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Japan Country Report

PREPARED BY

RICE

RESEARCH INSTITUTE OF CONSTRUCTION AND ECONOMY

Address NP-Onarimon Building,
25-33,Nishishinbashi 3-chome,
Minato-ku,Tokyo 105-0003,Japan
TEL +81-3-3433-5011
FAX +81-3-3433-5239
URL http://www.rice.or.jp/english/index.html
E-mail info@rice.or.jp

Country Report (Japan)

I. Overview

The Japanese economy entered into a recovery phase in FY2002 and recorded successive years of 2% economic growth from FY2003 to 2007. However, the economy has slowed drastically since then due to the effects of the global economic chaos triggered by the American subprime loan crisis in the summer of 2007, as well as the effects of the Great East Japan Earthquake, which struck in March 2011. However, a recovery trend is expected to emerge going forward due to the promotion of various reconstruction measures.

Japan's construction investment, which has been decreasing since the mid-1990s, was valued at ¥47.2 trillion yen in FY2008, about half of the value of the peak year (FY1992), reflecting the prolonged recession. However, increases are expected in FY2012 due to the increase in restoration and reconstruction investments following the Great East Japan Earthquake of March 2011 and the recovery of private-sector investment.

The current condition of the Japanese construction industry can be summarized as follows:

(1) The number of licensed construction companies continues to decline, falling to just 19.3% of the peak in 2000.
(2) While the number of construction industry employees continues to decline overall, the reduction in the number of employees of general contractors has been particularly remarkable. The number of foreign employees is also continuing to decline.
(3) Labor productivity in the construction industry remains at low levels as a result of various impediments to productivity at construction sites and within companies.
(4) The expected value of construction per unit of floor area of new starts and the cost of materials have risen in recent years due to high steel and resource prices worldwide. Meanwhile, the average wages of male construction workers are below the average for male workers in all industries, being even lower than those of the manufacturing industry.
(5) Japanese orders for overseas construction projects fell to ¥697 billion in FY2009 as a result of the global recession, but they rose again to 1,350.3 billion in FY2011 and are expected to continue to increase.

II. Macroeconomic Review and Future Projections

1. Overview of the Japanese Economy

The Japanese economy had been growing at 2% annually since 2003, continuing on a path of moderate recovery. Nonetheless, the effects of the global economic chaos triggered by the American subprime loan crisis in the summer 2007, combined with high resource prices, ended the longest economic recovery in the postwar period, which had continued since February 2002. Economic growth was negative in both 2008 and 2009. It recovered in 2010, but fell to 0% in 2011 following the Great East Japan Earthquake of March 2011.

In terms of the economic trends going forward, there are concerns about a downturn in overseas economies as a result of the European debt crisis, but as reconstruction demand continues to boost economic growth and the employment and income environment improves, consumption is expected to show moderate increases.

The Research Institute of Construction and Economy (RICE) predicts that in FY2012, given efforts to promote recovery policies and revisions to the employment and revenue environment, a genuine recovery will take hold as a result of broad domestic demand. Public fixed capital formation is up 6.3% as a result of government recovery policies, and government final consumption expenditures are up 2.0%. Private-sector capital investment is up 3.2% due to reconstruction demand, net exports of goods and services are up 1.6%, and real GDP is expected to rise 2.2% over the previous year.

Figure 1 Macroeconomic Trends (FY) (Unit: billion yen)

Fiscal year	1995	2000	2005	2008	2009	2010	2011	2012 (Forecast)	2013 (Forecast)
Real GDP	459,058	476,723	507,158	505,803	495,439	511,145	511,120	522,608	533,283
(YoY change)	2.7%	2.0%	1.9%	-3.7%	-2.0%	3.2%	0.0%	2.2%	2.0%
Real private final consumption e	265,891	275,056	292,579	291,456	295,062	299,594	303,007	307,654	312,286
(YoY change)	2.3%	0.3%	1.9%	-2.0%	1.2%	1.5%	1.1%	1.5%	1.5%
(Contribution rate)	1.3	0.2	1.1	-1.1	0.7	0.9	0.7	0.9	0.9
Real government final consump	73,617	83,960	92,363	93,438	95,942	98,184	99,923	101,913	103,520
(YoY change)	4.3%	4.8%	0.4%	-0.4%	2.7%	2.3%	1.8%	2.0%	1.6%
(Contribution rate)	0.6	0.8	0.1	-0.1	0.5	0.5	0.4	0.4	0.3
Real private housing	23,609	20,080	18,345	15,520	12,268	12,568	13,016	13,614	13,929
(YoY change)	-5.7%	-0.1%	-0.7%	-1.1%	-21.0%	2.4%	3.6%	4.6%	2.3%
(Contribution rate)	-0.3	0.0	0.0	0.0	-0.7	0.1	0.1	0.1	0.1
Real private corporate facilities	60,326	64,986	70,599	71,076	62,573	64,757	65,366	67,471	69,708
(YoY change)	3.1%	4.8%	4.4%	-7.7%	-12.0%	3.5%	0.9%	3.2%	3.3%
(Contribution rate)	0.5	0.7	0.6	-1.1	-1.7	0.4	0.1	0.4	0.4
Real public fixed asset formatio	41,704	35,071	24,113	19,847	22,124	20,649	21,298	22,650	20,981
(YoY change)	6.7%	-6.1%	-6.7%	-6.7%	11.5%	-6.7%	3.1%	6.3%	-7.4%
(Contribution rate)	0.6	-0.5	-0.3	-0.3	0.5	-0.3	0.1	0.3	-0.3
Real inventory increase	1,291	341	807	1,848	-5,217	-1,284	-3,264	-2,658	-2,646
(YoY change)	-241.5%	-110.2%	-46.3%	3.6%	-382.3%	-75.4%	154.1%	-18.6%	-0.4%
(Contribution rate)	0.6	0.8	-0.1	0.0	-1.5	0.8	-0.4	0.1	0.0
Real financial services net expo	-4,509	-2,087	8,349	12,251	11,687	16,818	12,095	12,286	15,827
(YoY change)	596.5%	102.6%	56.0%	-33.1%	-4.6%	43.9%	-28.1%	1.6%	28.8%
(Contribution rate)	-0.6	0.0	0.6	-1.1	0.2	0.8	-1.0	0.0	0.7
Nominal GDP	504,594	510,835	505,349	489,520	473,878	479,311	469,873	478,071	486,849
(YoY change)	1.8%	0.8%	0.5%	-4.6%	-3.2%	1.1%	-2.0%	1.7%	1.8%

Source: *Construction and Economic Forecasts*(RICE) for 2012 and 2013, Annual Report on National Accounts(Cabinet Office) for 1990-2011
Note: Real values reflect 2005 prices.

2. Major Economic Indicators

Figure 2 List of Major Economic Indicators

	2007	2008	2009	2010	2011	(Forecast) 2012
GDP (real, year(2005), billion yen)	525,470	505,803	495,439	511,145	511,120	522,608
GDP (nominal, year, billion yen)	513,023	489,520	473,878	479,311	469,873	478,071
GDP growth (year, %)	1.8%	-3.7%	-2.0%	3.2%	0.0%	2.2%
Agriculture, forestory, and fishery	6.3%	7.2%	-9.4%	-7.4%	-	-
Manufacturing	6.0%	0.8%	-17.7%	18.2%	-	-
Services	4.1%	1.1%	-4.7%	0.8%	-	-
Mining	-7.8%	-12.5%	-43.6%	2.3%	-	-
Construction	-2.1%	-7.2%	-2.0%	-0.9%	-	-
Demographic Indicators						
Population (year, thousands)	127,771	127,692	127,510	128,057	127,799	127,645
Population growth rate (year, %)	0.00%	-0.06%	-0.14%	0.43%	-0.20%	-0.12%
Total labor force (year, thousands)	66,690	66,500	66,170	65,900	65,450	65,600
Labor force growth rate (year, %)	0.18%	-0.28%	-0.50%	-0.41%	-0.68%	0.23%
Unemployment rate (year, %)	3.8%	4.0%	5.1%	5.1%	4.6%	4.5%
Inflation rate (year(2010), %)	0.7%	2.1%	0.7%	0.0%	-0.3%	0.0%
Financial Indicators						
Interbank interest rate	0.86	0.7425	0.4636	0.34	0.3364	0.3283
Short-term interest rate (%)	0.459	0.103	0.094	0.079	0.075	0.09
Long-term interest rate (%)	1.478	1.382	1.246	1.189	1.085	0.836
Exchange rate against US$	117.77	103.33	93.53	87.77	79.78	79.59

Source: Construction and Economic Forecasts (RICE, July 2012), Annual Report on National Accounts (Final Report for 2011, Cabinet Office), Financial and Economic Statistics Monthly (Bank of Japan), Ministry of Internal Affairs and Communications website.

