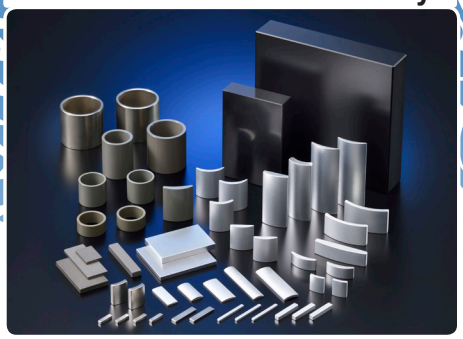
Examples of Products That Help Realize a Sustainable Society

The growing effects of climate change, reflected in rising sea levels and increasing storm and flood damage due to abnormal weather events, are prompting people around the world to take action to reduce environmental impacts. The Hitachi Metals Group focuses on developing key environmentally conscious products and providing them to customers in wide-ranging fields, such as automobiles and electric power. In these ways, we contribute to the realization of a low-carbon society.

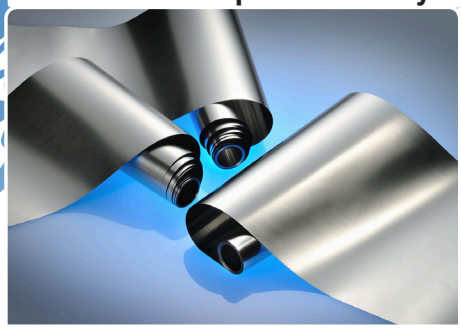
For the automobile industry



NEOMAX® neodymium magnets

7 AFFORDABLE AND CLEAN ENERGY
11 SUSTAINABLE CITIES AND COMMUNITIES
13 CLIMATE ACTION

For the electric power industry



Metglas® amorphous alloy ribbon

7 AFFORDABLE AND CLEAN ENERGY
13 CLIMATE ACTION

SUSTAINABLE DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD

In 2015, the United Nations adopted a set of 17 Sustainable Development Goals (SDGs) as part of a universal action plan aimed at ending poverty, protecting the planet, and ensuring peace and prosperity for all people by 2030.

1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

Neodymium magnets: Contributing to popularization of xEVs

In 1982, our company (then called Sumitomo Special Metals) invented a neodymium magnet with a much stronger magnetic force than ordinary ferrite magnets. In general, a stronger magnetic force of the magnet means higher performance of the motor, which contributes to miniaturization and weight reduction. In light of technological advances in xEVs*, neodymium magnets play a significant role, which are indispensable for making motors smaller and lighter, thus increasing efficiency and saving energy. The Hitachi Metals Group was the first in the world to develop and mass-produce neodymium magnets, sold under the NEOMAX® brand. Boasting the world's strongest magnetic force among permanent magnets, NEOMAX® magnets are used in various fields, including automobiles, IT, home appliances, industry, medical devices, and environment and energy. Currently, we are focusing on increasing our presence in the automotive market, which is undergoing transformation due to advances in connectivity, automated driving, and electrification. Supplying high-performance neodymium magnets for around 1.18 million vehicles annually, we contribute to higher efficiency and downsizing of xEV drive motors and generators.

* xEV: A generic term for electric vehicles (EVs), hybrid electric vehicles (HEVs), and plug-in hybrid electric vehicles (PHEVs).

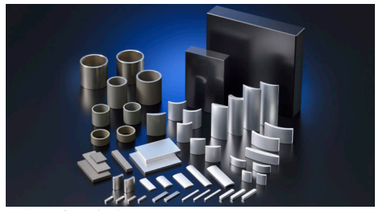
High-performance neodymium magnets supplied by the Group annually

Approx. 1.18 million vehicles

sustainable use of rare earth materials

Neodymium magnets are expected to find more widespread use as companies work to realize an energy-efficient society. These magnets consist mainly of neodymium, iron, and boron, a composition that is vulnerable to heat and whose magnetic properties deteriorate when the temperature exceeds around 80°C. Therefore, it is necessary to add dysprosium (Dy) and terbium (Tb), which are heavy rare earth elements.

