Assessing the Sustainability of Japan's Foreign Aid Program: An Analysis of Development Assistance to Energy Sectors of Developing Countries

Hideka Yamaguchi
University of Delaware

This article examines the effect of Japan's official development assistance (ODA) over 10 years that proposed to facilitate environmental conservation in developing countries. Special emphasis is given to ODA disbursements in the energy sector to evaluate whether Japan's foreign aid has shifted its policy toward more environmentally sound goals. The article finds that despite its articulated premise, Japan's ODA for the energy sector has favored environmentally problematic projects, that is, those based on fossil fuels and larger scale (10 megawatt or larger) hydropower. Similar to patterns in the early 1990s, environmentally friendly projects have received little attention. It is not surprising that the expected amount of greenhouse gas emissions from Japan's ODA-supported energy projects appears substantial.

Keywords: *sustainable development; environmental conservation; foreign aid policy; Japan; energy sector; official development assistance (ODA); CO_2 emissions*

More than a decade has passed since the government of Japan first identified environmental conservation as a priority for its foreign aid projects with the aim of realizing sustainable development in developing countries. This new orientation was motivated by an interest in addressing the environmental destruction caused by past Japan-funded projects in partner nations. Indeed, several of Japan's aid-recipient nations still suffer from severe problems arising from these projects, including ecosystem degradation and losses of social and cultural values (e.g., the Paiton coal-fired power plant project in Indonesia and the San Roque multipurpose dam project in the Philippines; see Yamaguchi, 2003). The problem has been particularly evident in the case of aid programs designed for energy sector development.

The purpose of this article is to analyze the effects of Japan's foreign aid policy on energy sector development since the government's first announcement to enhance environmental sustainability in partner nations in the late 1980s. The analysis examines Japan's Official Development Assistance (ODA) program funding in the energy sector to determine the extent to which environmental revisions of aid policy have affected ODA spending, especially over the past decade.

An Overview of Japan's ODA

With the world's second-largest economy, Japan has provided four types of economic assistance to the developing world: official development assistance (ODA), other official flows (OOF), private funds (PF), and grants by private, nonprofit agencies. Of these funding sources, the Japanese government has made substantial contributions through the ODA[1] program.

Japan's ODA was the world's largest for the period 1991-2000 (see Figure 1). In 1999, Japan's annual ODA budget reached $15.3 billion—a world record (Ministry of Foreign Affairs, 2002). In 1998, Japan became the largest donor to 42 countries, including Indonesia, China, Thailand, India, and the Philippines (Ministry of Finance, 2001). Its ODA budget ranked second behind the United States in 2001; however, total contributions for the past 10 years from Japan

Bulletin of Science, Technology & Society, Vol. 25, No. 5, October 2005, 412-425
DOI: 10.1177/0270467605279322

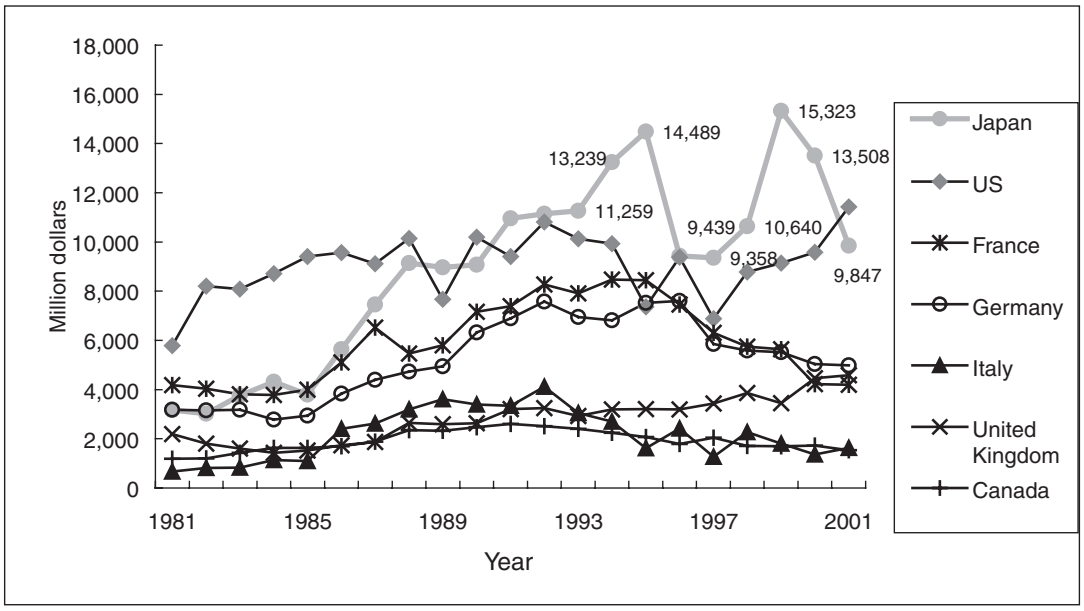

Figure 1. Official Development Assistance Trends Among Major Development Assistance Committee Countries
Source: Ministry of Foreign Affairs, 2002.

($118 billion) are still larger than those of the United States ($93 billion).

Another important feature of Japanese ODA is that since the late 1980s, in an effort to serve the country's interest for leadership in international environmental affairs (Peng, 1993, pp. 381-382), the program has articulated a core strategy for addressing environmental sustainability along with economic growth in developing countries. This new policy became visible on the eve of the Arche Summit in 1989 when Japan pledged to expand its ODA contributions in the environmental field. This pledge was immediately followed by an announcement to provide 300 billion yen (approximately $3 billion[2]) in environmental ODA from 1989 to 1991 (Yamamoto, 1994). Specific areas subject to Japan's environmental ODA were to include improvements in residential environment (water supply and sewage systems and disposal facilities), disaster prevention (such as floods), pollution control measures (air and water), and energy, forestry, and nature conservation (Ministry of Foreign Affairs, 1996).

In addition, at the 1992 Earth Summit, Japan promised to boost its environmental ODA to between 90 and 100 billion yen (approximately $6.9 billion and $7.7 billion) in the 5 years from fiscal year 1992. This represented one of the summit's largest pledges (Ministry of Foreign Affairs, 1996; Potter, 1994, p. 201). In actual donations, Japan disbursed 40% more than the pledged amount, 1.44 trillion yen (approximately $13.3 billion) by the end of 1996 (Ministry of Foreign Affairs, 1998).