Notes:

1. The GDP figure for FY2012 is a forecast.Real values: 2005 prices.
2. Population figures are estimates as of October 1each year. The FY2012figures are estimates as of July1.
3. The workforce population and unemployment rates are average values for 12 months. For 2012, the figure is an average value for five months.
4. The inflation rate is a percentage as compared with the previous year’s consumer price index. For FY2010, the figure is the rate of increase between FY2011 and August 2012.
5. Interest rates for 2012 are as of the end of July. Others reflect the year-end rates.
6. Short-term interest rates are calculated using the average published interest rate for domestic commercial paper.
7. Long-term interest rates are the rates on 10-year government bonds.
8. Exchange rate for 2011 is as of the end of September. Others are annual averages.

III. Construction Investment

1. Construction Investment (2011)

Japanese construction investment in FY2011 was estimated to value at ¥42.0 trillion yen, including ¥16.9 trillion in government spending and ¥25.1 trillion in private spending. Total construction investment was down 50.0% from the peak in FY1992, while government investment was down 48.1% from the peak in FY1995 and private investment was down 42.8% from the peak in FY1990.

Figure 3 Construction Investment Trends

(Unit: ¥1 billion)

	2008	2009	2010	2011	2012 (Forecast)
Public projects					
Government residential investment	534.7	561.5	520.0	610.0	670.0
Government non-residential investment	1,532.3	1,650.1	1,700.0	1,990.0	2,280.0
Government civil engineering investment	14,650.7	15,723.2	14,690.0	14,340.0	15,450.0
Machinery installation work	836.6	834.7	846.0	—	—
Maintenance and repair work	3,279.3	3,546.7	3,595.9	—	—
Private projects					
Private residential investment	16,387.0	12,840.4	12,980.0	13,140.0	13,810.0
Private non-residential investment	9,988.8	7,638.2	6,920.0	7,380.0	7,570.0
Private civil engineering investment	5,058.2	4,551.5	4,060.0	4,530.0	4,800.0
Machinery installation work	3,298.8	2,978.4	2,727.1	—	—
Maintenance and repair work	9,924.4	8,895.9	8,807.6	—	—

Source: Construction Investment Forecast 2011, Statistics on Construction Undertaken (2008～2010) (Ministry of Land, Infrastructure and Transportation [MLIT]).

Note: Machinery installation work includes electrical work.

2. **Outlook for the Construction Industry (2012)**

The RICE construction investment forecast published in July 2012 predicts that FY2012 construction investment would rise to ¥44.58 trillion, a 6.2% increase over the previous year, given the rapid progress being made toward recovery from the Great East Japan Earthquake. Government construction investment is expected to increase 8.6% as a result of reconstruction investment following that disaster. The post-disaster rally in private-sector residential building investment had stagnated, but today it has once again returned to a path of recovery. Going forward, with a boost from reconstruction demand, it is expected to increase 5.1% over the previous year. Private-sector non-residential building investment returned to a recovery trend in FY2011 following the recession caused by the collapse of Lehman Brothers, and it is expected to continue on a course of moderate recovery going forward. As a result, forecasts predict a 2.6% year-on-year (YOY) increase over the previous year in private-sector non-residential building investment, a 6.0% YOY increase in private-sector civil engineering investment, and a 3.9% YOY increase overall.

Figure 4　Construction Investment Forecast

(Unit: ¥1 billion)

FY	1995	2000	2008	2009	2010	2011	2012 (Forecast)
Nominal construction investment	79,017	66,195	48,152	42,965	40,870	41,990	44,580
(YoY change)	0.3%	-3.4%	1.0%	-10.8%	-4.9%	2.7%	6.2%
Nominal government construction investment	35,199	29,960	16,728	17,935	16,910	16,940	18,400
(YoY change)	5.8%	-6.2%	-1.3%	7.3%	-5.7%	0.2%	8.6%
(Contribution rate)	2.5	-2.9	-0.5	2.5	-2.4	0.1	3.5
Nominal private residential construction	24,313	20,276	16,387	12,840	12,980	13,140	13,810
(YoY change)	-5.2%	-2.2%	-1.3%	-21.6%	1.1%	1.2%	5.1%
(Contribution rate)	-1.7	-0.7	-0.5	-7.4	0.3	0.4	1.6
Nominal private non-residential construction	19,505	15,959	15,047	12,190	10,980	11,910	12,370
(YoY change)	-1.8%	0.7%	6.4%	-19.0%	-9.9%	8.5%	3.9%
(Contribution rate)	-0.4	0.2	1.9	-5.9	-2.8	2.3	1.1
Real construction investment	77,727	66,195	44,596	41,181	39,055	39,834	42,400
(YoY change)	0.2%	-3.6%	-2.2%	-7.7%	-5.2%	2.0%	6.4%

Source: *Construction and Economic Forecast* (RICE), *Construction Investment Forecasts* (MLIT).
Notes:
1. Real values reflect 2005 prices.
2. Private non-residential construction investment = private non-residential building investment + private civil engineering investment.

3. Construction Companies

There were 484,000 licensed construction companies in Japan as of the end of March 2012, 0.3% decrease from the same month the previous year. Compared with the end of March 2000, when the number of licensed construction companies was at its peak, there are 116,000 fewer (a 19.3% decrease).

A breakdown of the number of licensed construction companies shows that “corporations with ¥3 million up to ¥10 million in capital” account for the highest percentage (37.6%), followed by “corporations with ¥10 million up to ¥20 million in capital” (24.5%) and “sole proprietors” (20.1%).

Figure 5　No. of Licensed Companies, Composition Ratio, and Cumulative Composition Ratio by Capital Classification

Year	2008		2009		2010		2011		2012	
	(thousand)	Percent of total	(thousand)	Percent of total	(thousand)	Percent of total	(thousand)	Percent of total	(thousand)	Percent of total
No. of registered contractors (total)	508	100.0%	509	100.0%	513	100.0%	499	100.0%	484	100.0%
Breakdown of registered contractors by size classification										
8 Sole proprietor	106.1	20.9%	106.1	20.8%	107.9	21.0%	102.4	20.5%	97.0	20.1%
7 Corporation with less than ¥3 million in capital	3.1	0.6%	4.3	0.9%	5.8	1.1%	7.2	1.4%	8.4	1.7%
6 Corporation with ¥3 million up to ¥10 million in capital	184.8	36.4%	187.2	36.8%	189.7	37.0%	186.2	37.3%	181.9	37.6%
5 Corporation with ¥10 million up to ¥20 million in capital	131.5	25.9%	130.2	25.6%	129.0	25.1%	123.6	24.8%	118.4	24.5%
4 Corporation with ¥20 million up to ¥100 million in capital	76.0	15.0%	75.3	14.8%	74.9	14.6%	73.6	14.8%	72.3	14.9%
3 Corporation with ¥100 million up to ¥1 billion in capital	4.6	0.9%	4.5	0.9%	4.4	0.9%	4.4	0.9%	4.3	0.9%
2 Corporation with ¥1 billion up to ¥10 billion in capital	1.2	0.2%	1.1	0.2%	1.1	0.2%	1.0	0.2%	1.0	0.2%
1 Corporation with ¥10 billion or more in capital	0.4	0.1%	0.4	0.1%	0.4	0.1%	0.4	0.1%	0.4	0.1%

Source: *Survey of on the Number of Licensed Construction Companies* (MLIT)

The number of construction-related consultants is shown in Figure 6.

