

Global Warming Prevention

The amount of energy consumed in Japan by offices, stores and houses has risen 30% since financial year 1990, a major issue for the country in terms of meeting its reduction targets under the Kyoto Protocol. Kajima is making a concerted effort to make buildings more energy efficient, and to lessen the amount of energy used during the construction process.

Buildings Designed in Financial Year 2006 Will Provide CO₂ Reductions of 32,343 Tons Annually

The Energy Conservation Law, to promote energy savings in buildings, establishes standards for the efficiency of building facilities that building owners must meet. Kajima has set a voluntary standard for projects subject to the law that "exceeds the government standard by 5% or more in all categories¹."

Kajima has also incorporated the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) standard² into all of its designs and set CASBEE criteria for buildings according to their use as part of its effort to raise the standard for sustainable design.

Performance of Buildings with Energy-Efficient Design (FY 2006)

Activity/Issue	Item	FY 2006
Achievement of voluntary standard <i>Exceed the government standard by 5% or more</i>	Projects implemented	123 projects
	Projects that met voluntary standards	98 projects
	Achievement rate	80%
Greater energy efficiency <i>Rate of building energy efficiency in excesses of government standards (criteria of the owner)</i>	Average energy efficiency rate	27%
	CEC* air conditioning	39%
	CEC ventilation	27%
	CEC lighting	37%
	CEC water heating	14%
	CEC elevators/escalators	20%
Annual CO ₂ reduction (calculated from these 123 projects)		32,343 t-CO ₂ /year

* CEC (Coefficient of Energy Consumption) is an indicator of the energy efficiency of building facilities.

Notes: 1. The five categories are air conditioning, ventilation, lighting, water heating, and elevators/escalators.

2. CASBEE is a Japanese system for assessing the environmental efficiency of a building, under which the environmental quality and load of a building are calculated separately, and expressed as a ratio (Q/L).

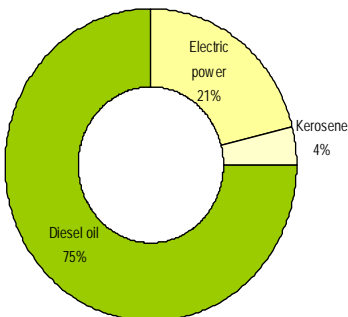
Project Site CO₂ Emissions per Unit Sales Reduced 10.2% from Financial Year 1990 Levels

Kajima has set a target for reduction of CO₂ emissions from project sites of 12% per unit sales from financial year 1990 levels by financial year 2008.

During financial year 2006, we achieved a 10.2% reduction in emissions per unit sales from financial year 1990 levels, and a decrease in total emission volume of 36.2%. Emission amounts were calculated based on a survey of energy use over a two-month period at 120 project sites.

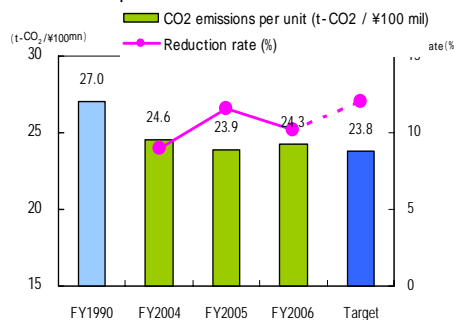
A full 75% of CO₂ emissions was from diesel oil. Kajima is working to introduce construction methods and procedures to lower CO₂ emissions, such as the shutting off of engines when stopping and parking, fuel-efficient operation of heavy equipment and vehicles, and the use of electrical power sources.

Proportion of CO₂ Emissions by Energy Source (FY 2006)

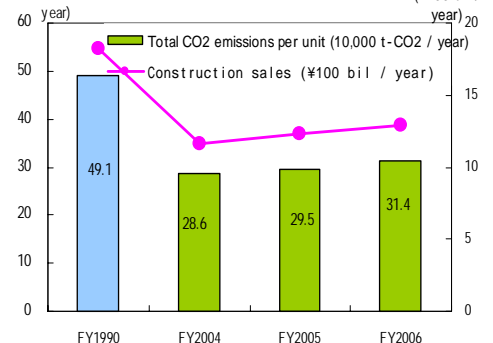


Implementation rate of diesel oil reduction measures (FY 2006)
Shutting off engines when stopping and parking: 88%
Fuel-efficient operational guidance: 28%

CO₂ Emissions per Unit

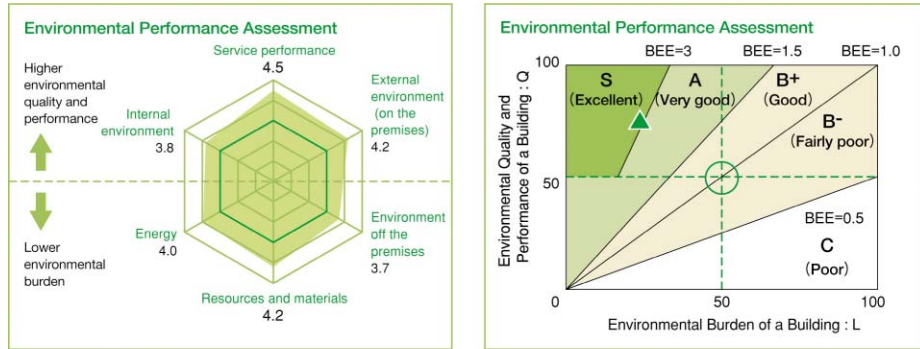


(10,000 t-CO₂ / Total Emissions and Construction Sales (¥100 bil / year)



Case Study: The “Digital Content Factory” Fuji Television Bayside, Tokyo

Fuji Television’s Bayside Studio makes full use of the latest digital technologies, and Kajima made an extensive effort to provide it with a sustainable design. The building itself is softly wrapped in a double-skin curtain wall that allows the natural ventilation appropriate for the versatile nature of a studio, as well as regulates sunlight and helps make the studio more energy efficient. The incorporation of numerous sustainable design concepts, such as natural ventilation provided by a cylindrical courtyard (the “air tube”), and “studio temperature layered air conditioning” to efficiently cool and heat large open spaces, allowed the studio to acquire the highest “S” ranking under CASBEE (BEE 3.2).