The increasing focus on environmental issues in developing countries was first officially described in the ODA charter in 1992. Along with other goals for poverty reduction, peace building, and economic development, the charter strengthened the goal of environmental conservation: "Environmental conservation is also a task for all humankind, which all countries, developed and developing alike, must work together to tackle" (Ministry of Foreign Affairs, 1999b). Similar statements are found in the national action program for Agenda 21, issued in 1993, which indicated that "Japan would work cooperatively with developing countries to identify appropriate environmental projects through policy dialogue" (Yamamoto, 1994). More recently, this pledge was restated in the "Medium Term Policy on ODA" (Ministry of Foreign Affairs, 1999a), a major periodic review released in August 1999, which outlined a 5-year aid plan for government administrators. In sum, the environment has become an area of growing significance in the ODA program over the past decade.

Japan's ODA Strategy for Energy Sector Development

Within its broad commitment to environmental conservation, the government of Japan began in the

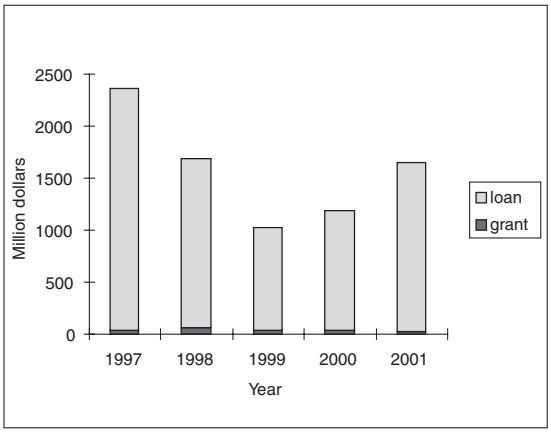

Figure 2. Share of Loans and Grants Among Bilateral Official Development Assistance for Energy Projects
Source: Ministry of Foreign Affairs, 2002.

1990s to highlight the importance of contributions to energy sector development in developing countries:

> Energy problems constitute a global-scale policy issue that is closely related to the response to global environmental problems and the achievement of sustainable development. Moreover, in many developing countries, securing access to adequate energy supplies constitutes a vital challenge in the realization of economic development. (Ministry of Foreign Affairs, 1999c)

Japan provided substantial ODA for energy projects, with the sum of budgets allocated between 1992 and 2001 reaching $19.7 billion (Organization for Economic Cooperation and Development, n.d.). By comparison, the United States offered far less than Japan, providing $1.7 billion over the same period (ibid). Clearly, providing ODA in the energy sector has been a top priority for Japan.

ODA in the energy sector consists of bilateral support (including grants and loans) and multilateral support (grants). Among these, Japan's contributions in the form of bilateral ODA loans have been the most significant (see Figure 2). Loans for the energy sector accounted for up to 98.4% of all bilateral energy ODA during 1997 and 2001. Equally important, energy constituted the largest sector in fiscal year 2002, with a share of 37.3% among total Japan ODA financing, or 206.2 billion yen (approximately $1.6 billion; Japan Bank for International Cooperation [JBIC], 2002). The JBIC—a merger of the Overseas Economic Cooperation Fund (OECF) and the Export-Import Bank of Japan (JEXIM)—oversees such bilateral ODA loans, whereas the Japan International Cooperation Agency (JICA) manages the grant aid and technical assistance projects.

Guided by the new ODA policy, Japan has stressed the importance of adopting environmentally friendly technologies, including these. for energy saving and renewable energy, for ODA energy projects (Ministry of Foreign Affairs, 1998). This policy is explained in Japan's ODA annual report in 1999:

> To reduce the emission of greenhouse gases by developing countries while achieving sustainable development, Japan will support the following measures: energy saving, the utilization of solar and wind power and other renewable energy sources, the introduction of coal-related technologies with reduced environmental burden, and the preservation and development of forests as a source of firewood. (Ministry of Foreign Affairs, 1999c)

In addition, in September 1999, the JBIC compiled environmental guidelines to require prospective loan recipients to submit environmental impact assessments for projects (Castellano, 2000).

Analysis of ODA Energy Project Funding

Although recent policy prescriptions promise a change in performance, an empirical analysis of energy sector ODA suggests otherwise. Energy sector ODA has frequently been offered to fossil fuel–based and large hydropower projects, which will likely contribute to additional environmental degradation in recipient nations. An analysis of energy-related projects financed under bilateral ODA will specifically demonstrate this.

All energy-related projects financed under bilateral ODA loans between fiscal years 1993 and 2002 have been analyzed. Bilateral ODA in the form of grants is not examined here because it comprises less than 5% of total ODA financing in the energy sector (see Figure 2). Energy projects financed under bilateral ODA were categorized into four project types: (1) fossil fuel–based, (2) hydropower, (3) transmission line, and (4) environmental conservation-related (see Table 1).

Power efficiency projects (see 4.1 in Table 1) aim to save energy by rehabilitating existing traditional

Table 1. Classification of Bilateral Energy Official Development Assistance (ODA) Loan Projects

Energy-Related Bilateral ODA Loan Projects			
(1) Fossil Fuel–Based Projects	**(2) Hydropower Projects**	**(3) Transmission Line Projects**	**(4) Environmental Conservation–Related Projects**
1.1 Fossil fuel power generation Coal Coal&gas Gas Gas&oil	2.1 Large and medium-scale hydropower projects Large (500 MW or greater) Medium (10-500 MW) 2.2 Fuel switching (to hydro)		4.1 Power efficiency 4.2 Renewables Small hydro (10 MW or smaller) Wind and geothermal 4.3 Mixed (Renewables&fossil fuels) Diesel/oil/nafta
1.2 Fossil fuel production 1.3 Fuel switching (to fossil fuels)			

energy facilities. These can be categorized as conventional energy projects (fossil fuel–based, hydropower, or transmission system) or environmental conservation–related projects. In this analysis, power efficiency projects are grouped under environmental conservation–related projects. All data are derived from JBIC annual reports between fiscal years 1993 and 2002.

