

Providing Environmental Value As a Green Enabler

Working to provide environmental value at each stage of the manufacturing process as a green enabler, we recognize our role in enabling customers to reduce their environmental impact through our products as a business opportunity. To provide value as a green enabler, we are working to (1) manufacture products using processes that reduce environmental impact, and to (2) develop environmentally friendly products.

1 | Manufacture and provision of products through processes that reduce environmental impact

We recognize that it is essential to make efforts to reduce environmental impact not only in our own company but also in the value chain. Measures we are advancing include the reduction of CO₂ emissions and of the resources used in each process, the promotion of recycling, and reduction in the use of harmful substances. We are focusing on these initiatives as we believe that products manufactured in processes that reduce the environmental impact indirectly contribute to reducing the environmental impact in the value chains of our customers who use those products. We also made our Scope 3 calculations based on this belief. Going forward, we will proceed with studies on managing CO₂ emissions under Scope 3 based on these calculation results.



We give priority to business partners who are working proactively on environmental conservation as well as to materials that have a low environmental footprint, such as recycled materials.

We are engaged in the research, development, and design of products and services that can provide environmental value and lead to sustainable growth and social contribution.

In addition to energy-saving measures, such as optimizing processes and layouts and improving energy efficiency, we are promoting the deployment of renewable energy.

Promoting manufacturing that takes life-cycle assessment (LCA) into consideration, we are also working to reduce environmental impact in distribution and sales operations.

We contribute to the reduction of environmental load with environmentally friendly products. These products include materials that are essential for xEV manufacturing, materials that reduce power loss, and materials that contribute to the long service lives of our customers' products and components.

We are actively working on recycling that leads to the effective use of limited resources and to a reduction in the CO₂ emissions generated during the manufacturing process.

Raw Material Procurement	Research and Development/Design	Manufacturing	Distribution/Sales	Product use	Recyclable (Including recovery)
<p>Main Initiative Expanding the use of recycled raw materials</p>	<p>Main Initiative ● Promoting the development of environmentally friendly products that contribute to decarbonization and reduction of energy use over the product life cycle ● Conducting environmentally friendly design assessments, etc. during new product development See page 23 for details →</p>	<p>Main Initiative ● Expanding the deployment of renewable energy ● Promotion of energy saving</p>	<p>Main Initiative Reduction of impact on the environment caused by transportation</p>	<p>Main Initiative By their use of our environmentally friendly products, we are contributing to resolving our customers' environmental issues and those in society as a whole. See next page for details →</p>	<p>Main Initiative ● Material recovery and reuse ● Product recovery and reuse</p>
<p>Examples ● Iron scrap ● Waste from cutting magnets ● Amorphous metals, etc.</p>	<p>Examples ● Proposing high-performance ferrite magnets for xEV drive motors ● Reducing CO₂ emissions during the manufacture of cathode materials (page 24) ● Developing high-performance magnetic slot wedges that increase the efficiency of induction motors (page 24)</p>	<p>Examples ● Installation of one of the largest photovoltaic panel installations in Japan ● Use of alternative coke</p>	<p>Examples ● Use of low-emission vehicles ● Improvements to load efficiency ● Reduction of transportation frequency ● Shortening of transportation routes ● Promotion of modal shift</p>		<p>Examples ● Collection and reuse of cutting waste generated on production lines ● Recovery and reuse of amorphous materials, a major product</p>
<p>Results (FY2022) Amount of recycled materials used 1,293 thousand tons</p>	<p>Results (FY2022) New product ratio 23%</p>	<p>Results (FY2022) Reduction in CO₂ emissions 31% compared with FY2015</p>	<p>Results (FY2022) Improvement rate for reducing the use of energy for transportation 0.1% compared with the previous fiscal year</p>	<p>Results (FY2022) Sales ratio of environmentally friendly priority products 22.4%</p>	<p>Results (FY2022) Improvement rate for reducing amount of waste, valuables, etc. generated 33.6% compared with FY2010</p>