Figure 6 No. of Registered Construction-Related Businesses
(by Business Type and Net Registered Number)

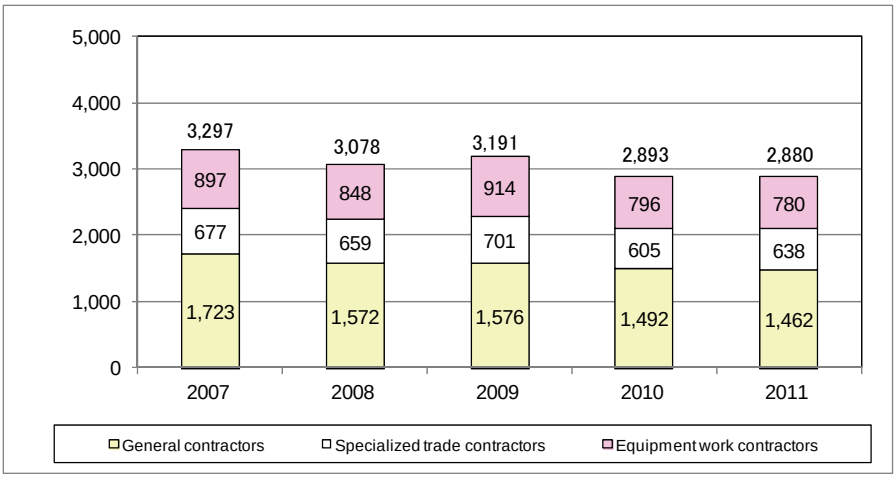
Business Type	Fiscal Year[2]	2008	2009	2010	2011	2012
Surveying[1]	No. of registered companies	13,683	13,324	12,974	12,695	12,566
	YoY change (%)	-1.5	-2.6	-2.6	-2.2	-1.0
Construction consulting[1]	No. of registered companies	4,042	3,993	3,952	3,991	3,935
	YoY change (%)	-2.4	-1.2	-1.0	1.0	-1.4
Geological surveying[1]	No. of registered companies	1,336	1,305	1,286	1,289	1,265
	YoY change (%)	-2.9	-2.3	-1.5	0.2	-1.9
Net number of companies	No. of registered companies	15,140	15,057	14,605	14,200	13,951
	YoY change (%)	-4.5	-0.5	-3.0	-2.8	-1.8

Source: Registration Status of Construction-Related Companies (MLIT)
Notes:
1. Including companies with multiple registrations.
2. As of the end of March in each fiscal year.

4. Employees and Construction Labor

The numbers of construction industry employees by trade/field shows that 1,462,000 (50.8%) work for "general contractors," 638,000 (22.2%) for "specialized trade contractors," and 780,000 (27.1%) for "equipment work contractors," for a total of 2,880,000 employees. This total is down 41,700 from FY2007, reflecting a particularly large decrease in the number of general contractors.

Figure 7 Number of Construction Industry Employees



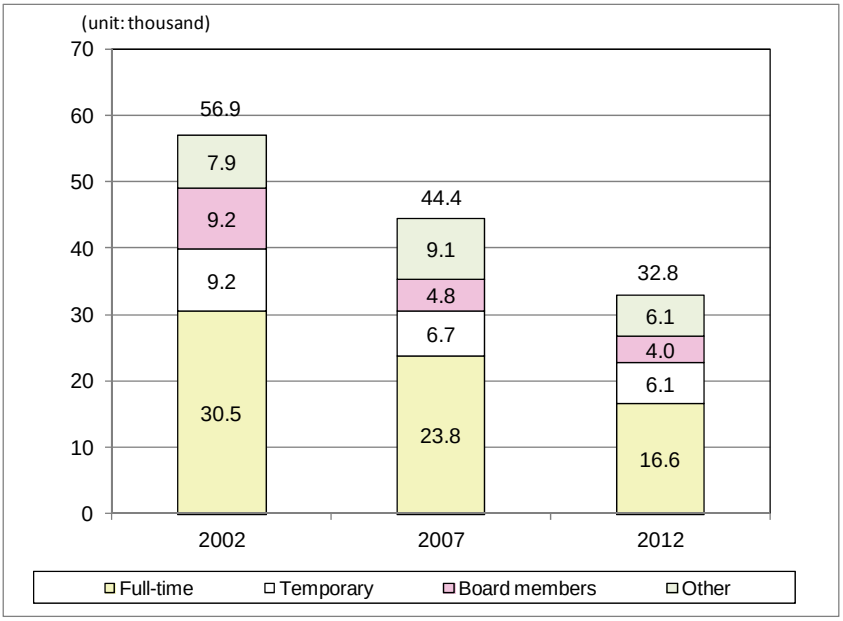
(unit:thousand)

	2,007		2,008		2,009		2,010		2,011	
General contractors	1,723	52.3%	1,572	51.1%	1,576	49.4%	1,492	51.6%	1,462	50.8%
Specialized trade contractors	677	20.5%	659	21.4%	701	22.0%	605	20.9%	638	22.2%
Equipment work contractors	897	27.2%	848	27.5%	914	28.6%	796	27.5%	780	27.1%
Total	3,297	100.0%	3,078	100.0%	3,191	100.0%	2,893	100.0%	2,880	100.0%

Source: *Statistics on Construction Projects Implemented* (MLIT)

Of the total 32,800 foreign employees in the construction industry in 2012, 16,600 are full-time employees (56.1%), 6,100 are temporary employees (9.8%), and 4,000 are members of the board (13.4%). Compared with 2007, the total number has decreased by about 11,600 employees.

Figure 8 Number of Foreign Construction Industry Employees by Type of Employment in FY 2002, 2007 and 2012



(unit: thousand)

	2002		2007		2012	
Full-time	30.5	53.7%	23.8	53.5%	16.6	56.1%
Temporary	9.2	16.2%	6.7	15.0%	6.1	9.8%
Board members	9.2	16.2%	4.8	10.9%	4.0	13.4%
Other	7.9	13.9%	9.1	20.5%	6.1	20.7%
Total	56.9	100.0%	44.4	100.0%	32.8	100.0%

Source: *National Census* (Ministry of Internal Affairs and Communications)

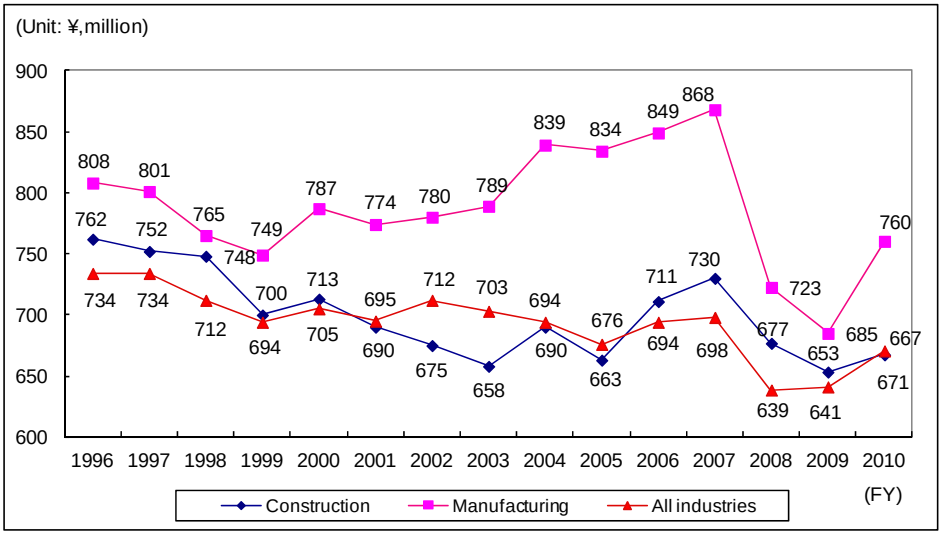
5. Productivity

The low level of labor productivity in the construction industry versus manufacturing and other industries is largely due to macroeconomic factors, impediments to productivity also exist at work sites and in companies. The major factors involved are as

(1) Productivity improvement in workplace that would bring about major reforms in the production system has not been adequately developed.

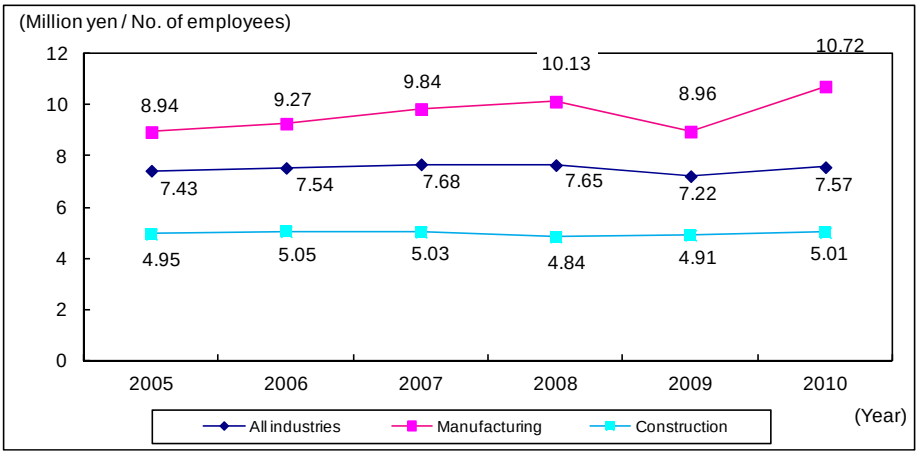
(2) Production system has been in effective because of that the state of “too many layers of subcontractors” leads to increased overhead costs.