Bilateral ODA Loans for Energy Projects

Since fiscal year 1993, Japan has provided 2,280 billion yen (approximately $20.1 billion) in financing for energy-related bilateral ODA loan projects. Figure 3 shows trends for those projects for the past 10 years. As illustrated here, annual expenditures had been almost the same until fiscal year 1998, with an average of 283.2 billion yen (approximately $2.5 billion) spent between fiscal years 1993 and 1998. However, fiscal year 1999 showed a sudden decrease, dropping by about half compared to fiscal year 1998. Presumably, this trend is attributable to Japan's declining economic performance in the latter half of the 1990s (Castellano, 2000). Expenditures have gradually increased, but have only returned to the level of fiscal year 1998.

Expectably, Japan's bilateral ODA loans in the energy sector give great emphasis to Asia. Table 2 lists 10 nations that have received the largest energy-related bilateral ODA loans (based on the sum of ODA spending since fiscal year 1993). China and India have received 448.1 billion yen (approximately $3.9 billion, or 19.7% of the total) and 399.7 billion yen (approximately $3.5 billion, or 17.5% of the total),

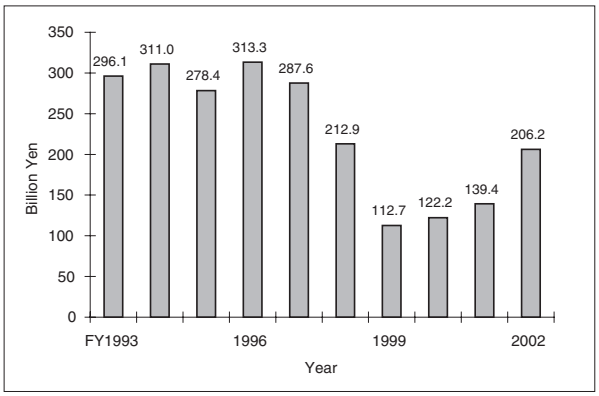

Figure 3. Trends in Total Bilateral Official Development Assistance Loans Assigned for Energy Projects (FY 1993-2002)

Note: FY-fiscal year

respectively. Among the top 10 recipients, 9 are located in Asia, which received most of the loans (85.0%) financed through the JBIC in the past decade, totaling 1.9 trillion yen (approximately $17.1 billion). The remaining 15.0% went to other regions: Eastern Europe and the former Union of Soviet Socialist Republics (5.0%), South America (4.7%), Middle East (3.7%), and Africa (1.5%) (see Figure 4). Among Japan's 32 energy-related bilateral ODA loan-recipient nations, there are 13 Asian countries.

Bilateral ODA financing in the energy sector has concentrated on fossil fuel–based and larger scale hydropower projects. Figure 5 shows the share of these categories, along with transmission line and environmental conservation–related projects. Fossil fuel–based and hydropower projects account for approxi-

Table 2. A Ranking of Japan's Energy-Related Bilateral Official Development Assistance Loan-Recipient Countries in Billions of Yen ($USbillion in parentheses) (1993-2002)

1 China	2 India	3 Vietnam	4 Indonesia	5 Malaysia	6 Thailand	7 Sri Lanka	8 Philippines	9 Pakistan	10 Peru
448.1 (3.9)	399.7 (3.5)	265.8 (2.3)	209.4 (1.8)	163.5 (1.4)	133.3 (1.2)	97.2 (0.9)	90.3 (0.8)	60.9 (0.5)	56.3 (0.5)

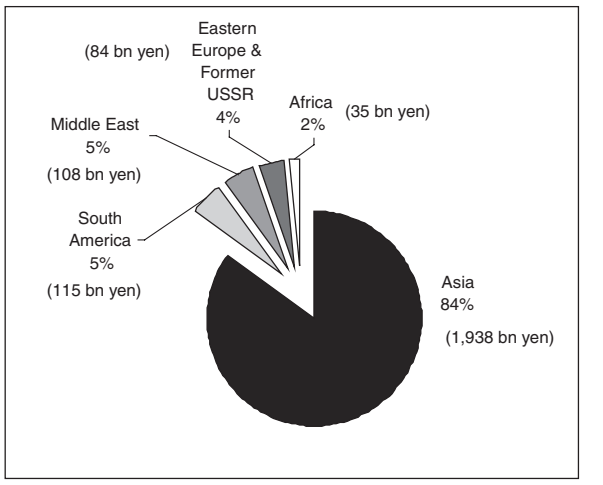

Figure 4. Regional Distribution of Energy-Related Bilateral Official Development Assistance Loans
Note: U.S.S.R. = Union of Soviet Socialist Republics; bn = billions.
Note: bn = billion.

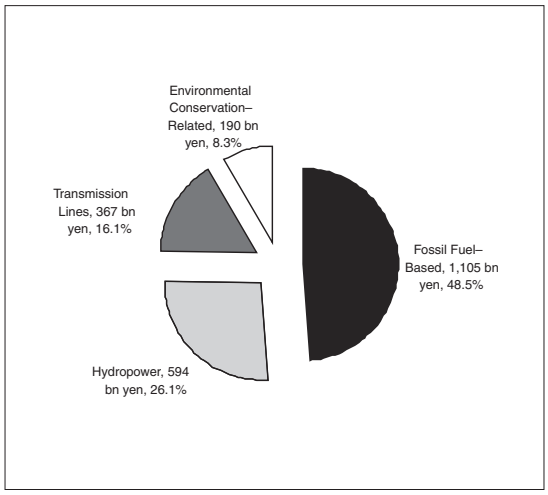

Figure 5. The Share of Each Group Among the Sum of Bilateral Energy Official Development Assistance Loans for the Past 10 Years
Note: bn = billion.

mately three quarters of all bilateral energy sector ODA loans. In contrast, environmental conservation–related projects occupy the smallest portion, at less than 10%.

Fossil Fuel–Based Projects

In the past 10 years, 1.1 trillion yen (approximately $9.7 billion) in loans was provided to support 63 fossil fuel–based projects. This expenditure represents 48.5% of total energy-related bilateral ODA loans (see Figure 5). An examination of these projects reveals that environmental considerations played little or no role in their design.

Fossil Fuel Power Generation Projects

Among fossil fuel–based projects, power generation is dominant. In the past 10 years, 860 billion yen (approximately $7.6 billion) in loans supported a total of 53 projects. This amount represents 77.8% of all fossil fuel–based ODA. China, India, Vietnam, Malaysia, and Indonesia were the five largest recipient nations; together they received about 84.3% of the financing over the past decade.

