

### Example Transformers That Use Vegetable Oil

Mitsubishi Electric also develops and manufactures a wide variety of products in the energy sector toward the realization of a sustainable society. At the Transmission & Distribution Systems Center Ako Plant, transformers for electricity distribution have been developed and manufactured using vegetable oil extracted from the nuts and seeds of plants and then refined. We have adopted vegetable oil for the internal insulation of transformers in consideration of its environmental friendliness and low risk of fire. Since 2017, these transformers have been installed in railway systems, airports, and industrial facilities.



MELCORE-NEO™, a transformer that uses vegetable oil

Mineral oil derived from crude oil has been used in transformers for over 100 years. However, as it is a non-renewable resource, we are currently in the process of transitioning to vegetable oil. Mitsubishi Electric will develop and manufacture transformers that use vegetable oil and establish diagnostic technologies for wider regions as our contribution to environmental consideration and stable power supply.

### Characteristics of Vegetable Oils

Calculations show that vegetable oils reduce CO<sub>2</sub> emission equivalents by 90% compared to mineral oil throughout their entire lifecycle (figure 1), because the plants that are used to make them absorb CO<sub>2</sub> from the atmosphere during their growth. Additionally, the soybean oil that is used in our transformers is about four times more biodegradable than mineral oil (figure 2). In a fish acute toxicity test (OECD 203) which verifies impacts on aquatic life, soybean oil passed the Eco Mark certification criteria\*. Therefore, it can be said that soybean oil is an environmentally low-risk material. Furthermore, as the flash point of vegetable oils is substantially higher than that of mineral oil (figure 3), the use of vegetable oils can reduce the risk of fire or explosion. Under the Fire Service Act, mineral oil is classified as a hazardous material, but vegetable oils are classified as designated flammable goods.

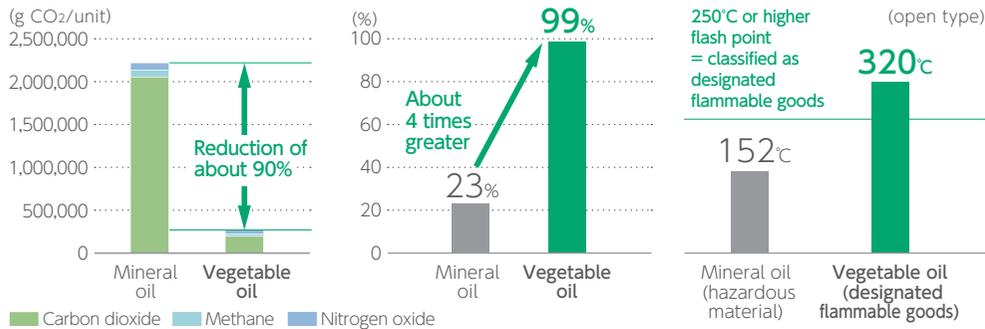


Figure 1: CO<sub>2</sub> emission equivalents

Figure 2: Comparison of biodegradability between mineral oil and vegetable oil

Figure 3: Comparison of flash point between mineral oil and vegetable oil

\* Acquired Eco Mark certification as a biodegradable lubricant oil (certification number: 18110002)  
 Sources: Figure 1: NIST, "Determining the Environmental Preferability of a Biobased Oil" (2002)



## Reducing Environmental Risk through Operation of the Green Accreditation System

### The Green Accreditation System Is Introduced in Consideration of Biodiversity and Environmental Risk

In April 2006, the Mitsubishi Electric Group introduced a Green Accreditation System based on the Green Procurement Standards Guide established in September 2000, and revised in July 2014. The Group is working to minimize environmental risks by evaluating the status of environmental management system accreditation acquired by suppliers, compliance with statutory and regulatory requirements, and management of chemical substances contained in products, while at the same time certifying suppliers that meet the Company's criteria and standards. When it comes to the status of chemical substance management, all evaluations are conducted taking into consideration aspects such as changes to regulations.

In fiscal 2011, Mitsubishi Electric added consideration for preserving biodiversity as an assessment criterion of the Green Accreditation System. We have also implemented a means of confirming whether or not our business partners have introduced initiatives to preserve biodiversity as well.

The overall Green Accreditation rate among Japanese and overseas suppliers of manufacturing materials essential to Mitsubishi Electric's manufacturing activities stands at 91% as of fiscal 2021. Guidance for improvement continues with the aim of achieving 100% in the future.