Figure 9　Added Value Per Employee



Source:　*Corporate Statistics* (Ministry of Finance)
Note:　Added value = operating income + personnel expenses + interest expenses/discount expenses + taxes and public fees, etc.

Figure 10　Trends in Real Labor Productivity in the Construction Industry



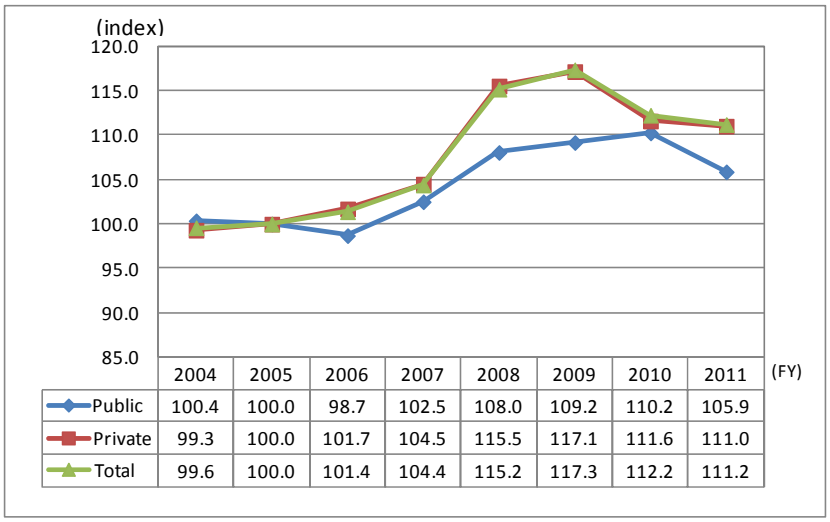
Source: *National Accounts (2010 Final Version)* (Cabinet Office)
Notes:
1. Real labor productivity = GDP by economic activity / no. of employees engaged in each economic activity
2. Benchmark year 2005. Real prices: Fixed standard year method.

6.　Construction Costs

(1) Trends in the expected construction costs per floor area of new starts

This diagram shows the trends in the expected construction costs per floor area of new starts using FY2005 as the baseline. The index, combining the public and private sectors, shows that there has been an increasing trend in construction costs since FY2003. This is largely due to high steel product prices.

Figure 11　Trends in the expected construction costs per floor area of new starts

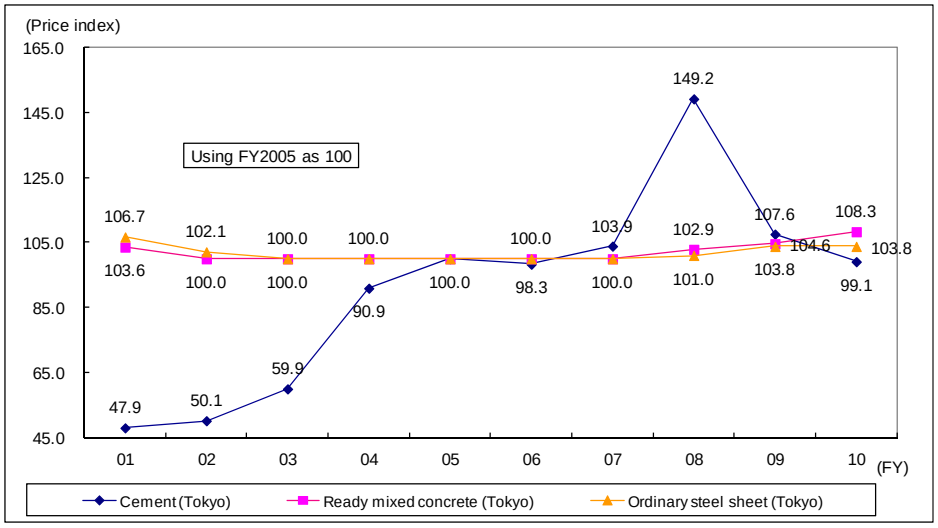


	2004	2005	2006	2007	2008	2009	2010	2011
Public	100.4	100.0	98.7	102.5	108.0	109.2	110.2	105.9
Private	99.3	100.0	101.7	104.5	115.5	117.1	111.6	111.0
Total	99.6	100.0	101.4	104.4	115.2	117.3	112.2	111.2

(2)　Average Construction Material Prices

Figure 12 shows the trends in prices of major materials in the form of an index based on the average prices in 2005 (construction materials price index). The leading factor in the increasing trend in construction costs in the steel product price index is massive price increases due to the sharp rise in ordinary steel product prices in 2003–04 and to the impact of rising shipping costs resulting from natural resource price increases in 2007–08, all of which have been affected by rising prices associated with an increased demand for steel worldwide. Reductions since 2009 are attributed to the effects of the Lehman Brothers collapse.

Figure 12　Trends in the Construction Materials Price Index

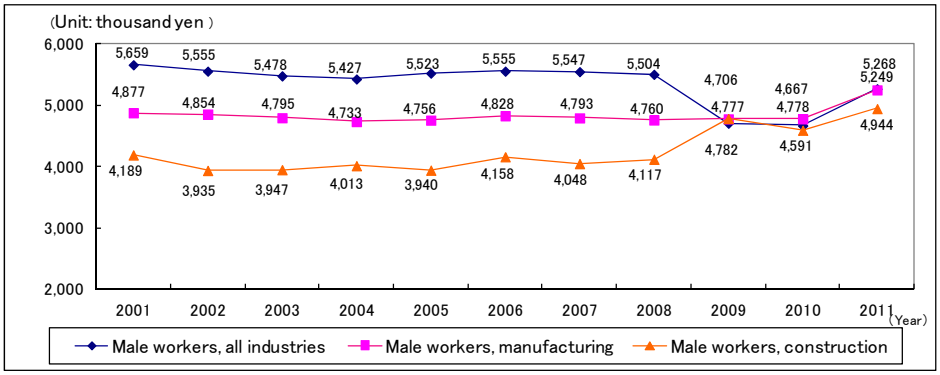


Source:　*Market Conditions and Price Trends for Major Commodities*
(Economic Research Association)

(3) Construction Industry Wages

Until the early 1990s, wages of production workers in the construction industry had been rising alongside of workers in other industries. However, the decrease of wages began in 1995, earlier and larger than other industries, and this drop caused the gap between the construction industry and other industries to widen. In 2011, annual construction wages were about ¥320,000 lower (6.2%) than the average wage for male production workers in all industries and about ¥310,000 lower (5.8%) than the average wage of male production workers in the manufacturing industry. The wage gap shrank in 2009 and 2010, but it began expanding against in 2011.

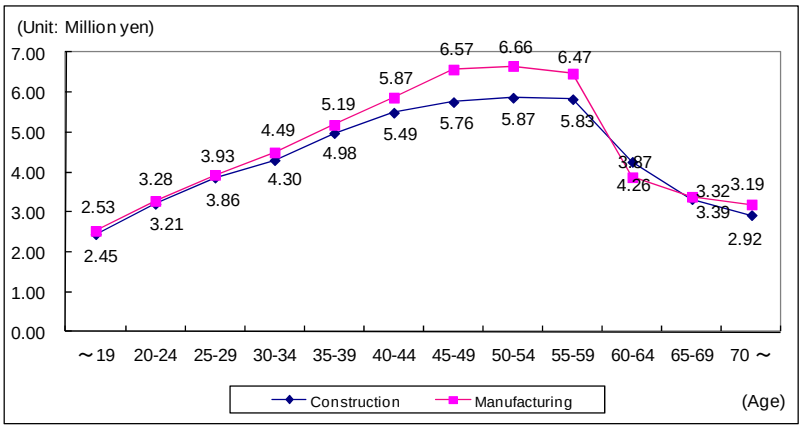
Figure 13 Trends in Total Annual Wages of Production Workers



Source: *Basic Survey of Wage Structures* (Ministry of Health, Labor, and Welfare)
Note: Total annual wages = fixed monthly salary × 12 (months) + annual bonus and other special pay

The wage curve for production workers by age in the construction industry shows that wage increases level off at around 35-59 years old when workers likely own homes and have a burden of payment for their children's education. A large gap between this curve and that of the manufacturing industry is highly visible.