Neodymium and heavy rare earth elements are indispensable materials for the evolution of magnets, but since they are derived from natural resources, there are risks in terms of procurement stability and costs. Because it is difficult to reduce the amount of neodymium, which is the basic composition of the magnets, the Group has been developing the NEOMAX®F Series since 2014, reducing the amount of heavy rare earth elements while maintaining heat resistance. By limiting the use of rare earth elements, we contribute to their sustainability.



NEOMAX® neodymium magnets

Rare earth magnet business

We produce neodymium rare earth magnets (neodymium magnets), which are indispensable for advances in miniaturization, weight reduction, and operational and energy efficiency. They are used in motors in such fields as automobiles, IT, home appliances, industry, medical devices, and environment and energy. In the automotive field, they are used in xEV drive motors and generators.

	Contribution to SDGs	Value created
Environmental value	7.3 / 11.6 / 13.1	We provide high-performance rare earth magnets for xEV applications in order to improve fuel efficiency, reduce vehicle exhaust emissions, and enhance operational efficiency and miniaturization of xEV drive motors and generators, stemming from replacement of internal combustion engines with xEV motors. (Approximately 1.18 million vehicles/year equivalent) [Customer value created] *Based on the amount used and shipment volume for xEV applications Developing magnets that require less heavy rare earth resources (less heavy rare earth magnets) will reduce the use of such resources. [In-house value created]

Potential risk of business on society/environment	Response
Environmental destruction due to rare earth mining; poor working conditions	Procure from companies that care for the environment and working conditions

Amorphous alloys: Contributing to energy efficiency of power transformers

Transmission energy gets lost as electricity travels from the power plant to factories and homes. High-voltage electricity sent from the power plant is converted to low-voltage electricity by transformers for safety reasons. However, transformers not only consume power during the conversion, but also when in standby mode.

To solve this problem, the Hitachi Metals Group developed an amorphous alloy called Metglas®. Transformers using Metglas® as the core material consume around one-third of the power of those using conventional materials, such as magnetic steel sheets. We have been supplying this alloy since 2003. Unlike ordinary metals and alloys, amorphous alloys have excellent soft magnetic properties due to their lack of crystal structure, which makes it possible to suppress power loss in standby mode. To date, the Group has provided Metglas® as the core material for around 480,000 amorphous transformers. Compared with magnetic steel sheet transformers, this translates to a reduction in CO_2 emissions* of approximately 50,000 tons per year.

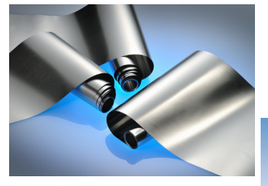
* Based on shipment volume and difference in transformer energy loss, according to Indian standards
For the CO_2 emission coefficient, we use IEA CO_2 emissions from fuel combustion (2017 world).

CO_2 emissions compared with conventional transformers

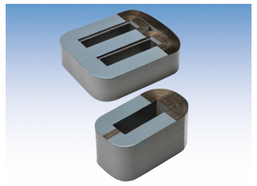
Approx. 50 thousand-ton reduction

Pursuing new possibilities for materials and developing products that help reduce environmental impact

Because amorphous alloys can contribute to energy savings in various products, we anticipate their deployment in many areas other than transformers. Unlike general metals, amorphous alloys are hard yet flexible, meaning they are difficult to deform or cut. However, there are still many unknown points about this principle. Hitachi Metals participates in the Next Generation TATARA project, a joint initiative by regional universities and industry promoted by Shimane University. Under the project, we engage in research aimed at further clarifying the properties of amorphous alloys. By deepening our understanding of these materials and establishing solid theories, we believe we can create new production methods and processes and develop eco-friendly products that help reduce environmental impacts.



Metglas® amorphous alloy ribbon



High-frequency transformer core

Soft magnetic materials business

We produce soft magnetic materials used in energy-saving transformers and noise suppression components in industrial and electronic equipment.

	Contribution to SDGs	Value created
Environmental value	7.3 / 13.1	Compared with transformers using conventional soft magnetic materials, such as grain-oriented magnetic steel sheets, the no-load loss (standby power) of those using amorphous alloys is low, at around one-third. We provide high-efficiency amorphous transformer materials that can significantly reduce power conversion loss (used in around 480,000 transformers). This translates to an annual CO_2 emission reduction of around 50,000 tons compared with transformers using grain-oriented magnetic steel sheets. [Customer value created]

Potential risk of business on society/environment	Response
—	—