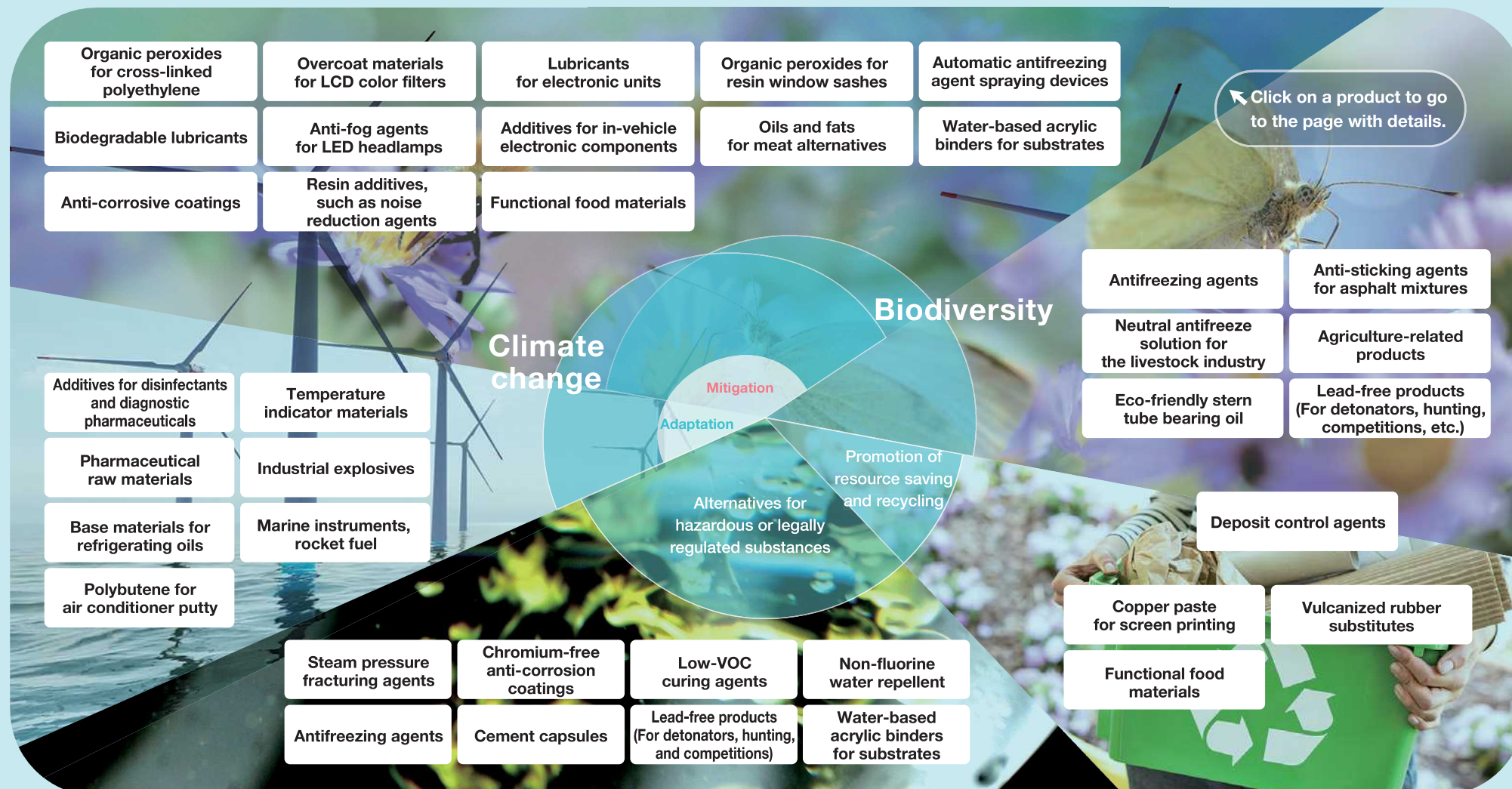
GRI 201-2/304-2/417-1

In response to global issues such as climate change and biodiversity, the NOF Group is conducting research and development for technologies (cleantech) in our three prioritized business fields, and creating a variety of products that contribute to the environment.