Figure 14 Annual Wages for Male Production Workers in Construction and Manufacturing



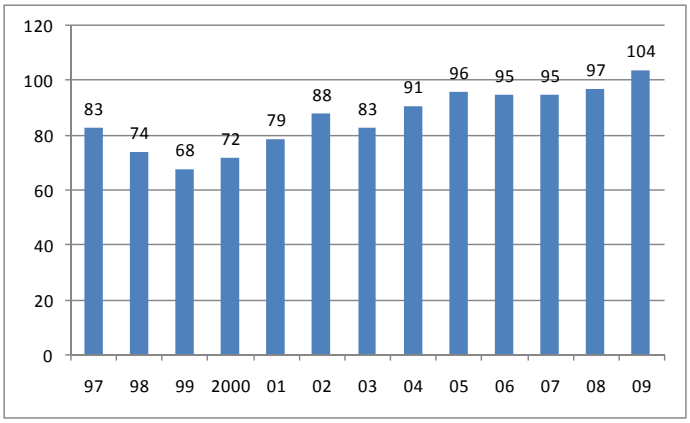
Source: *Basic Survey of Wage Structures* (Ministry of Health, Labour, and Welfare)
Note: Total annual wages = fixed monthly salary × 12 (months) + annual bonus and other special pay

7. International Transactions in the Construction Market

(1) International Construction Companies in Japan

In FY2009, there were 104 international construction companies holding construction licenses in Japan (foreign corporations and Japanese corporations with 50% or greater foreign ownership). The WTO Agreement on Government Procurement in 1996 was the trigger for this internationalization. The country with the most licensed companies in Japan is the US, with about 40 companies operating in Japan.

Figure 15 No. of International Construction Companies Holding Construction Licenses in Japan



Source: MLIT

Figure 16 shows the current minimum value of construction work covered by the WTO Agreement on Government Procurement. The value of orders received in Japan by international construction companies is not statistically tabulated. The number of orders and their ratio to all orders received is expected to be small.

Figure 16 Minimum Value of Construction Work Covered by WTO Agreement on Government Procurement

(Unit: ¥1 million)

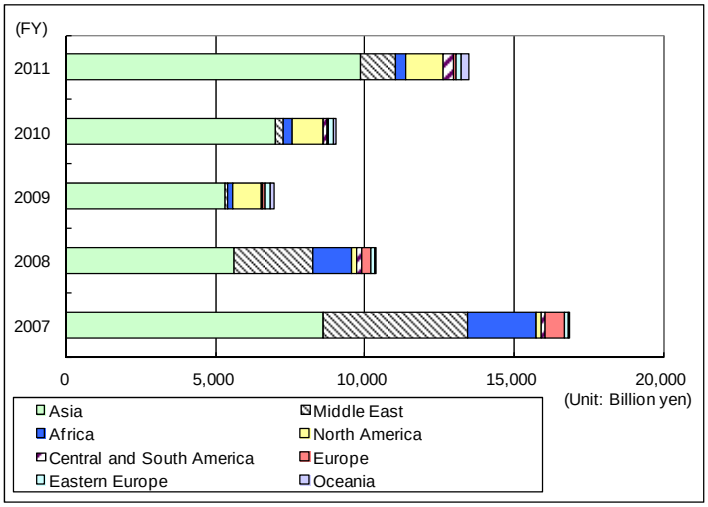
	Construction work	Design and consulting
Central government (including a part of independent administrative agencies)	580	58
Government agencies	1,940	58
Prefectures, designated cities	1,940	190

Source: The Overseas Construction Association of Japan. Ink

(2) Japanese Construction Companies Overseas

Construction orders of Japanese companies from overseas trended at about the ¥1 trillion level for more than 20 years since first crossing the ¥1 trillion threshold in FY1983. Orders received in FY2007 set a new record of ¥1,682 billion. However, as a result of the global economic downturn, orders received in FY2008 fell to ¥1,034.7 billion. Construction orders of Japanese companies from overseas fell to ¥697 billion in FY2009 due to the effects of the global recession, but they rose to ¥1,350.3 billion in FY2011.

Figure 17 Overseas Construction Orders Received in 2007–2011 (by Region)



	2007	2008	2009	2010	2011
Asia	8,616	5,653	5,344	7,008	9,863
Middle East	4,844	2,599	90	269	1,164
Africa	2,273	1,336	148	292	376
North America	201	148	954	1,031	1,243
Central and South America	122	199	68	159	338
Europe	661	302	87	33	98
Eastern Europe	96	110	146	171	176
Oceania	7	8	133	108	245
Total	1,062	1,171	1,648	1,681	1,350

Source: The Overseas Construction Association of Japan. Ink

The Construction and Transport Ministry has set a goal of increasing overseas orders in the construction industry to ¥2 trillion by FY2020. It has established this as one of the priority goals outlined in the Social Capital Development Plan and is expected to implement various support policies toward that end. Thus, overseas construction orders by Japanese companies are expected to expand in the future.

Figure 18　Overseas Construction Sales of Major Japanese Companies (by Region)

(Unit: ¥1 billion)

	2010		2011	
Company name	Total sales	Overseas sales	Total sales	Overseas sales
Kajima Corporation	1,325.7	194.6	1,457.8	203.1
Shimizu Corporation[1]	1,303.8	83.0	1,336.2	77.6
Taisei Corporation[2]	1,218.1	190.2	1,323.5	113.1
Ohbayashi Corporation	1,131.9	160.8	1,245.8	170.0
Takenaka Corporation	992.1	80.5	976.6	119.7
Penta-Ocean Construction	302.3	82.3	328.0	83.7
Nishimatsu Construction	257.9	25.3	263.9	46.2
Fujita Construction	241.4	22.2	310.9	39.5

Source: Annual reports of each company

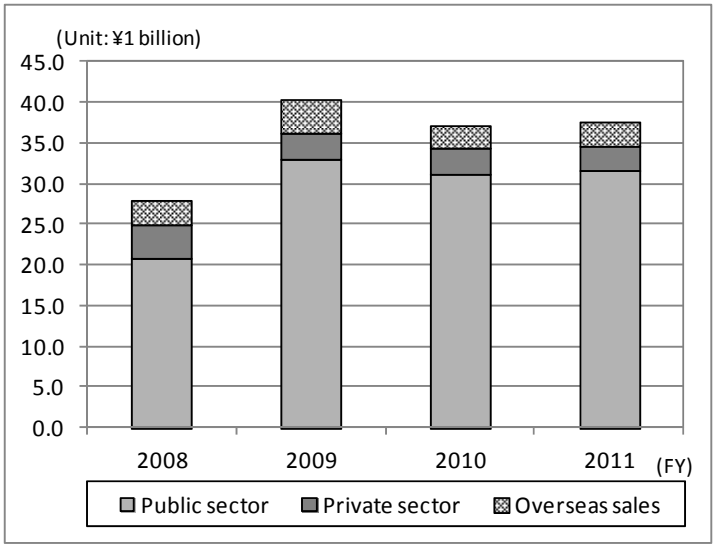
Note 1: Shimizu Corporation does not publish its consolidated overseas sales, so its non-consolidated figures were used.

Note 2: Taisei Corporation does not publish its consolidated overseas sales 2011, so its non-consolidated figures were used.

(2)　Japanese Construction Consulting Companies Overseas

Overseas sales by Japanese construction consultants have trended around ¥50 billion since FY2009 due to the rally that has occurred from the global recession, and they were reported to be at ¥46.3 billion in FY2011.

