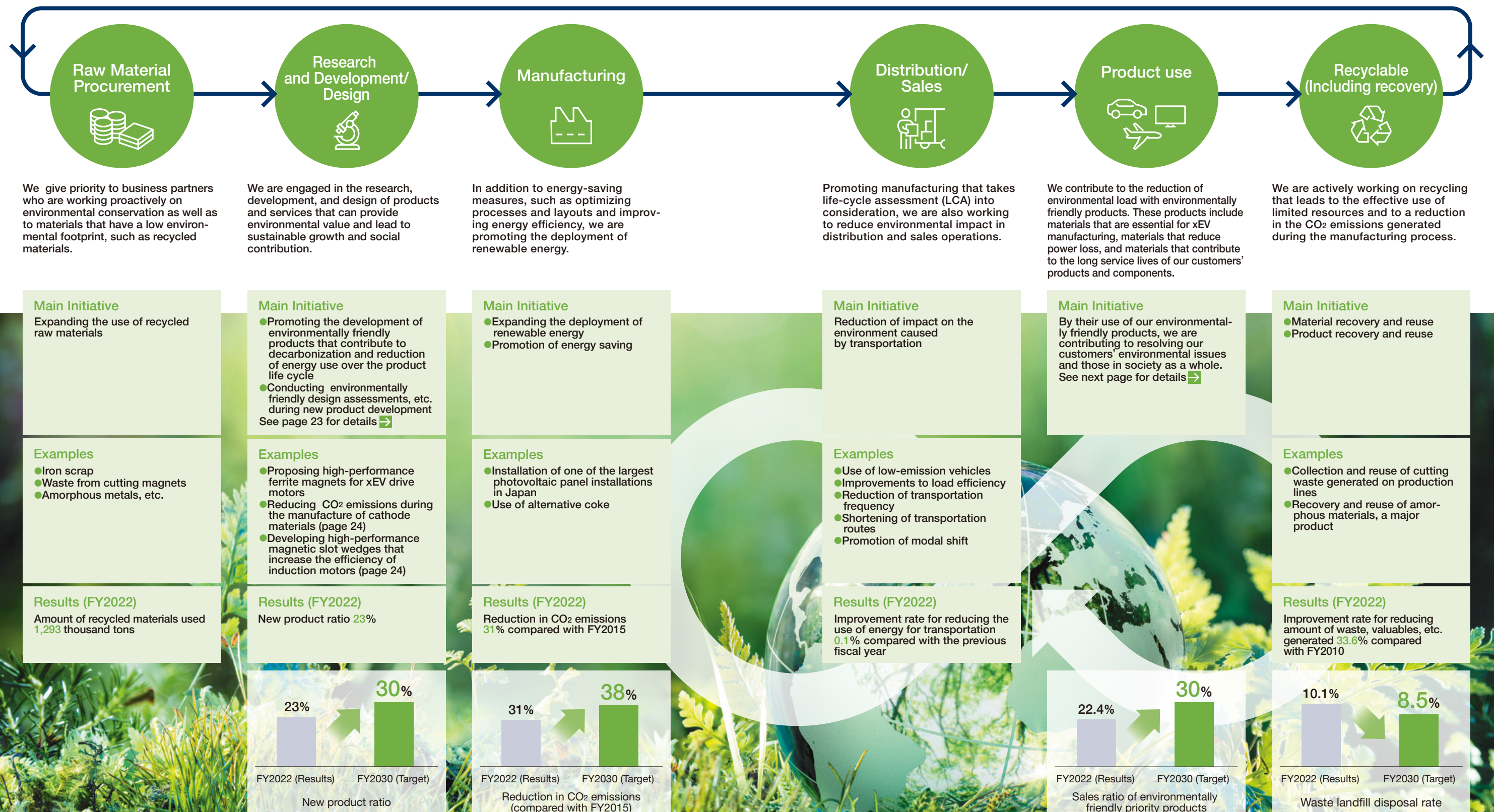


# Providing Environmental Value As a Green Enabler

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 CO<sub>2</sub> 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 CO<sub>2</sub> emissions under Scope 3 based on these calculation results.