These projects can be further divided into five subgroups, according to their energy sources: coal, the combination of coal and natural gas (coal&gas), natural gas, the combination of natural gas and oil (gas&oil), and diesel, oil, or nafta (diesel/oil/nafta) (see Table 1). Figure 6 shows that expenditures for coal represent about one half of all fossil fuel–based projects. Between fiscal years 1993 and 2002, 32 coal projects were approved, totaling 543.1 billion yen (approximately $4.8 billion) in loans. This cost is equivalent to 63.1% of total loans for fossil fuel power generating projects and 49.1% of all fossil fuel–based projects. Gas&oil projects account for the second largest share, or 14.5%, of fossil fuel–based projects. Eight projects utilized gas and oil combined cycle technologies. For this category, 159.8 billion yen (ap-

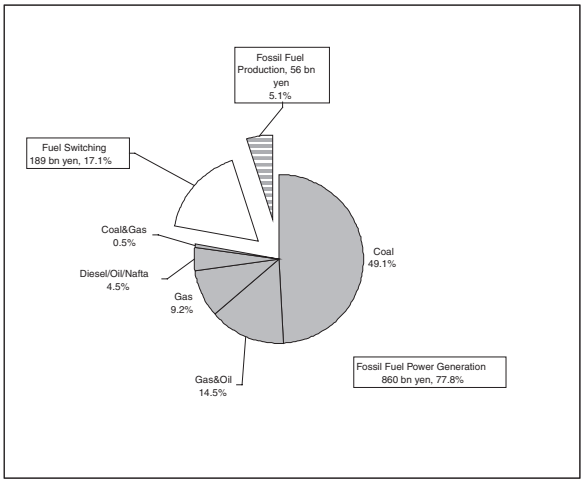

Figure 6. Share of Loans for Each Sector Among All Fossil Fuel Power Generation Projects
Note: bn = billion.

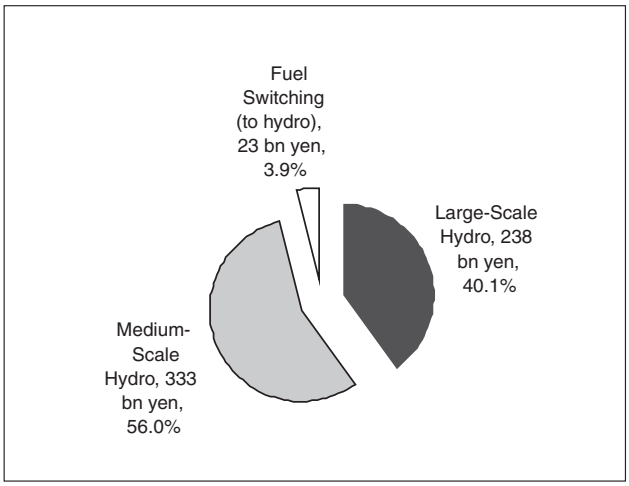

Figure 7. Type and Share of Funding Among Hydropower Projects
Note: bn = billion.

proximately $1.4 billion) in loans was financed. The third largest component was for natural gas technology, with an allocation of 101.4 billion yen (approximately $0.89 billion). The remaining 5.0% went to diesel/oil/nafta and coal&gas projects. The former consists of five projects in Jordan, Kenya, Sri Lanka, and Peru, whereas the latter consists of one project: construction of the Sylhet combined cycle power plant in Bangladesh (financed in fiscal year 1993).

Fuel-Switching Projects

Fuel-switching projects were the second most frequent among fossil fuel–based lending. A total of seven projects were approved by the JBIC and received 188.7 billion yen (approximately $1.7 billion) in loan support. The funds here supported switching fuels in three regions: the Severnaya gas combined cycle power plant project in Azerbaijan (switching to natural gas), the Port Dickson (Tuanku Jaafar) power station rehabilitation project in Malaysia (switching to coal & gas), and three environmental improvement projects in Beijing, Henan, and Anhui in China (switching to natural gas).

Fossil Fuel Production Projects

Among fossil fuel–based projects, production has claimed a smaller component, accounting for only 5.1% among fossil fuel–based ODA spending. These included three projects in China, Bangladesh, and India, which aimed to increase natural gas production. Financing of 56.2 billion yen (approximately $0.49 billion) was provided since fiscal year 1993.

Hydropower Projects

Hydropower projects represented the second-largest component of Japan's bilateral ODA financing in the energy sector. In the past 10 years, 42 hydropower projects received 594.3 billion yen (approximately $5.2 billion). These consisted of three subgroups—large (500 megawatts [MW] or greater), medium (between 10 and 500 MW), and fuel switching (to hydropower) projects (see Figure 7).

Large-Scale Hydropower Projects

In the past decade, large-scale hydropower projects received 238.0 billion yen (approximately $2.1 billion) in loans to support 13 projects. China, Iran, India, Pakistan, Thailand, and Indonesia are the recipient nations, with China, Iran, and India receiving 33.5%, 24.2%, and 19.4%, respectively. The latest of these projects occurred in fiscal year 2000 when the JBIC approved the Zipingpu multipurpose dam (760 MW) and the Shandong Tai'an pumped storage power station (1,000 MW) in China and the Masjid-e-Soleiman hydroelectric power (2,000 MW) in Iran.

Medium-Scale Hydropower Projects

In the hydropower sector, medium-scale projects have dominated. Twenty-eight projects were approved

by the JBIC between fiscal years 1993 and 2002 with 333.0 billion yen (approximately $2.9 billion) in loans. Support was distributed to 11 countries, including Vietnam (67.1 billion yen), Sri Lanka (54.5 billion yen), Indonesia (50.5 billion yen), Peru (33.0 billion yen), India (33.7 billion yen), China (33.4 billion yen), Malaysia (17.0 billion yen), Nepal (16.9 billion yen), Costa Rica (16.7 billion yen), Kenya (6.9 billion yen), and Laos (3.9 billion yen). Vietnam—the largest recipient nation—received 20.2% of all Japan's financing in this category, mainly to build the Ham Thuan-Da Mi hydropower dam (472 MW) and the Dai Ninh hydropower (300 MW) dam.