Figure 19　Overseas Sales of Major Japanese Construction Consulting Companies (by Region)



(Unit: ¥1 billion)

Fiscal year	2008	2009	2010	2011
Domestic sales	343.2	383.7	318.5	375.7
(YoY change)	-11.7%	11.8%	-17.0%	18.0%
Public sector	298.4	334.7	270.7	332.4
(YoY change)	-8.9%	12.2%	-19.1%	22.8%
Private sector	44.8	49.0	47.8	43.4
(YoY change)	-26.9%	9.3%	-2.4%	-9.3%
Overseas sales	38.1	49.1	49.7	46.3
(YoY change)	23.5%	28.7%	1.4%	-6.9%
total	381.3	432.7	368.3	422.0
(YoY change)	-9.1%	13.5%	-14.9%	14.6%

Source: The Overseas Construction Association of Japan. Ink

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RICE

RESEARCH INSTITUTE OF CONSTRUCTION AND ECONOMY

Address NP-Onarimon Building,
25-33,Nishishimbashi 3-chome,
Minato-ku,Tokyo 105-0003,Japan
TEL +81-3-3433-5011
FAX +81-3-3433-5239
URL
http://www.rice.or.jp/english/index.html
E-mail info@rice.or.jp

Sustainable Construction Practices during the Construction Stage

I. Sustainable Construction Practices during the Construction Stage in Japan

1. Efforts by the Japanese Government

This report outlines the efforts and results that have been implemented and achieved in both the public and private sectors in the Japanese construction industry. Fundamentally, the government has been creating new legal regulations and designation systems, while private companies have been strengthening their efforts based on those regulations and systems. Thus, we start by looking at the government's efforts from the three perspectives of resources, construction works, and zero emissions efforts.

1.1 Material Procurement

(1) Promoting Purchases of Eco-Friendly Goods and Services (EFGS)

To create a recycling-oriented society, efforts to supply recycled products must be accompanied by efforts on the demand side. Based on this idea, in May 2000, the Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing, LPGP) was enacted. This law promotes the priority procurement of EFGS (products and services that help reduce environmental impact) by the government and other public institutions, aims to facilitate a shift in demand by the dissemination of information regarding EFGS, and promotes the formulation of a society which can enjoy sustainable development with a lower environmental impact.

In February 2001, according to the LPGP, the Cabinet approved a Basic Policy on Promoting Green Purchasing, which established Designated Procurement Goods (DPG, types of goods such as EFGS which are promoted for priority procurement by the government and other public institutions) and the Way for Setting Procurement Targets (WSPT). Since then, revisions have been made to DPG and WSPT as needed, and construction companies have been managing their own green procurement systems while using those regulations and revisions as a source of reference. The specific examples are outlined in section 2.1 (3).

1.2 Construction Works

(1) Environmental Measures for Construction Works

In terms of its environmental measures for construction works, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) launched its Environment and Recycle Planning Office in July 2011, and it has been strengthening efforts in three areas: (1) guidance in and dissemination of technologies for environmental preservation related to the construction equipments; (2) planning, proposals, coordination, and guidance related to work methods for environmental preservation used in projects by Central Government Entities (CGE); and (3) planning, proposals, coordination and guidance related to surplus soil and other by-products of CGE's projects.

(2) Noise and Vibration Measures

Noise and vibrations generated by construction equipments (CEs) during construction works cannot be avoided, and numerous complaints from nearby residents continue to be lodged. The government is therefore advising construction companies to reduce noise and vibrations through the introduction of legal regulations and a designation system.

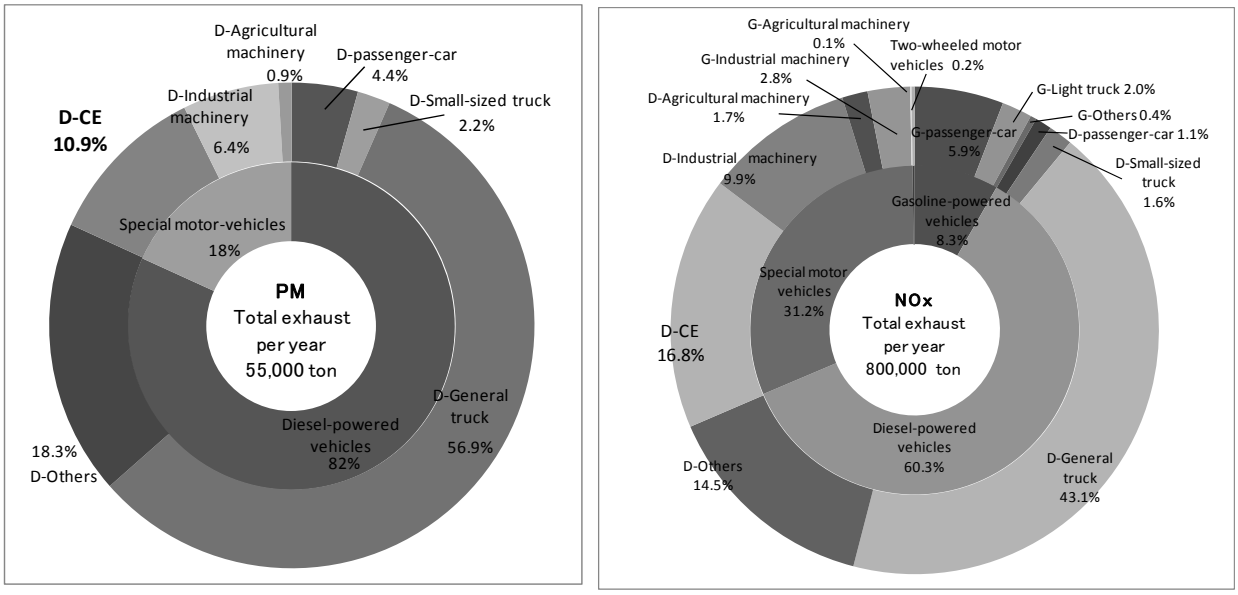
The legal regulations are as follows. The Noise Regulation Law and Vibration Regulation Law define designated construction works as works in which considerable noise and vibrations are generated during the construction works. When a company wants to engage in designated construction works in an area that has been designated for regulation of noise and vibrations by the governor (or mayor of a designated city), such company is required to give advance notice to each municipality by seven days prior to the commencement of the works.

The designation system works as follows. The use of low-noise CEs is generally required by the low-noise, low-vibration construction equipment designation system, and when construction works are performed using only designated CEs, the project is exempted from the application of the designated construction project regulations specified under the Noise Regulation Act.

(3) Emission Gas Measures

Article 16 of the Basic Environment Law establishes standards that should be maintained for the sake of protecting human health—specifically, those regarding environmental conditions related to air pollution[1]. Estimates of total exhaust emission gas from Motor Vehicles (2005) indicate that emissions gas from construction equipments (CEs) account for about 10% of the total particulate matter (PM), and 17% of nitrogen oxides (NOx). There is a growing need to implement exhaust emission gas regulations in response to this situation.

Figure 1: Estimate of Total Exhaust Emission from Motor Vehicles (PM, NOx)



Source: Central Environment Council of Japan

[1] Article 16, Clause 1 of the Basic Environment Law: With regard to the environmental conditions related to air pollution, water pollution, soil contamination and noise, the Government shall respectively establish environmental quality Standards, the maintenance of which is desirable for the protection of human health and the conservation of the living environment.

The government is making efforts to reduce exhaust emission gas through the introduction of legal regulations and designation systems, as it is doing in the case of noise and vibration measures.

The designation systems were launched in 1992, based on the first standard values for emission gas. Today, CEs applicable for emission gas control are made based on the fourth revised standard values.

Legal regulations, meanwhile, were launched in 2006 with the enactment of the Act on Regulation, Etc. of Emissions from Non-road Special Motor Vehicles on May 25, 2005 (nicknamed the Off-Road Law).

The MLIT requires only the use of designated CEs in the projects by Central Government Entities (CGE), and it implements policies to increase construction company incentives to introduce designated CEs, such as financial system arrangements that allow designated CEs to be acquired at low interest rates and measures to award additional points for the use of such equipments in the technical tender for the projects by CGE.

Today, the use of designated CEs goes beyond the projects by CGE. More than 90% of prefectures and designated cities also require only the use of designated CEs, and the dissemination of designated CEs is thus expanding. For example, more than 70% of backhoes are applicable for emission gas control, and even more widespread use of designated CEs is expected in near future.

(4) Global Warming Measures

One of the major factors in global warming seems to be the increase in greenhouse gases, and Japanese CO_2 emissions account for about 5% of emissions worldwide. Japan is trying to reduce its CO_2 emissions in an effort to prevent further global warming, and the construction industry is no exception. To reduce CO_2 emissions generated from CEs, the MLIT is working to create manuals for energy-saving operation, to introduce a system of certification for fuel-efficient CEs to promote the dissemination of energy-saving CEs, and to introduce a system of certification for low-carbon CEs to promote the dissemination of hybrids CEs.