Products that contribute to the environment, including to address climate change and biodiversity, among the cleantech-related products of the NOF Group

☀ Responses to Climate Change (TCFD) 📖 ▶ P.107-121

🦋 Biodiversity Conservation 📖 ▶ P.141-147





Products that Contribute to the Environment

GRI 201-2/304-2/417-1

Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to the shift to EVs

Functional Materials business

Metal Coatings business

- Additives for in-vehicle electronic components
- Lubricants for electronic units
- Anti-corrosive coatings
- Overcoat materials for LCD color filters
- Resin additives, such as noise reduction agents
- Anti-fog agents for LED headlamps



It is expected that electric vehicles (EVs) will contribute to climate change mitigation because they generate less greenhouse gas emissions than gasoline-powered vehicles when running. In addition, compared to gasoline-powered vehicles, EVs are expected to require more electronic components (passive components), electronic units, LCD panels, very quiet components, and power-saving components. Thus, the NOF Group's products used in these applications provide positive contributions in this area. Climate change mitigation also contributes to biodiversity because it reduces the ecological imbalance caused by global warming.

Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to renewable energy

Functional Materials business

Metal Coatings business

- Organic peroxides for cross-linked polyethylene
- Biodegradable lubricants
- Anti-corrosive coatings



Eco Mark Certification Number:
08110006
Name of utilizing contractor:
NOF CORPORATION
Products: MILLUBE® series

Renewable energy such as wind power and solar power are becoming increasingly important because they do not produce greenhouse gases. Our anti-corrosive coatings and biodegradable lubricants used in solar panel mounting parts as well as wind power generation blades and gears for wind power generation provide positive contributions in this area. In addition, ultra-high voltage and high-voltage electric wires are indispensable to transmit electricity from wind and solar power generation sites. Thus, our organic peroxides for cross-linked polyethylene used as a coating material provide positive contributions to the spread of renewable energy.



Products that Contribute to the Environment

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Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to reducing greenhouse gas emissions and securing protein sources

Functional Foods business

- Oils and fats for meat alternatives



Due to the greenhouse gases (methane) produced by the livestock industry and the protein shortage accompanying the rapid growth of the global population, movements are starting to find new sources of protein. NOF's oils and fats for meat alternatives are contributing to the spread of soy protein and other such meat alternatives, as they enhance the flavor and texture of these products through our proprietary oil and fat processing technologies.

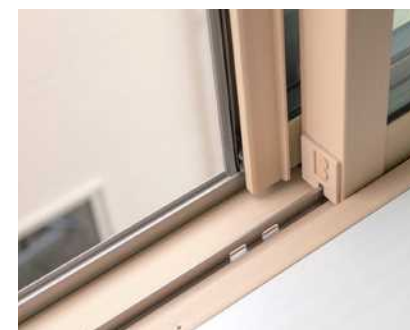
Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to the spread of energy conservation

Functional Materials business

- Organic peroxides for resin window sashes

Window sashes made using vinyl chloride resin contribute to the spread of energy-efficient housing because of their excellent heat insulation. Organic peroxides are used as polymerization initiators for the vinyl chloride resin, and thus contribute to the spread of energy conservation.



Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to the reduction of food loss

Functional Foods business

- Functional food materials

Securing food resources has become an issue, as waste due to expiration of food products leads to food loss. NOF provides functional materials for food that can maintain the softness and improve the texture and volume of breads and sweets, thereby contributing to reduction of food loss by preventing waste due to expiration.





Products that Contribute to the Environment

GRI 201-2/304-2/417-1

Climate change

Biodiversity

Promotion of resource saving and recycling

Alternatives for hazardous or legally regulated substances

Products that contribute to the prevention of ozone layer depletion

Functional Materials business

- Base materials for refrigerating oils



HFC (Hydrofluorocarbon) refrigerants, which do not deplete the ozone layer, are increasingly used as refrigerants for air conditioners and refrigerators. Base materials for refrigerating oils enhance co-solubility with HFC refrigerants and improve their thermal stability, electrical insulation performance, and other factors. Moreover, the low viscosity contributes to saving energy consumption. In recent years, refrigerants with a smaller global-warming potential compared with previous products are required. NOF is now supplying refrigerating machine oil for refrigerants with a low global-warming potential.

Climate change

Biodiversity

Promotion of resource saving and recycling

Alternatives for hazardous or legally regulated substances

Products that contribute to biodiversity, climate change mitigation, and environmental conservation

Explosives & Propulsion business

Nippon Koki Co., Ltd.

- Antifreezing agents
- Automatic antifreezing agent spraying devices



KAMAGU®, together with AUTOKAMAGU® JET, is proving highly effective against the freezing of road surfaces.

