

Environmental Considerations for Value Chain Management



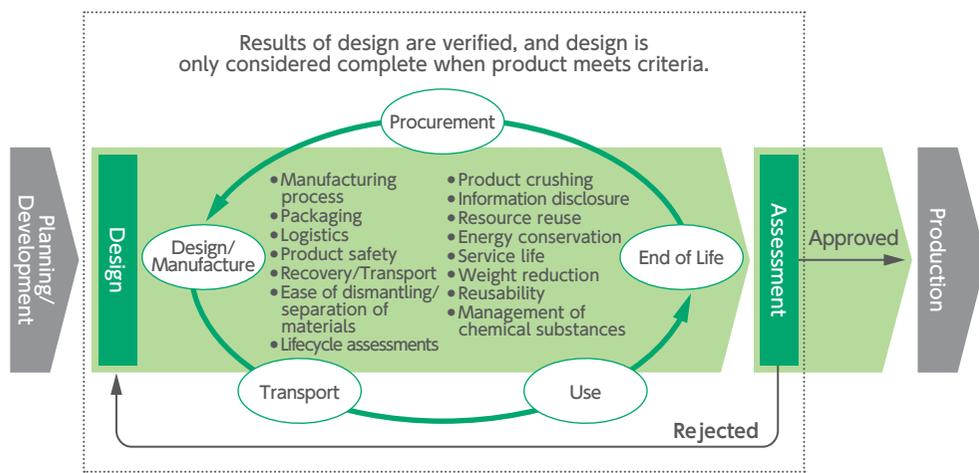
Implementation of Environmentally Conscious Design

Product Development in Consideration of the Overall Lifecycle of Products

As the concept of “lifecycle thinking” grows increasingly more important globally, the Mitsubishi Electric Group aspires to reduce environmental load by closely overseeing the entire product lifecycle, from collecting resources to design, manufacture, and disposal after use. Since fiscal 2004, product environmental assessments for all newly developed products have been implemented from the perspective of MET.* From fiscal 2016, we began operating the assessment based on the Design for Environment rules that conform to international standards focusing on lifecycle thinking. Furthermore, with regard to the index that measures improvements in the environmental efficiency of products (Factor X), we have established an original calculation method based on the MET standard so that it can be used for product environmental assessment.

* MET stands for material (effective use of material resources), energy (efficient use of energy) and toxicity (avoiding emissions of toxic substances with potential environmental risk).

The Concept of Design for the Environment



Product Environmental Assessment that Gives Consideration to MET throughout the Lifecycle of Products

Research and Development of Products and Technologies to Solve Environmental Issues

Example Development and Operation of ZEB for Net-Zero Energy Consumption

In October 2020, Mitsubishi Electric completed the construction of a net-zero energy building test facility, SUSTIE, on the premises of the Information Technology R&D Center (Kamakura City, Kanagawa Prefecture). This new facility conducts research and development aimed toward the further spread of ZEBs*¹. Looking ahead to the future of ZEB, we are working to realize Mitsubishi Electric’s original ZEB+® (zeb plus)*² concept and to enhance the functionality of buildings, for example by increasing the efficiency of working environments.



ZEB testing facility “SUSTIE”

SUSTIE has received ‘ZEB’ certification as well as the highest BELS*³ 5-star rating with regard to the building’s energy efficiency. Additionally, it has acquired the highest Rank S certification in CASBEE Wellness Office*⁴, which is a certification system for the health and comfort of an office. SUSTIE became Japan’s first medium-sized office building (building alone) with a total floor space of more than 6,000m² to obtain both of these certifications. This proves that SUSTIE has simultaneously achieved “energy efficiency,” “comfort,” and “healthiness,” which has hitherto been considered difficult.

ZEB is more than just a building design. It is important for ZEB to be operated as planned at the time of design, as well as for it to be further improved based on the results of its operation. More than fifty different experiments are currently underway at SUSTIE. Relevant divisions across the company will be kept informed of the outcome of these experiments, so they can also be used for the development of new products.

*1 ZEB: Net-Zero Energy Building

*2 ZEB+®: Mitsubishi Electric’s unique initiative that aims to enhance building functionality by adding such values as productivity, comfort, convenience, and business continuity to ZEB, and managing a building throughout its lifecycle.

*3 BEL: Building-Housing Energy-efficiency Labeling System

*4 CASBEE Wellness Office: A tool for evaluating the specifications, performance, and efforts of the office area of buildings to support the maintenance and improvement of the health and comfort of their users.

Definition of ZEB

ZEB is a building designed for net-zero primary energy consumption on an annual basis. Buildings are classified into four ranks according to their reduction rate of primary energy consumption. SUSTIE is ranked in the highest ‘ZEB’ category, as it has achieved a reduction of 106% through energy saving and creating measures compared with the standard primary energy consumption.

ZEB Ranking (Classification According to Reduction in Primary Energy Consumption)

‘ZEB’	Energy savings (50% or more reduction) + 100% or more reduction through energy creation
Nearly ZEB	Energy savings (50% or more reduction) + 75% or more reduction through energy creation
ZEB Ready	50% or more reduction through energy savings
ZEB Oriented	30% or more or 40% or more reduction* ⁵ through energy savings

*⁵ For buildings with a total floor space of more than 10,000 m². The required rate of energy savings varies depending on the type of facility.

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 CO₂ emission equivalents by 90% compared to mineral oil throughout their entire lifecycle (figure 1), because the plants that are used to make them absorb CO₂ 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.

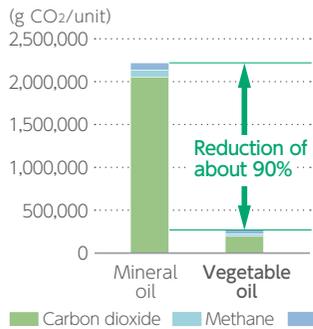


Figure 1: CO₂ emission equivalents

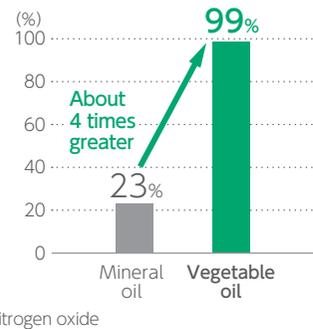


Figure 2: Comparison of biodegradability between mineral oil and vegetable oil

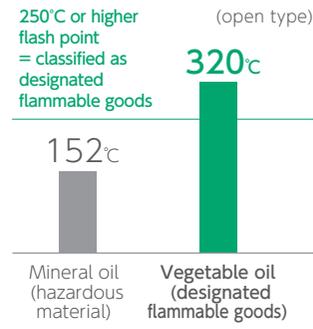


Figure 3: Comparison of flash point between mineral oil and vegetable oil

* 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.