Fuel-Switching Projects

Between fiscal years 1993 and 2002, only one fuel-switching project was supported—China's Shanxi Xilongchi pumped storage power station (1,200 MW). This project accounted for only 3.9% of total loans for hydropower (see Figure 7). For this project, the JBIC provided a loan of 23.2 billion yen (approximately $204.1 million).

Transmission Line Projects

Transmission line systems have received a modest level of financing from Japan's ODA compared to fossil fuel–based and hydropower projects in the past decade. Between fiscal years 1993 and 2002, a total of 367.3 billion yen (approximately $3.2 billion, or 16.1% of total bilateral loans for energy ODA) was organized to finance 44 projects. Among 15 loan-recipient countries, Thailand received the largest loan at 96.4 billion yen (approximately $0.85 billion), accounting for 26.2% of total expenditures assigned for transmission line financing. India and the Philippines were the other major recipient nations; more than half (53.7%) the total loans allocated for transmission line projects were provided to these 3 countries.

Environmental Conservation–Related Projects

Environmental conservation–related projects have accounted for the smallest portion, about 8.3%, of total energy-related bilateral ODA financing by Japan in the past 10 years. There have been only 24 such projects approved since fiscal year 1993, and no financing for environmental conservation projects was approved in fiscal year 1999. In comparison with the 149 conventional fuel-supply projects supported with Japan's ODA (63 fossil fuel–based, 42 hydropower, and 44 transmission line projects), it is clear that less attention has been directed to environmental conservation–related projects. These projects consist of power efficiency, renewables, and mixed (renewables and fossil fuels) projects.

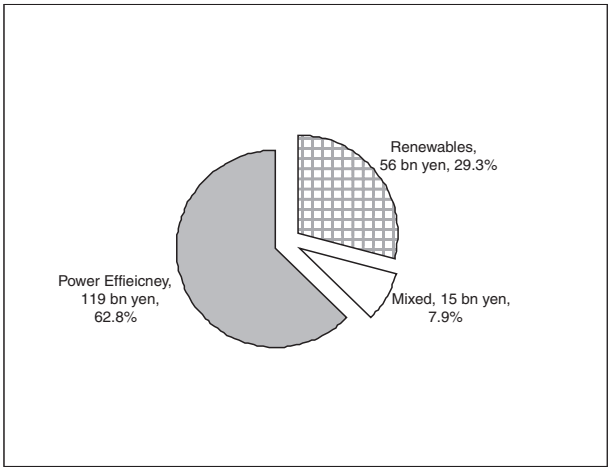

Figure 8. Type and Share of Funding for Environmental Conservation–Related Projects
Note: bn = billion.

Power Efficiency Projects

Among environmental conservation–related projects, power efficiency has been the dominant component (62.8%; see Figure 8). A total of 119.1 billion yen (approximately $1.0 billion) was financed to support 18 power efficiency projects. Projects included in this category are those to rehabilitate existing power plants or transmission systems. As these deal with conventional energy-related infrastructure, they may also be categorized as fossil fuel–based, hydropower, or transmission line projects.

Topping the list of recipients are Uzbekistan (20.9%), Bangladesh (14.0%), China (11.5%), and the Philippines (11.5%). Uzbekistan became the largest recipient nation in fiscal year 2002 when the JBIC approved 25.0 billion (approximately $220 million) in loans for the Tashkent thermal power plant modernization project.

Renewables Projects

The number of renewables projects has been very small relative to power efficiency. Only six projects with a total of 55.6 billion yen (approximately $0.49 billion) financing were approved in the past decade. In

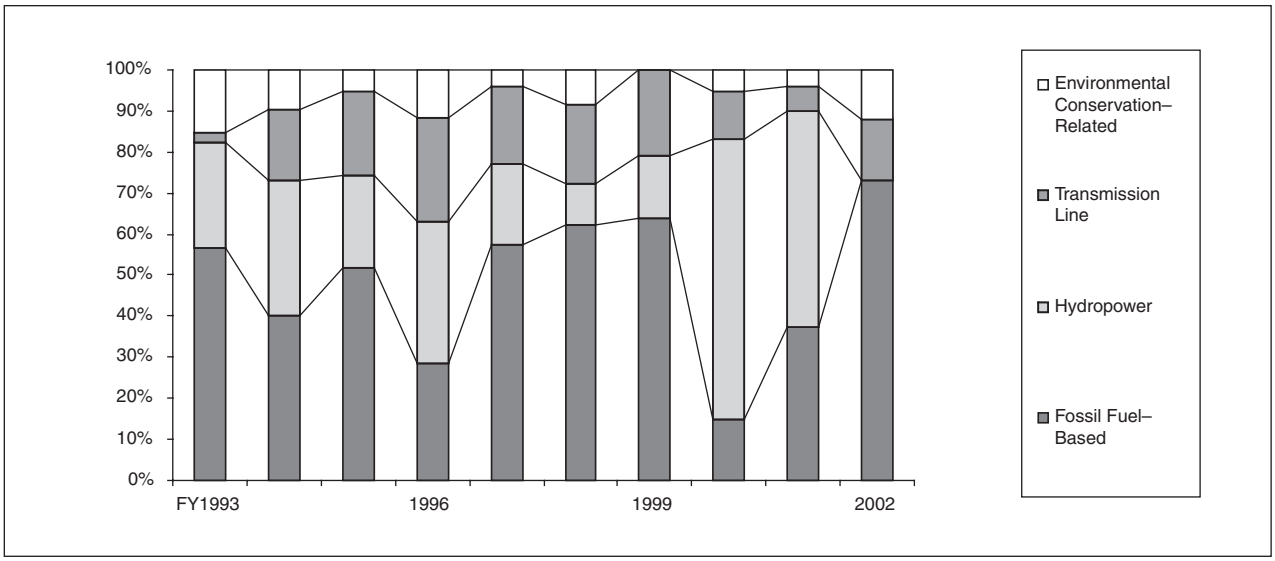

Figure 9. Trends in the Share of Bilateral Energy Official Development Assistance Loans by Type of Loan

addition, project provision has been concentrated in three countries: the Philippines, Indonesia, and Brazil. There have been three renewables projects (two geothermal and one wind) in the Philippines, two small hydro projects in Indonesia, and one wind project in Brazil. No solar electric project was found in this period, despite Japan being a leading promoter of this technology. The total loan amount for renewables projects for the past 10 years accounted for 29.3% among total environmental conservation–related loans, but only 2.4% of total energy-related bilateral ODA financing.