Antifreezing agents, such as calcium chloride conventionally used on road surfaces in cold areas, have posed the problem of “salt damages.” NOF’s antifreezing agent KAMAGU®, an acetic acid-derived chemical containing no chloride, poses no fear of salt damages. It is also an eco-friendly anti-freezing agent with minimal impact on plants. AUTOKAMAGU® JET, an automatic antifreezing agent spraying device, is a sensor-based system that automatically sprays KAMAGU® onto snowy or frozen roads. A type is available that works using 100% natural energy (solar energy), and thus contributes to climate change mitigation. It can also perform advanced road surface management via remote monitoring and control, and therefore contributes to both environmental conservation and road safety along with the antifreezing agent.



Climate change

Biodiversity

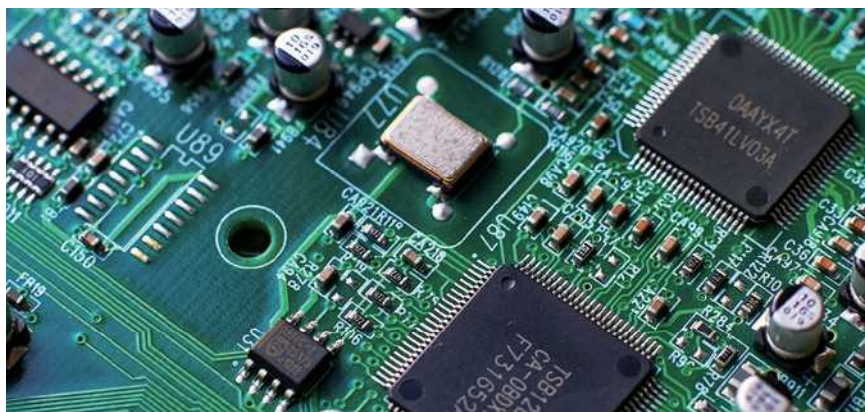
Promotion of resource
saving and recycling

Alternatives for hazardous or
legally regulated substances

Products that contribute to environmental conservation and energy saving

Functional Materials business

- Water-based acrylic binders for substrates



Demand for ceramic substrates and green sheets is increasing due to the enhanced performance and miniaturization of vehicles, electronic devices, telecommunications equipment, and other such items. Solvent-based binders, which are high in volatile organic compounds (VOCs), have typically been used to form these items. NOF's water-based acrylic binder, MARPROOF® AE-002, not only reduces environmental impact and improves worker safety due to its low VOC levels, but also offers excellent thermal decomposition at low temperatures, which contributes to energy saving.

Climate change

Biodiversity

Promotion of resource
saving and recycling

Alternatives for hazardous or
legally regulated substances

Products that contribute to climate change adaptation (air conditioners / refrigerators)

Functional Materials business

- Base materials for refrigerating oils
- Anti-corrosive coatings
- Polybutene for air conditioner putty



As temperatures rise, there is an increasing need for air conditioners and refrigerators around the world, including in developing countries. Base materials for refrigerating oils, which are used for refrigerator lubricants, as well as anti-corrosive coatings for fastening parts for external air conditioner units and polybutene for putty used for air conditioners, which fills in gaps in outer walls, provide positive contributions in this area.



Products that Contribute to the Environment

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Climate change

Biodiversity

Promotion of resource saving and recycling

Alternatives for hazardous or legally regulated substances

Products that contribute to climate change adaptation

(diagnostic pharmaceuticals / pharmaceutical raw materials)

Functional Materials business

Life Science business

- Additives for disinfectants and diagnostic pharmaceuticals
- Pharmaceutical raw materials



If tropical infectious diseases and other diseases and disorders spread due to the effects of climate change, then positive contributions in this area will be made by our disinfectants for infectious diseases and additives for diagnostic pharmaceuticals as well as our pharmaceutical raw materials that combat diseases and disorders.

Climate change

Biodiversity

Promotion of resource saving and recycling

Alternatives for hazardous or legally regulated substances

Products that contribute to climate change adaptation

(environmental information / disaster prevention and mitigation products)

Explosives & Propulsion business

Nippon Koki Co., Ltd.

NiGK Corporation

- Marine instruments, rocket fuel
- Industrial explosives
- Temperature indicator materials



As climate change progresses, there may be an increase in the need to survey the entire world, including seawater temperatures. In addition, there may be an increase in embankment construction to safeguard against the risk of storm surges and other such conditions. Marine instruments and rocket fuel for these environmental surveys, as well as industrial explosives used to procure rocks and sediment from the mountains, will make positive contributions in this area.