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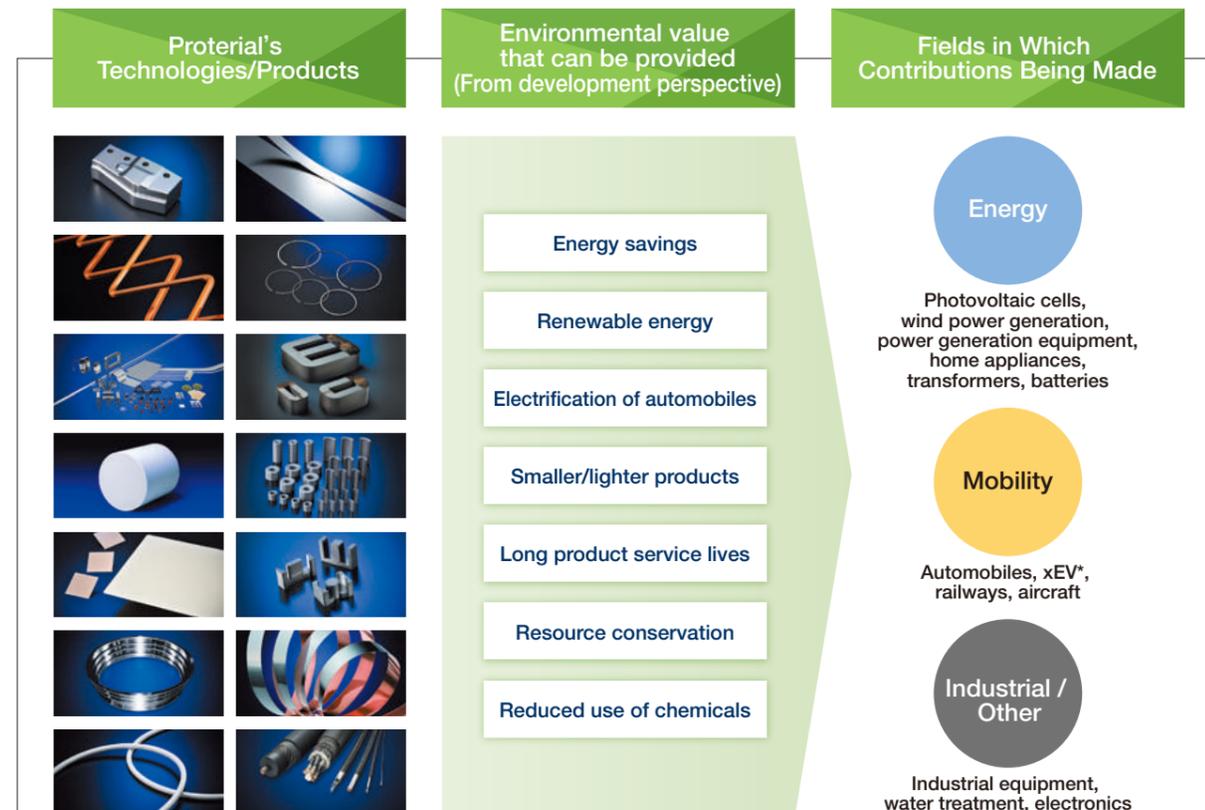
2 | Development of environmentally friendly products

As a green enabler, we promote contributions to society through the provision of environmentally friendly products. As an environmentally friendly company, Proterial develops products not only from the perspective of reducing the environmental burden during product use but also from the perspective of giving consideration to resource recycling during the manufacturing process. As an initiative to create environmentally friendly products, we are promoting efforts to implement environmentally friendly design assessments in accordance with the IEC62430 international standard at the start and completion of development in the R&D phase. Involving the use of environmental assessment sheets to evaluate the environmental impact at each product life cycle stage during the R&D and product development phases, environmentally friendly design leads to environmentally friendly products after commercialization.