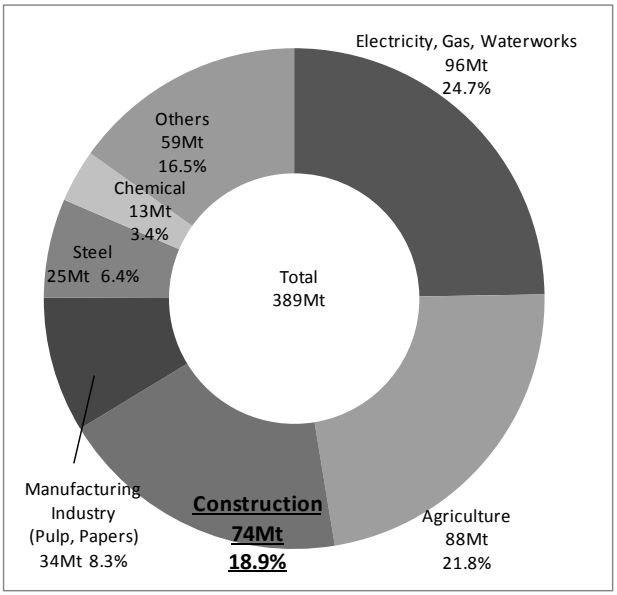
Through these efforts, the MLIT is striving to further reduce emissions in the construction sector, which were reported to be at 14 million tons in 1990.

1.3 Zero Emissions

(1) Construction Recycling

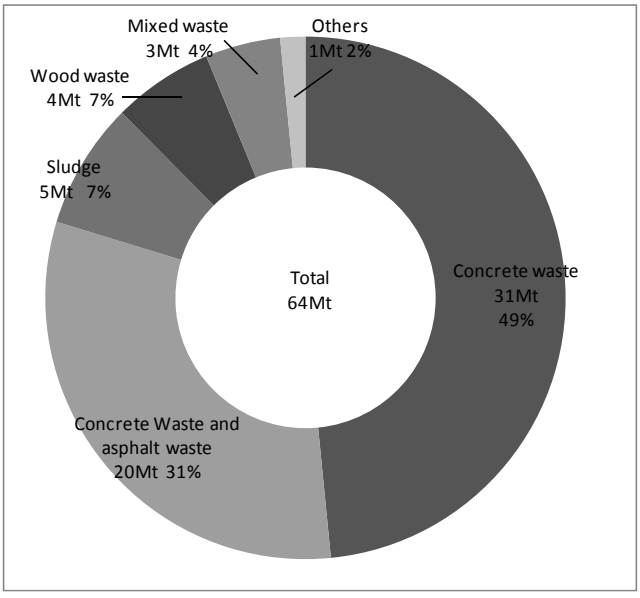
Construction works require the input of an extremely large amount of resources. Construction waste accounts for about 20% of Japan's total industrial waste output and about one-fourth of its final disposal volumes.

Figure2: Amount of by-products derived from Industry



Source: Ministry of the Environment "The condition of emission and disposal of Industrial Wastes, FY2009"

Figure3: Classified construction by-products volumes



Source: Ministry of Land, Infrastructure, Transport and Tourism "Survey of construction by-products FY2008"

While various laws are being established to promote the creation of a recycling-oriented society, in the construction industry, regulations are being applied through the Construction Material Recycling Law (CMRL), which requires to contractors to sort out and recycles wastes generated in demolition works of buildings that the specified construction materials, such as concrete (including pre-cast plates), asphalt/concrete and wood building materials are used or construction works using the specific construction materials.

Measures to promote construction recycling began with the 1992 formulation of rules for adhering to the principle of recycling, and these measures were instigated by the lack of effective uses for construction by-products, low excess capacity at final disposal sites, and the need to cut final disposal volumes through the promotion of recycling. Later, in conjunction with the enactment of the CMRL in 2002, the effects achieved through policies focused on regulatory methods began to improve considerably.

In 2008, as a result of the fact-finding survey of the CMRL and the formulation of the Construction Waste Recycle Strategic Program 2008 (CWRSP), even more progressive efforts were implemented. CWRSP was formulated for the purpose of promoting the 3Rs (Reduce, Reuse, Recycle) and was intended to apply to all construction works, whether performed by the State, local governments, or private sector.

2. Efforts by Private Construction Companies

Construction companies are implementing various efforts not only from the perspective of ensuring compliance with rules established by the government—that is, obeying laws and adapting to designation systems—but also from the perspective of fulfilling their social responsibility given their role as companies that are responsible for the development of the social infrastructure. As part of these efforts, companies are genuinely working to address environmental problems, and they have reached a certain level of success in achieving the major goal of engaging in “sustainable construction.” The sections below present efforts made by private construction companies from the three perspectives of resources, construction works, and zero emissions efforts.

2.1 Material Procurement

(1) Cutting CO_2 emissions during the production and processing of structural materials

It is well known that electric furnace process reduce CO_2 emissions from the production of steel and reinforcing bars (re-bar), and many construction companies in Japan are striving to reduce CO_2 emissions by accepting steel and re-bar that is produced using electric furnaces. When it comes to the cement that is needed for making concrete, the use of type-B blast-furnace slag cement likewise reduces CO_2 emissions.

(2) Construction Methods That Require Fewer Resources

Every construction company, through efforts to improve the strength of its construction materials and to re-examine structures as a result of technological developments, is able to construct buildings that use fewer resources than in the past, with no structural problems. For example, the adoption of construction methods that have a low environmental impact reduces the amount of resource inputs needed and thus effectively reduces the CO_2 emissions generated in the production of those resources.

(3) Green Purchasing

Construction companies typically use a wide variety of materials in rather high volumes and thus can have both a direct and indirect impact on the environment through their purchasing decisions.

The Japanese construction industry has thus been making efforts to promote green purchasing, taking an active role in building and maintaining a sustainable society. Using as reference the government's Basic Policy on Promoting Green Purchasing (BPPGP), construction companies have been engaging in activities to promote green purchasing (contributing to the creation of a sustainable, recycling-oriented society by taking environmental impact into account and striving to give priority to office supplies and construction materials that have a lower environmental impact).

To thoroughly implement green purchasing, it is essential that each construction company enact its own internal green procurement standards and guidelines and work to achieve its goals in cooperation with its materials suppliers. It is also important for construction companies to make proposals to its contractees and designers, encouraging them during the design phase to use recyclable resources and construction materials and to use materials with a low environmental impact.

Within this context, Japanese construction companies are approaching procurement in accordance with the BPPGP and are striving to contribute to the creation of a sustainable society. By way of example, the guidelines formulated by various companies include stipulations regarding: (1) the promotion of efforts to save energy and resources; (2) reductions in CO_2 emissions; (3) the control of waste generation; (4) the promotion of recycling; (5) the controlled use of hazardous substances; and (6) the preservation of the surrounding environment and ecosystem.

2.2 Construction Works

(1) Promoting Green Construction methods

70% of the CO_2 emissions from construction projects are derived from the use of heavy construction equipments (CEs) or the use of automotive diesel oil. Given survey results indicating that a majority of CO_2 emissions is accounted for by cranes and hydraulic shovels, it is extremely important to promote efforts to improve the efficiency of these CEs.

By using high-performance CEs that are well suited to the site conditions and type of construction works being performed, and by striving to speed up and streamline construction works, it becomes possible to cut the amount of time CEs are being operated and thus to reduce CO_2 emissions.