## Providing Environmental Value As A Green Enabler

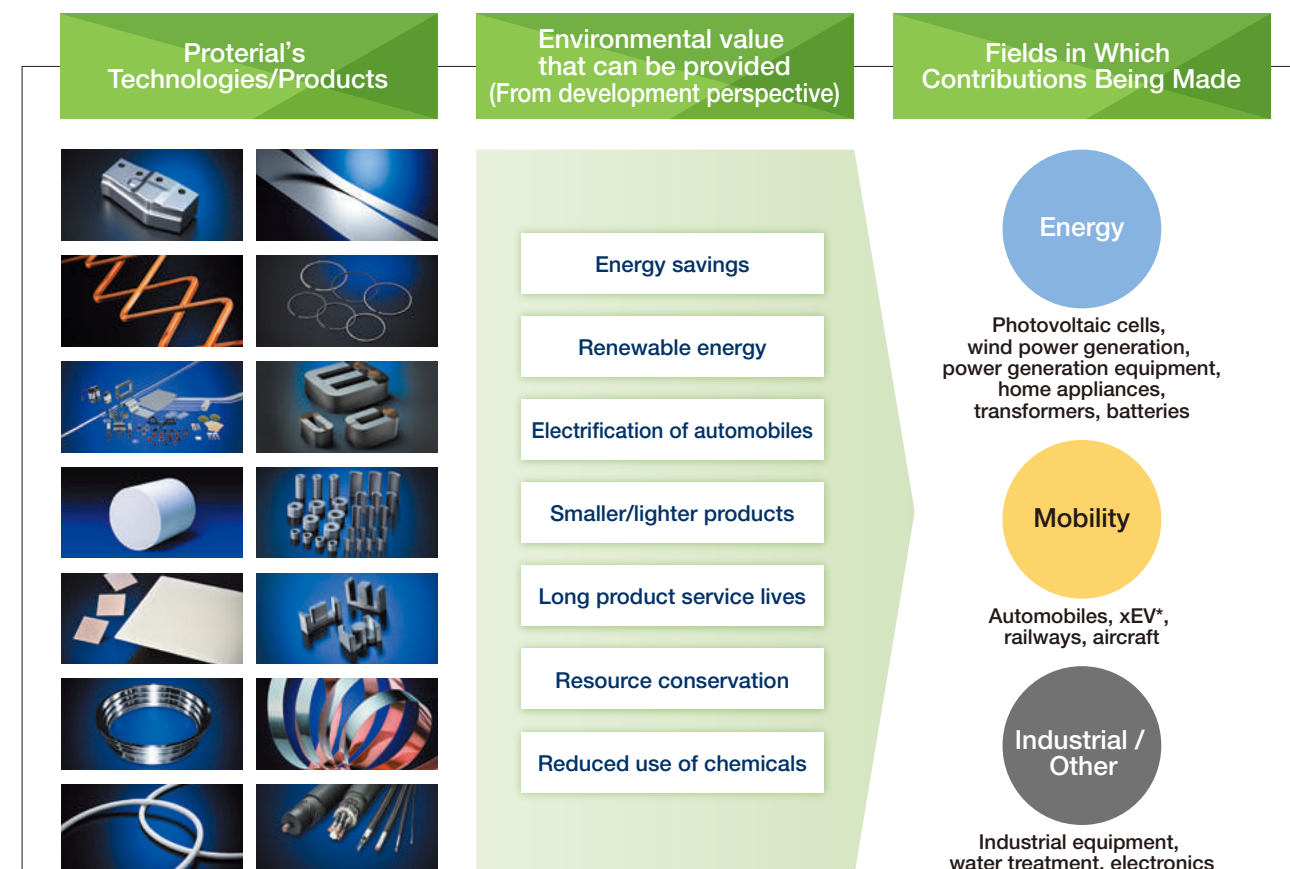
### 2 | Development of environmentally friendly products

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

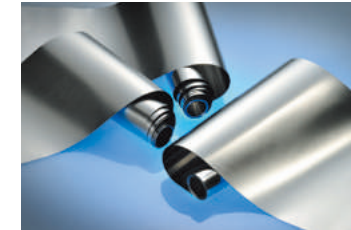
Growing importance of strengthening CO<sub>2</sub> reduction and energy saving measures and accelerating the introduction and expansion of renewable energy toward a decarbonized society

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

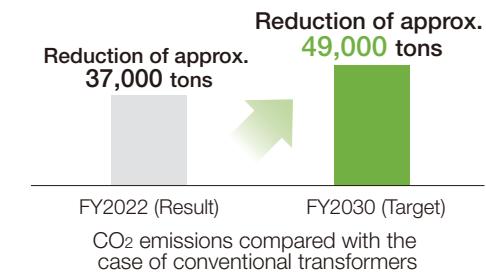


Metglas™ amorphous alloy ribbon



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 CO<sub>2</sub> 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 CO<sub>2</sub> emission coefficient, we used the IEA's World CO<sub>2</sub> 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 energy efficient, and more 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 CO<sub>2</sub> 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 CO<sub>2</sub> emissions. Of those, the CO<sub>2</sub> 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)<sub>2</sub> (nickel hydroxide) to produce the precursor, which is the starting material. Through this technological development, it became possible to reduce CO<sub>2</sub> 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.