Mixed Projects

The JBIC provided 15.1 billion yen (approximately $0.13 billion) during the past 10 years to support rural electrification projects in Indonesia, mainly to build a 45 MW diesel plant and a 0.2 MW small hydropower plant.

Trends in Lending

Figure 9 plots the share of each type of ODA loan—fossil fuel–based, hydropower, transmission line, and environmental conservation–related projects for the 1993-2002 period. As shown in this figure, the largest loans have been assigned to fossil fuel–based or larger hydropower projects. Environmental conservation–related projects have always claimed the smallest portion.

Fossil fuel–based projects accounted for the largest share of lending, except for 2000-2001, when hydropower projects dominated. Not only the proportion but also the actual loan value for projects in this category increased.

Figure 10 compares Japan's ODA funding for conventional energy and environmental conservation–related projects. Again, the dominance of conventional energy projects each year is evident. Equally important, the ratio between conventional energy and environmental conservation–related projects has not improved with time. In fiscal year 1993, the ratio was about 5 to 1; in fiscal year 2002, the ratio was 7 to 1.

Arguably, Figure 10 overstates investments in environmental conservation–related projects because power efficiency projects are included in the category. If power efficiency projects moved to conventional energy projects, one sees more polarized results—investment in environmental conservation–related projects is absent in 5 of the 10 years studied. Figure 11 provides this comparison. No environmental conservation–related projects are found in fiscal years 1995, 1998, 1999, 2000, and 2002. Even in fiscal year 2001, the last year when renewables and/or mixed projects were approved, the ratio of conventional projects to environmental conservation–related projects (23 to 1) was worse than in the preceding fiscal years 1993 (11 to 1) and 1996 (12 to 1). In short, attention to environmentally friendly energy projects has undoubtedly decreased the past 10 years.

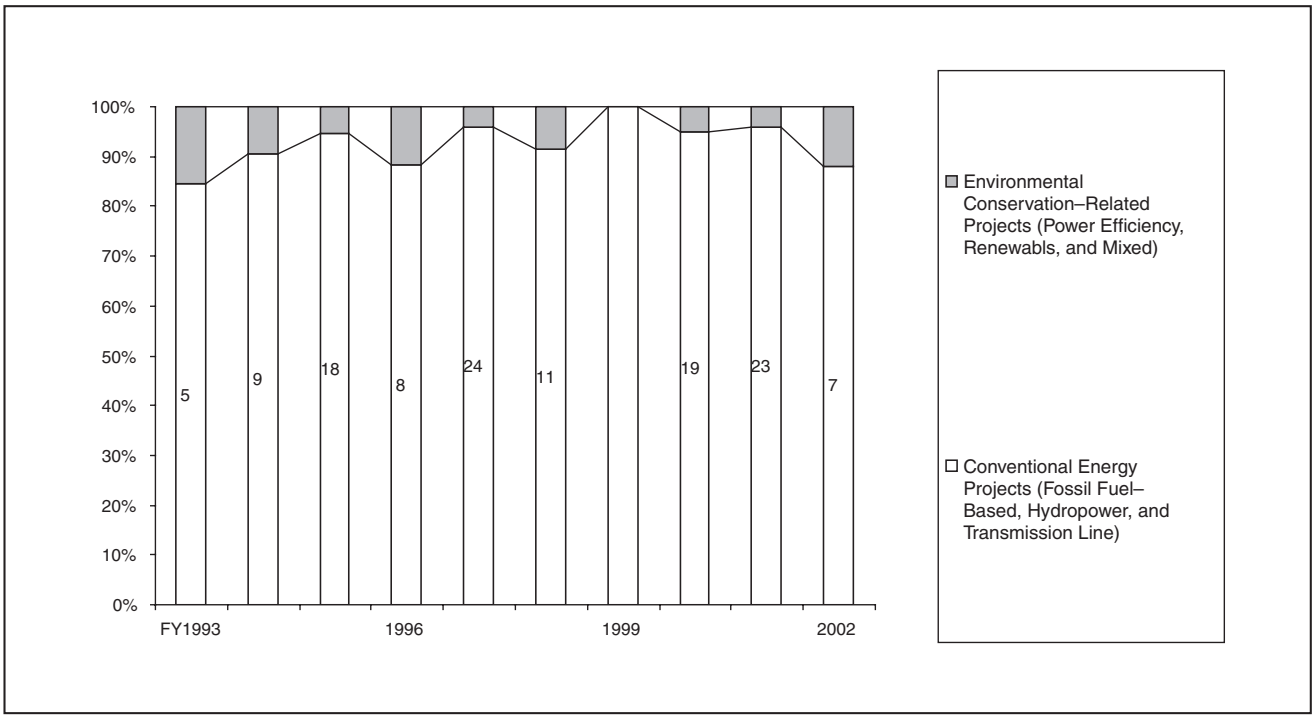

Figure 10. Comparison of Official Development Assistance Funding for Conventional Energy Projects and Environmental Conservation-Related Projects

Note: The number inside each column shows the ratio of conventional energy to environmental conservation–related projects.