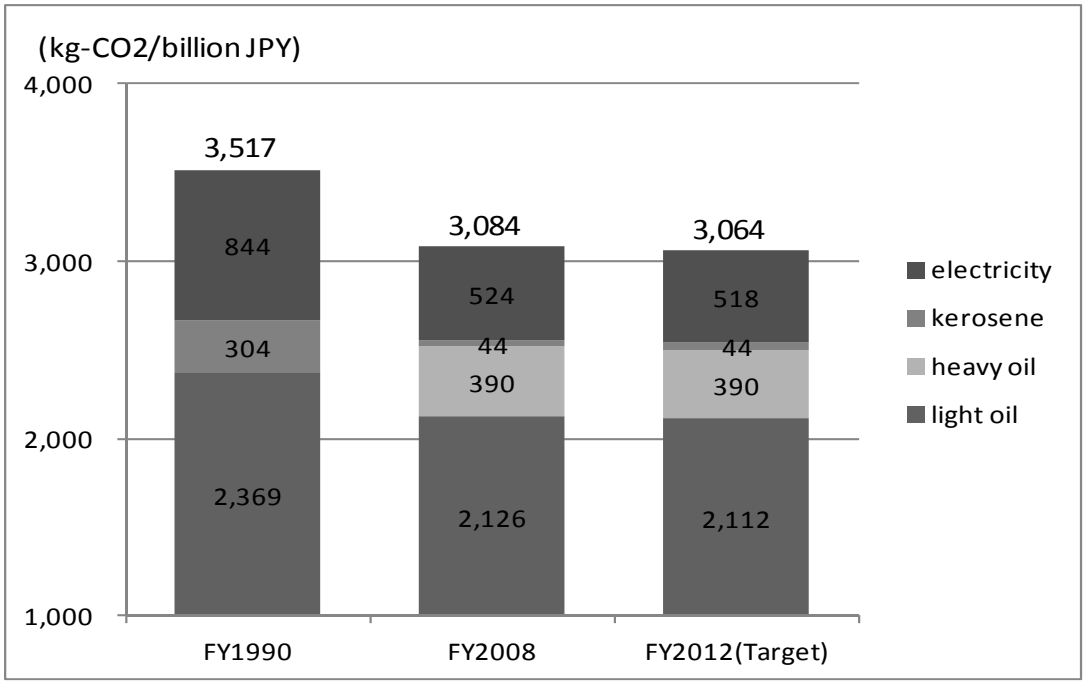
Efforts are also being made to work with manufacturers and partner companies to promote the development of hybrid heavy CEs and CEs that run on clean fuels. There are even some examples where heavy CEs that run on biodiesel fuels (BDF) are being used.

To achieve the more efficient operations of trucks and hydraulic shovels, some companies are conducting lessons on fuel-saving operating tips. They are also adding drive management systems that have eco-drive evaluation functions to their vehicles and are thus working to reduce CO_2 emissions by monitoring driving practices.

Reducing surplus soil shipment volumes and shipping distances makes it possible to improve the fuel efficiency of trucks and to reduce the distances they travel, ultimately cutting CO_2 emissions.

Survey results indicate that through these types of efforts, the CO_2 emissions in FY2008 were reduced by 12.3% as compared with FY1990.

Figure4: CO_2 emissions factor on construction industry



Source: Japan Federation of Construction Contractors "Environmental voluntary action plan of Construction Industry 4th edition (revised) (2010)"

(2) Saving Electricity

Given the impact of the Great East Japan Earthquake that struck in March 2011, the government established a target of cutting electricity use by 15% across the board, compared to 2010. In response, the major construction companies have taken various measures to achieve the goal.

Specifically, their efforts have included summer breaks for construction sites on a rotating basis, adjusting the summertime work hours, and the active use of generators. Some major construction companies have established bulletin boards showing the electricity use at their workplaces based on the idea that making it possible for people to visualize their electricity use will help remind them to conserve electricity.

As a result of these efforts, in 2011 some of the major construction companies actually exceeded the goals set by the government by a wide margin (30%).

Last year, emergency energy-saving measures were implemented, but this year, companies are looking into more long-term responses to energy conservation and are now implementing such measures. For example, some have added the enforcement of rules to perform work only during non-peak hours and a review of the procedures for using construction equipments that consumes a lot of electricity. They are also considering other efforts such as trying to use large cranes in the early morning hours and importing fuel.

If such measures are not actually implemented at construction sites, these visions will come to little more than pie-in-the-sky dreams, but the know-how of safety patrols, which have been developed through Japan's safety-first campaign, are now being applied to electricity conservation. For example, a construction manager walks around construction sites and makes inspections to determine if there are any irregularities. If a problem is found, he records the situation using a digital camera, discusses the matter in the meeting, and strives to prevent a recurrence. Such efforts raise the awareness of

workers and ensure that various measures are being diligently performed.

2.3 Zero Emissions Efforts

(1) Industry Trends

As was mentioned in section 1.3, while the government was promoting construction recycling to achieve its zero emissions goals, the Japanese construction industry has followed the trend and began its own zero emissions goals since around 2000. Efforts were made at many construction sites, particularly by general contractors, to control the amount of waste generated and to cut disposal volumes. The range of efforts taken by each company varied, but they had several elements in common: (1) reduce, (2) reuse, and (3) recycle (the 3Rs). To achieve a recycling-oriented society, construction companies are working to reduce and recycle construction by-products.

Reduction efforts include processing and pre-cutting construction materials in the factory in order to reduce wastes. Items that can be reused are reused. Companies are cutting way back on packaging, and when possible, they are delivering materials to construction sites without packaging. The modularization of interior parts has been implemented, along with the use of precast concrete floor panels, thus making every effort to ensure that no new by-products are created at construction sites.

Recycling efforts have to be made through a common awareness of their importance by everyone at the company, from the general contractor’s employees to the most incidental workers on the project.

To ensure that all companies have a shared awareness of the importance of recycling, it has recommended discussions be held at the daily meetings at each work site in order to cultivate a common awareness of the zero emissions goal. At waste disposal locations, efforts should be made to ensure that waste is sorted by type and that each company has its own dumpsters. Making it possible for workers to easily and visually sort waste will ensure that more waste is sorted properly.

Items that can be recycled should be identified as such and channeled for recycling in advance. The goal is to send zero waste to landfills.

(2) Introduction of Electronic Manifests

Companies are promoting the introduction of electronic manifests (an online system for keeping logs that confirm that waste processing has been handled appropriately) as a means of properly processing industrial waste. They are now being used by more than 80% of companies, and their use is expected to become even more widespread in near future.

II. Conclusion

In Japan, construction waste accounts for the vast majority of industrial waste that is illegally dumped, and the construction of new waste-processing facilities is becoming extremely difficult. Recycling materials into new construction materials is the most direct solution for cutting down on industrial waste.

Thus the Construction Material Recycling Law was enacted in 2002. In addition to calling for the establishment of recycling goals, the creation of a registration system for demolition companies, and the appropriate payment of additional costs related to deconstruction for recycling, it also obligates companies to engage in deconstruction and recycling. Meanwhile, the Law on Promoting Green Purchasing encourages the use of construction materials made from recycled materials.

As a result, over the past 10 years or so, nearly all of the concrete and asphalt waste produced (98%) has been recycled into aggregate for the creation of new concrete through a process of fine pulverization. However, only about 50% of surplus soil and construction sludge is recycled, and more than 70% of the mixed waste that is generated when homes are demolished is treated as waste without being recycled. Thus, greater efforts are needed to reduce and recycle construction sludge and mixed waste.

Some measures can be implemented prior to recycling. To control the generation of construction waste in advance, it is important to make efforts to extend the life (longevity) of structures like bridges and tunnels by ensuring that they are properly maintained, and to promote the use of long-life materials in residential buildings (single-family homes in Japan are generally made of wood).

In terms of policies related to construction equipments (CEs), ongoing environmental measures to deal with nitrogen oxides (NOx) and suspended particulate matter (SPM) are being promoted, as are measures to combat global warming, such as CO_2 reduction policies. The share of Japan's total CO_2 emissions (about 1.2 billion tons) accounted for by the construction industry is less than 1%, but it is nonetheless estimated to be more than 10 million tons. To improve the fuel efficiency of CEs, efforts have been made to create manuals with tips for energy-saving use (2003) and to launch a system of certifying energy-saving CEs (2007). However, given the government’s goal of reducing emissions by 25% (versus 14 million tons in 1990) by 2020, the industry has been taking even more steps in recent years to promote the dissemination of hybrid CEs that combine electric energy with diesel engines.

Meanwhile, there has been growing interest in the sustainability of water resources around the world. Thus, efforts are also being made to develop water-conservation technologies that will be useful for construction projects in areas where clean water is a particularly precious resource. Generally speaking, saline matter is not appropriate for reinforced concrete structures, but some companies have developed technologies for using seawater to make concrete that is very fine and offers high levels of strength and durability. These technologies are expected to be used in areas of the Middle East, where water resources are particularly valuable, and they are also likely to be useful in efforts to recycle salt-containing rubble that was inundated by the tsunami generated by the Great

East Japan Earthquake. Today, joint research is being promoted among the government and some companies to facilitate the dissemination of the use of these technologies at actual construction sites.

This report has discussed environmental sustainability by focusing on three separate components: (1) the resources that are used in construction works; (2) the CO_2-reducing, energy-saving, and resource-saving measures implemented in the course of construction works; and (3) the reduction of waste generated in the construction process. As the scope of human economic activities expands, its negative aspects, such as environmental degradation, waste problems, and global warming are all becoming more serious issues. Even greater efforts must be made to address these problems if we are to ensure sustainability.