Products that Contribute to the Environment

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Climate change

Biodiversity

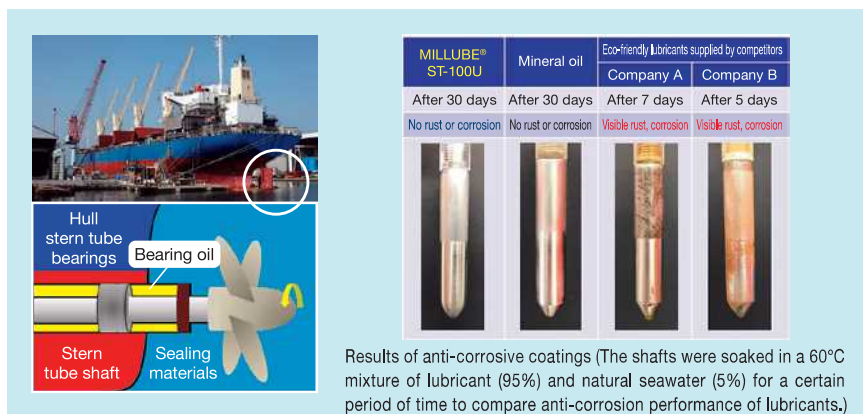
Promotion of resource saving and recycling

Alternatives for hazardous or legally regulated substances

Products that contribute to conservation of marine environments

Functional Materials business

- Eco-friendly stern tube bearing oil



Results of anti-corrosive coatings (The shafts were soaked in a 60°C mixture of lubricant (95%) and natural seawater (5%) for a certain period of time to compare anti-corrosion performance of lubricants.)

After a major oil spill in the Gulf of Mexico in 2010, the United States' 2013 Vessel General Permit (VGP) regulations came into effect for all vessels in 2013. This regulation has led to growing global demand for biodegradable, eco-friendly lubricants. We developed MILLUBE® ST-100U, stern tube bearing oil that meets the needs of the market by greatly improving the lubrication and anti-corrosion performance of conventional biodegradable lubricants offered by other companies. The product, which satisfies 2013 VGP requirements in terms of high biodegradability, low toxicity, and low bioaccumulation, is a superior lubricant that can help conserve marine environments.

Climate change

Biodiversity

Promotion of resource saving and recycling

Alternatives for hazardous or legally regulated substances

Products that contribute to protection of animals (disinfectants)

Explosives & Propulsion business

Nippon Koki Co., Ltd.

- Neutral antifreeze solution for the livestock industry



Barns, vehicles, etc. are disinfected for hygienic livestock management, but the disinfectant freezes in the winter, so it must be mixed with antifreeze. We contribute to protection of animals with Viva Frostir®, a neutral antifreeze solution for the livestock industry that is gentle to animals and humans.



Products that Contribute to the Environment

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Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to environmental conservation

Functional Materials business

- Anti-sticking agents for asphalt mixtures



Eco Mark Certification Number: 12110001
Name of utilizing contractor: NOF CORPORATION
Product:
ASPHARAB® series

In road construction, asphalt mixtures often stick to the cargo beds and hoppers used within plant facilities, and to prevent this trouble, petroleum-derived adhesion preventers have been used. However, conventional adhesion preventers are not friendly to the environment; they contaminate soil and/or water. ASPHARAB®, made from natural oil, contributes to environmental conservation as a highly biodegradable product.

Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to protection of animals (weak calves, dirt removal)

Functional Materials business

YUKA SANGYO CO., LTD.

- Agriculture-related products
(NEODRINK®, Za Yoroi-Otoshi)

NEODRINK® is a nutritional supplement that maintains the physical strength of weak calves, and Za Yoroi-Otoshi helps reduce stress in cows by quickly removing stubbornly-stuck dirt from the cows' bodies.



Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to use of old paper

Functional Materials business

YUKA SANGYO CO., LTD.

- Deposit control agents

Recycled paper resources contain numerous impurities, including sticky substances such as adhesives. These impurities lower the efficiency of the paper recycling process and impact the quality of the product. The pitch control agent MILLSPRAY®, SPANOL® and DETAC® and the removing agent BIOREX® have solved these problems and promote the recycling of waste paper.



These products demonstrate their superior performance in reducing impurities that generate in the paper-making process.



Products that Contribute to the Environment

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Products that contribute to environmental conservation and health maintenance

Explosives & Propulsion business

Lead-free products (detonators, hunting, competitions, etc.)

We are promoting the removal of lead from detonators, ammunition, and small arms that have long contained a large amount of lead. Lead can cause poisoning of birds of prey as well as soil and water pollution. Lead in detonators can vaporize during firing and cause health damage to the human body. Therefore, making such products lead-free contributes to environmental preservation and health maintenance.



Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to recycling

Functional Materials business

Vulcanized rubber substitutes

While large quantities of vulcanized rubber are used in auto parts and sealing materials, which have to be highly resistant to heat and oil, vulcanized rubber can never be molten once it is molded, and therefore cannot be recycled. Unlike this, the NOFALLOY® TZ series, which can be heated for re-melting as many times as wanted for recycling, is extensively utilized as a substitute for vulcanized rubber.



Products made recyclable by the use of NOFALLOY® TZ series

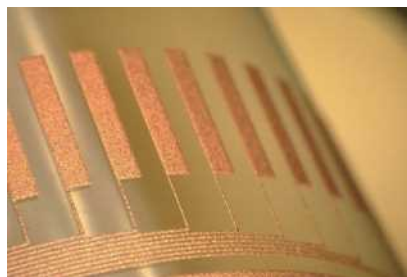
Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to efficient resources utilization

Functional Materials business

Copper paste for screen printing

Etching is the standard method for forming copper wiring on electronic circuit boards. However, this method requires waste fluid processing because copper waste fluid is generated as most of copper foil is dissolved. The copper paste developed by NOF makes it possible to directly draw copper wire on the necessary areas through the screen printing method. For this reason, it is possible to form copper wiring that is not wasteful without generating waste fluid, which in turn makes it possible to use resources efficiently and contribute to environmental preservation.



Example of use in printing of copper paste by screen printing

Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to reducing environmental impact

Functional Materials business

Low-VOC* curing agents

Bath tubs are manufactured by thermally curing unsaturated polyester resin. PERHEXYL® A is a curing agent that can shorten the molding cycle and moreover significantly reduce the VOC, an environmental load that remains in the molded product.



* Volatile Organic Compounds



Products that Contribute to the Environment

GRI 417-1

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Products that contribute to environmental conservation and health maintenance

Metal Coatings business

Chromium-free anti-corrosion coatings

The chromium-free anti-corrosion coating GEOMET® is a water-based anti-corrosion coating which contains no chrome compounds. Satisfying the requirements of Europe's ELV*1 and RoHS*2 directives, GEOMET® treatment parts are used by automakers across the world.

*1 Scrapped automobiles

*2 Restriction of the use of certain hazardous substances in electrical and electronic equipment



Parts treated with GEOMET® anti-corrosive coating

NOF METAL COATINGS ASIA PACIFIC CO., LTD.

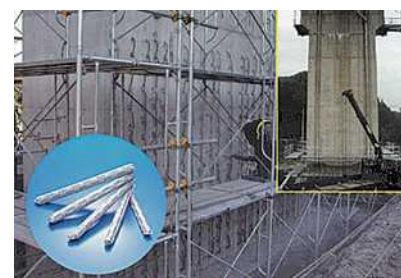
Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that contribute to reducing environmental impact

Explosives & Propulsion business

Cement capsules

A cement capsule is an (inorganic) adhesive-based capsule anchor for post-installed application intended for typical use in anti-earthquake reinforcement work. This product is more resistant to fire than resin products, and excels in safety as it contains no harmful chemicals, which might lead to sick house syndrome.



Example of use in an actual project (anti-earthquake reinforcement of Shinkansen bridge piers)

NiGK Corporation

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Products that contribute to environmental conservation and health maintenance

Functional Materials business

Non-fluorine water repellent

Organic fluorine compounds (PFAS), which have been used to make products water repellent, are known for their poor biodegradability, bioaccumulation, and toxicity. Due to this, the European Chemicals Agency (ECHA) has unveiled proposed restrictions on their use. In response, NOF has developed BLEMMER® HU-SP, a plant-derived, PFAS-free product. We will contribute to meeting the growing need for PFAS substitutes in applications such as paper, textiles, and leather products.



Climate change Biodiversity Promotion of resource saving and recycling Alternatives for hazardous or legally regulated substances

Products that are gentle on the surrounding environment

Explosives & Propulsion business

Steam pressure cracking agent, GANSIZER®

GANSIZER® uses high vapor pressure that is generated during the thermolysis of the agent to crush bedrock, stone, and concrete structures with low vibration and low noise. It has gained a strong reputation as a crushing agent not containing explosives that is friendly towards the surrounding environment. It has a strong track record in situations such as crushing concrete and excavation works near rivers, and it was also used for underwater crushing of breakwaters that were destroyed in the Great East Japan Earthquake.



Nippon Koki Co., Ltd.