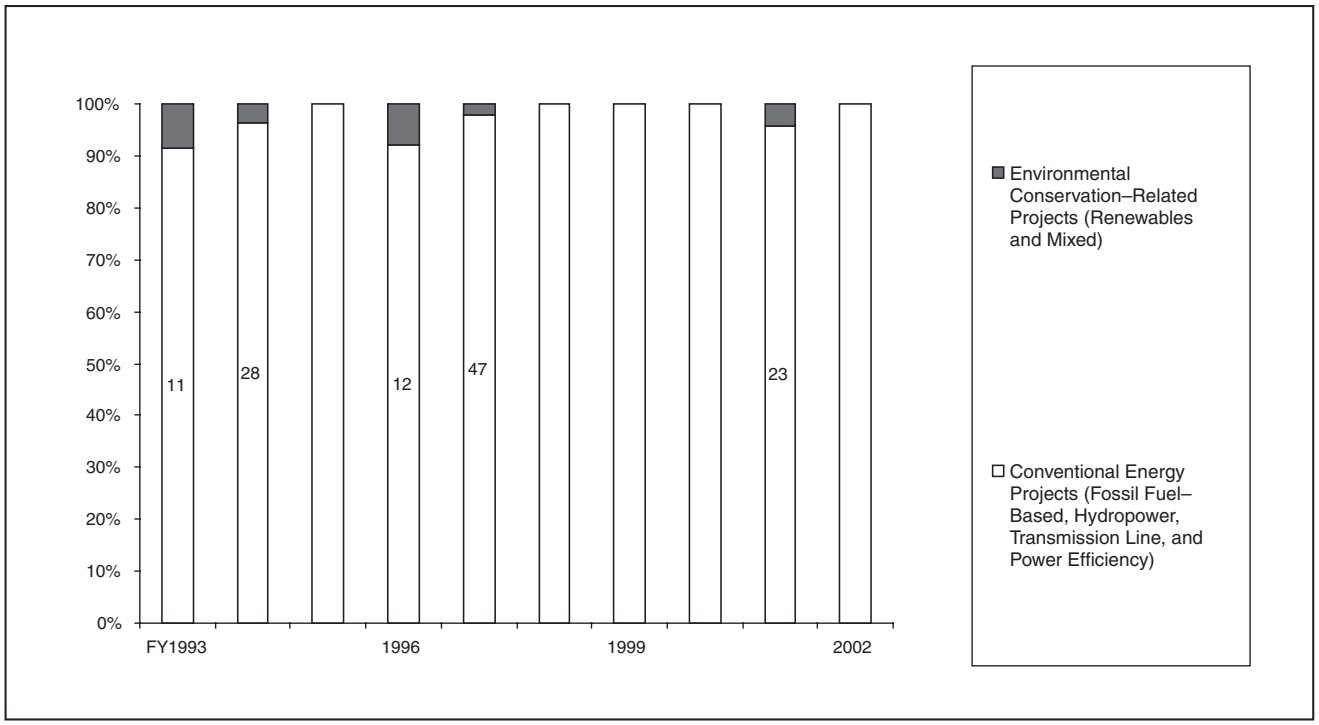

Figure 11. Comparison of Official Development Assistance Funding for Conventional Energy Projects and Environmental Conservation-Related Projects When Power Efficiency Is Included in the Former

Note: The number inside each column shows the ratio of conventional energy to environmental conservation–related projects.

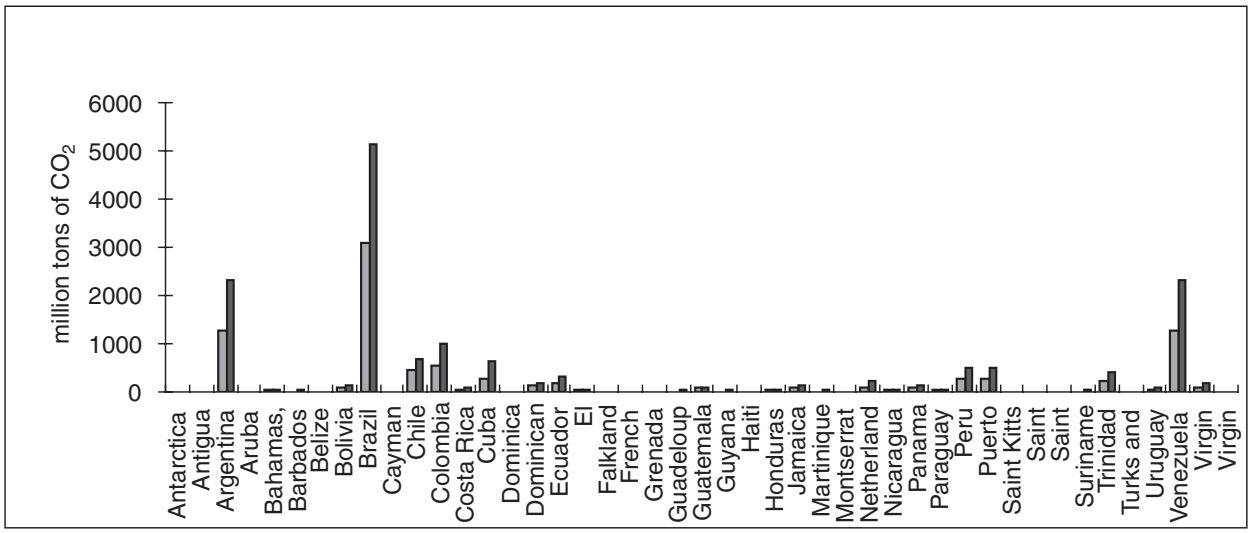

Figure 12. Sum of (CO_2) Amounts Emitted From Countries in Central and South America During 1992-2001 (left) and 1982-2001 (right)

Source: Energy Information Administration, 18, 2005.

Summing up, an analysis of Japan's bilateral ODA financing for the energy sector from 1993 to 2002 finds that the majority of loans have supported conventional energy projects, especially those based on fossil fuels and larger scale hydropower. In contrast, environmentally friendly projects have been generally neglected. Over the past 10 years, the actual value of environmental conservation–related projects declined, as did the ratio of environmental conservation–related to conventional energy projects.

In this respect, Japan's energy-related ODA has changed little despite pledges since the late 1980s to increase environmentally friendly projects. Although Japan has proclaimed an interest in protecting the environment in developing countries, the ODA strategy still actively facilitates fossil fuel–based and larger scale hydropower projects, which have little capacity to enhance environmental conditions in aid-recipient nations.

(CO_2) Emissions From Japan's ODA Loan Projects in the Energy Sector

The dominance of fossil fuel–based projects has led to significant CO_2 emissions from partner nations. Over the lifetime of operations, an estimated 2,204 million tons of CO_2[3] will be emitted from energy projects partially or wholly financed by the JBIC between fiscal years 1993 and 2002 (see appendix for details). This sum is more than the total CO_2 emissions for 10 years from 1992 of any country in Central and South America except for Brazil. In Africa, only South Africa has emitted more. Similarly, over a 20-year span, only three countries (Brazil, Argentina, and Venezuela) in South America and only one country (South Africa) in Africa have larger emission amounts than 2,204 million tons of CO_2 (see Figures 12 and 13).

Most CO_2 emissions from ODA energy projects will come from Asian countries. Through their lifetimes, projects in Asian countries are expected to release an estimated 2.1 billion tons of CO_2, accounting for 93% of the total CO_2 emissions from all Japan's ODA energy projects. This amount is equivalent to the sum of emissions from 1999 to 2001 by Japan (Energy Information Administration, 2005).