※BEE:Building Environmental Efficiency

The new studio achieves excellent overall environmental performance through a combination of high-efficiency features with a low environmental burden.



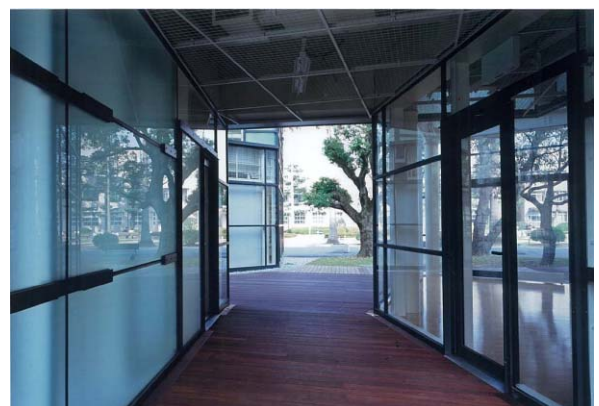
Appearance of the Fuji Television Bayside Studio, Tokyo



The cylindrical courtyard (the “air tube”) provides natural ventilation.

Case Study: Facility Blended into a Small Wood Osaka City University Takahara Hall

The plan for the Takahara Hall was to situate it within a small wooded area on the campus, with an external design that follows the staggered tree line drawn by the 50-year-old camphor trees, without having to fell a single one. The interior and exterior form a continuous link, with an irregular, individual expression. The recycled glass in the entranceway reflects the trees, with the silhouette of the building blending seamlessly into the tree line. The building gives the feeling of coming upon it while walking in the woods, a natural place where people come together.



Interior of the Takahara Hall

Case Study: Reducing CO₂ Emissions during Tunnel Construction

The construction of a tunnel is a major civil engineering undertaking that consumes vast amounts of energy. A particularly large proportion of this energy is used by the dump trucks that carry out the excavated soil, and when the bedrock is broken up with explosives during the excavation, the soil removal process is thought to account for more than half the total CO₂ emissions from the project.

Recently, conveyor belts to continuously carry out the soil have begun to replace dump trucks in an effort to reduce CO₂ and other emissions. The use of electric conveyance makes a significant contribution to the reduction of CO₂, which was reduced by a total of 730 tons, or 26%, during Kajima's construction of the Tohoku Shinkansen Hakkoda Tunnel between Hachinohe and Shin-aomori (completed in March 2007). Electric conveyance also helps to enhance operational safety by controlling the amount of stone dust to improve the work environment, as well as offers other benefits such as a reduction in noise in the surrounding area.

The use of belt conveyors was limited to use in tunnels 3,000 meters or longer due to the cost involved and other considerations, but Kajima is working to make the system practical for shorter construction projects as well, such as the Nagohigashi No. 1 Tunnel in Okinawa Prefecture (total length 1,976 meters).



A belt conveyor installed within the Hakkoda Tunnel worksite

Kajima Strives for Effective Utilization of Natural and Biomass Energy

Kajima promotes the effective utilization of renewable energy sources such as wind power, sunlight and biomass as part of its efforts to help realize a sustainable society.

Case Study: Summit Wind Power KASHIMA Launches Operations

Summit's Wind Power Kashima Wind Farm (Kashima City, Ibaraki Prefecture) began operating in February 2007. Kajima received the order for construction of the power station from Summit Wind Power Kashima Corporation (a wholly owned subsidiary of Sumitomo Corporation), handling the entire operation from the design through the procurement, construction and testing of the windmills. Ten windmills of Spanish manufacture with an output capacity of 2,000 kilowatts each were installed at the station, which will generate 42 million kilowatts of power annually. This is equivalent to the electricity consumed by approximately 12,000 households—around half the number of ordinary homes in Kashima City, and will reduce CO₂ emissions by roughly 18,000 tons annually.



The windmill towers seen from Hirai Beach

Case Study: Japan's Largest Biogas Collection and Reuse Facility in Operation at a *Shochu* Distillery
The Head Office Distillery of Kirishima Shuzo Co., Ltd.

The METAKLES methane fermentation facility developed by Kajima was put into operation at the sweet potato *shochu* lees recycling plant of the Kirishima Shuzo Co., Ltd. (Miyakonojo City, Miyazaki Prefecture) in December 2006. METAKLES is a technology to recover biogas through high-temperature methane fermentation (around 55°C) of organic waste, and use it as energy.

This facility recovers approximately 20,000 m³ of biogas from 400 tons of *shochu* lees daily, which is used as fuel for the drying equipment at the adjoining *shochu* lees dehydrated feed cake plant.

* The energy generated from 20,000 m³ of biogas is equivalent to the daily electricity consumption of 10,000 households.



View of the METAKLES facility

A Customer's Voice: Yoriyuki Enatsu CEO, Kirishima Shuzo Co., Ltd.

"The process of distilling *shochu* from sweet potatoes generates twice the amount leftover material (the lees, including the potato fiber and skin) as finished product, and we had been exploring various methods of processing this byproduct. Kajima's METAKLES system provided us with a fully satisfactory resolution in terms of both cost and environmental conservation."