Product development geared toward reduced environmental impact

Growing importance of strengthening CO₂ reduction and energy saving measures and accelerating the introduction and expansion of renewable energy toward a decarbonized society

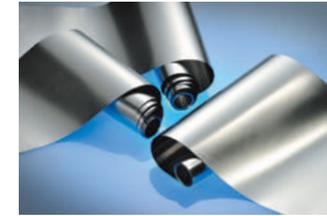
In moving toward a sustainable society, the need to move away from mass production/consumption socio-economic activities and shift swiftly to a circular economy that makes efficient use of limited resources



* xEV: General term for electric vehicle (EV), hybrid electric vehicle (HEV), and plug-in hybrid electric vehicle (PHEV)



Amorphous alloy contributes to energy saving in power transformers

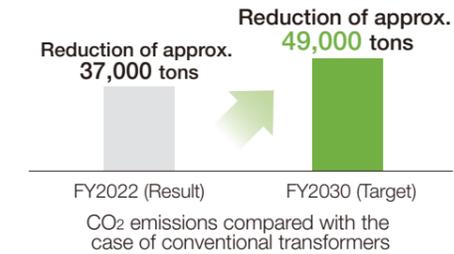


Metglas™ amorphous alloy ribbon



Core materials for amorphous transformers

Power transformers lose power even when in standby mode. To solve that problem, since 2003 we have been providing Metglas™, an amorphous alloy that reduces standby power consumption to about one-third that in the case of conventional core materials (such as electromagnetic steel sheets) used for transformers. By providing core materials for amorphous transformers, the Proterial Group is aiming to contribute to reducing CO₂ emissions* by approximately 50,000 tons per year (compared with the figure for conventional magnetic-steel transformers). In March 2020, we developed a new amorphous material called MaDC-A™, which will contribute to further improving transformer efficiency.



* Based on shipment volume and difference in transformer energy loss, according to Indian standards. For the CO₂ emission coefficient, we used the IEA's World CO₂ Emissions from Fuel Combustion (2017).



Neodymium magnets contribute to the popularization of xEV vehicles



NEOMAX® neodymium magnets

In 1982, our company (Sumitomo Special Metals at that time) invented the neodymium magnet, the magnetic force of which is much stronger. Generally, as the magnetic force of the magnet gets stronger, the performance of the motor gets higher, and the motor can be designed to be smaller and lighter. In particular, in regard to the technological evolution of xEVs*, the magnet plays an important role as an indispensable material enabling motors to be smaller, lighter, more efficient, and more energy efficient. As a permanent magnet boasting the highest magnetic force in the world, the Company's NEOMAX® neodymium magnet is contributing to the improved efficiency and miniaturization of xEV drive motors and generators by providing high-performance neodymium magnets.

Supply volume of magnets for xEVs (FY2022)

Approx. **880,000 units*** * Figure is Proterial estimate



Developed a technology that reduces CO₂ emissions by more than 20% when manufacturing cathode materials for lithium-ion batteries



Cathode materials

In the EV vehicle manufacturing process, lithium-ion battery (LIB) manufacturing makes up a large proportion of CO₂ emissions. Of those, the CO₂ emissions derived from the cathode starting materials account for the largest proportion. In the manufacture of cathode materials, Proterial therefore developed a technology that can produce cathode materials without going through the previously required process of converting nickel into Ni(OH)₂ (nickel hydroxide) to produce the precursor, which is the starting material. Through this technological development, it became possible to reduce CO₂ emissions during cathode material manufacturing by 20% or more when compared with the production method based on the solid phase reaction method established by our company.

Development of high-performance magnetic slot wedge that contributes to higher efficiency of induction motors



Magnetic slot wedge

It is said that motors are responsible for 40% of the world's power consumption, and thus increasing their efficiency represents a key issue. Therefore, the existence of magnetic slot wedges that achieve high efficiency simply by mounting without changing the structure or size of the motor are drawing attention. By utilizing a new technology that bonds magnetic particles together, Proterial has developed a new type of magnetic slot wedge that does not contain any resin. This new technology has made it possible to increase the density of the magnetic particles, resulting in a high magnetic permeability that is about double the level of existing magnetic slot wedges. As a result, in a general 3.7kW four-pole motor we were able to improve efficiency by 0.5% compared with motors with existing magnetic slot wedges.

