

# Combating Global Warming

To help combat global warming, Kajima is working to provide buildings that greatly exceed national energy-saving standards, and has set a new medium-term target to reduce CO<sub>2</sub> emissions over building lifecycles by 30% by fiscal 2011. Moreover, the company is targeting a 50% reduction of CO<sub>2</sub> emissions from construction by 2020.

Priority Issue 1

## Designing Buildings that Emit Less CO<sub>2</sub>

Kajima is placing its building construction design capabilities at the forefront of its efforts to provide buildings that emit the least amount of CO<sub>2</sub> possible during building use.

One of Kajima's medium-term goals up until fiscal 2008 was to exceed standards for energy savings established by the Energy Conservation Law, and in that year, the company's average energy savings exceeded the standards by 30%. This amounted to a reduction of 31,968.8 tons of CO<sub>2</sub> emissions during building use per year. From fiscal 2003, when figures were initially released, the annual reduction of CO<sub>2</sub> was 152,000 tons per year, since the CO<sub>2</sub> reduction during building operation continues every year.

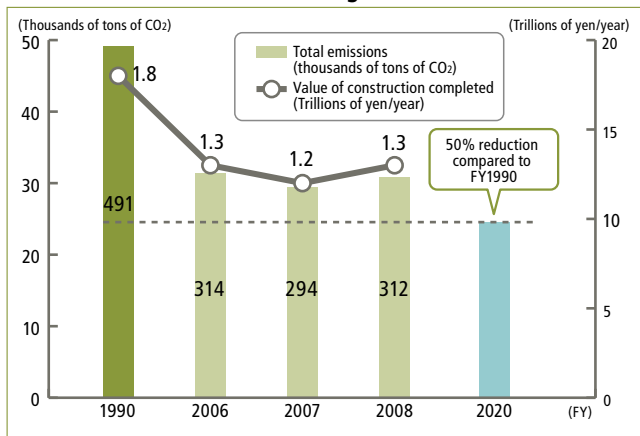
To meet the new medium-term emissions reduction target in effect from fiscal 2009, as set in its voluntary energy-saving standards,<sup>1</sup> Kajima has been focusing efforts on reducing CO<sub>2</sub> emissions by 30%

by fiscal 2011 compared with fiscal 1990 throughout the building lifecycle, from construction to building use and demolition, for projects in which Kajima is responsible for design and construction.

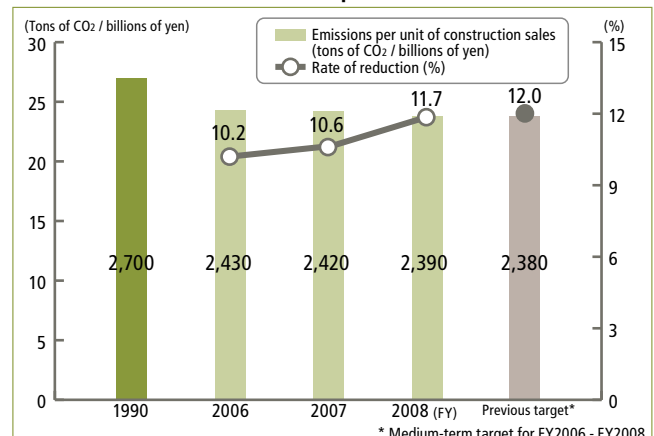
Beyond CO<sub>2</sub> emission reductions, Kajima has been working to improve the environmental performance of its buildings across a number of dimensions, raising its score under the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE). The company is aiming to win an "A" rating for all of its projects under this system as a medium-term goal.

1. Voluntary energy-saving standards consist of the following targets.  
 Non-residential buildings: 15% improvement over national standards for PAL and CEC, equivalent to ERR of approximately 15%  
 Residential buildings: Energy savings in line with Grade 3 criteria for residences as set out in the Housing Quality Assurance Act.  
 PAL (Perimeter Annual Load) is an indicator of a building's thermal insulation performance  
 CEC (Coefficient of Energy Consumption) is an indicator of energy efficiency of building facilities such as air conditioning and lighting  
 ERR (Energy Reduction Ratio) is the geometric mean of CEC amounts for each building facility

Total CO<sub>2</sub> emissions and future target



CO<sub>2</sub> emissions from construction per unit of construction sales



**Priority Issue 1**

**Reducing CO<sub>2</sub> Emissions from Construction**

In fiscal 2008, Kajima reduced its CO<sub>2</sub> emissions per unit of construction sales by 11.7% compared to the fiscal 1990 level, slightly below its target of 12% for that year. The company cut total emissions by 39%, also compared to 1990, mainly owing to improvements in construction methods, including more efficient application of heavy machinery and vehicles (saving fuel when driving, using fuel-efficient heavy machinery and vehicles, and properly maintaining heavy machinery and vehicles), as well as reductions in soil volume taken from construction sites.

Looking forward, Kajima will continue using the latest energy-saving heavy machinery and vehicles as well as reviewing and improving its range of construction methods. The company will also work toward reducing total CO<sub>2</sub> emissions by an additional one percentage point each year from the 39% reduction in fiscal 2008.

**Case study**

**Reducing CO<sub>2</sub> Emissions through Innovative Construction Initiatives**

**Improved Productivity of Construction at the Higashi-Gotanda 2-Chome Sector 2 Urban Redevelopment Project**

For the Higashi-Gotanda 2-Chome Sector 2 Urban Redevelopment Project, a high-rise residential complex in the heart of Tokyo, Kajima reduced the energy used in its construction activities through innovative initiatives designed to improve productivity. The company reduced its electricity consumption by speeding up construction with fewer workers and shortened construction times, and improved transport efficiency by fabricating building materials at factories and transporting them with large vehicles. The company also promoted train commuting by workers through more efficient scheduling of work times at the same sites. All of these activities were aimed at generating lower emissions of CO<sub>2</sub>.

Through these efforts, Kajima shortened the period of its construction by two months and reduced the amount of industrial waste, resulting in a 19% reduction of CO<sub>2</sub> emissions compared with conventional construction practices.

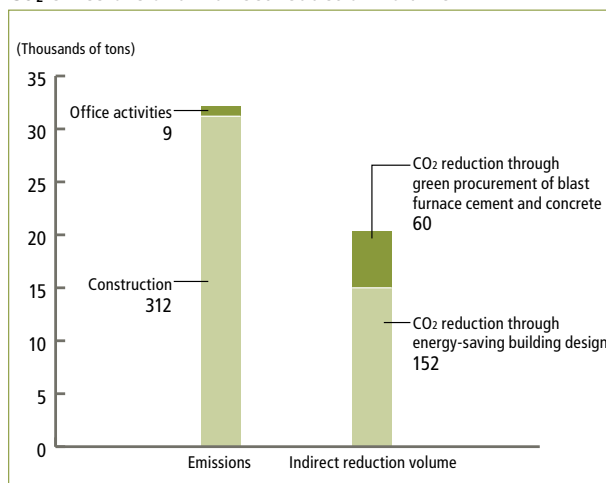
**CO<sub>2</sub> reductions from initiatives aimed at improving productivity**

(tons-CO<sub>2</sub>)

Productivity improvement initiative	Factor contributing to CO <sub>2</sub> reduction	Emissions from conventional construction	Emissions* from this construction	Reduction
1 Reduce construction period (from 37 to 35 months)	Reduction of electricity use at offices and other sites	204	193	11
	Reduction of lighting during construction	123	116	7
2 Efficient scheduling of employees' work times at the same sites	Promotion of workers commuting by train to reduce consumption of CO <sub>2</sub>	129	13	115
3 Build larger pre-cast concrete frames	Use of rail and improved heavy machinery to reduce generation of CO <sub>2</sub>	1,038	890	148
4 Improve loading rate through more efficient transport	Use of rail and improved heavy machinery to reduce generation of CO <sub>2</sub>	528	425	103
5 Reduction of industrial waste	Transport of waste by rail to reduce generation of CO <sub>2</sub>	25	14	11
Total		2,047	1,652	395

\* Figures are based on the ongoing progress of current initiatives and forecasts.

**CO<sub>2</sub> emissions and indirect reduction volume**



**Performance of buildings with energy-saving design in FY2008**

Activity	Item	FY2008 results
<b>Achievement of voluntary standards</b> 15% more energy-savings than national standards for each item	Projects implemented	100
	Projects that met voluntary standards	83
	Achievement rate	83%
<b>Greater energy savings</b> Rate of energy savings compared to national standards (primarily based on construction-related criteria)	Average energy efficiency rate	30% improvement
	Air-conditioning CEC*	29% savings
	Ventilation CEC	31% savings
	Lighting CEC	40% savings
	Water-heating CEC	18% savings
	Elevator / escalator CEC	26% savings
Annual reduction of CO <sub>2</sub> emissions from these 100 projects		31,968.8 tons-CO <sub>2</sub>

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