Most of the CO_2 emissions are from coal-based power generation projects (see Figure 14). An estimated 2.1 billion tons of CO_2—95% of the total CO_2 amount from ODA energy projects—will be released due to construction of new coal thermal power plants.

Conclusion

Japanese foreign aid policy has not fulfilled its promise to promote environmentally sustainable development. Despite repeated statements since the mid-1990s of the necessity of achieving environmental

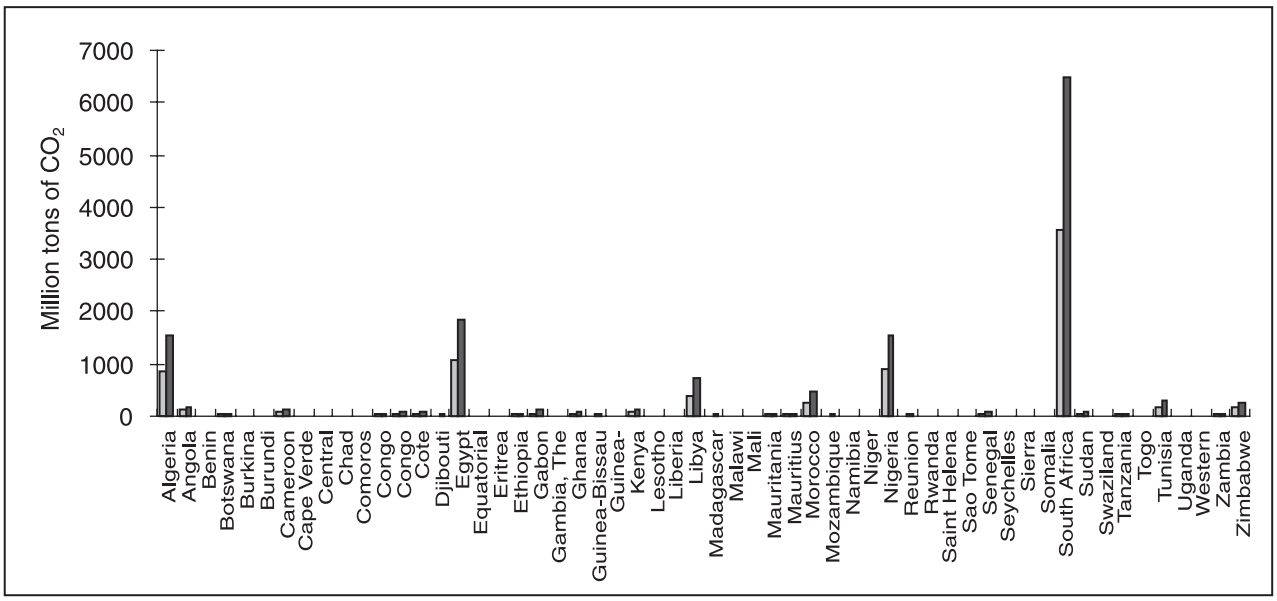

Figure 13. Sum of (CO_2) Amounts Emitted From Africa During 1992-2001 (left) and 1982-2001 (right)
Source: Energy Information Administration 2005.

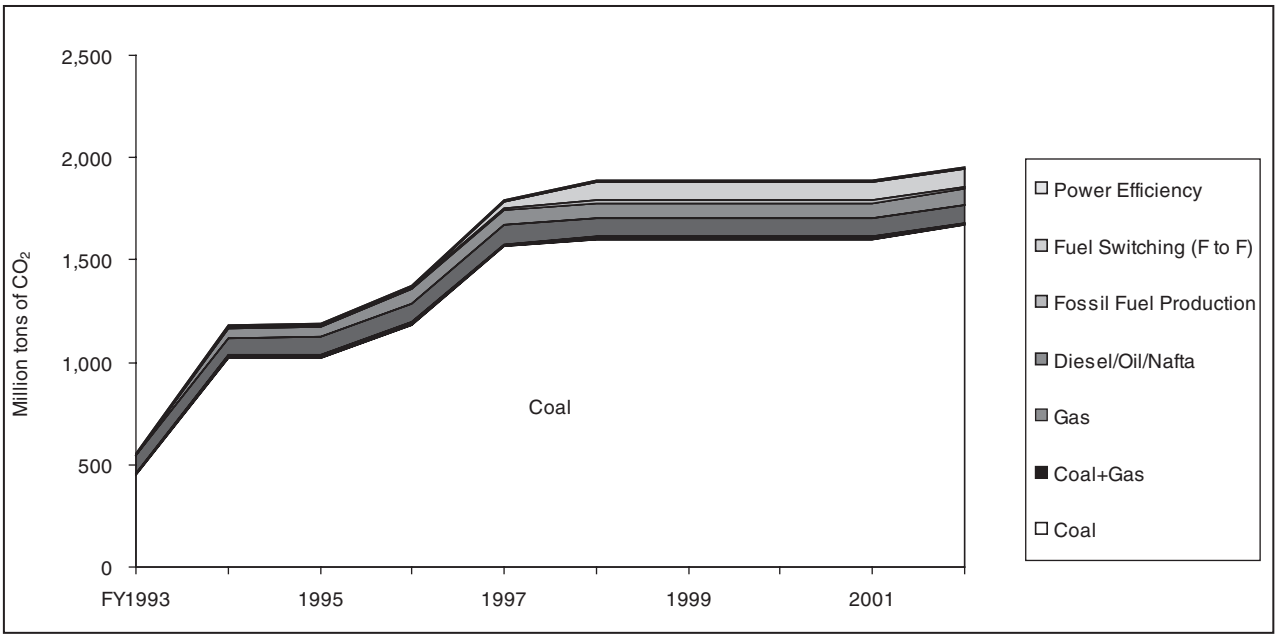

Figure 14. Cumulative (CO_2) Emissions Since Fiscal Year 1993
Note: FY = fiscal year F = fossil fuel-based

sustainability in developing countries, there is little evidence that this goal for Japan's ODA has been accomplished.

This article finds problematic trends in the funding of fossil fuel–based and larger hydropower projects, which have showed no decline over the past decade.

One of the direct consequences is substantial greenhouse gas emissions from recipient nations of Japan's aid. In particular, Japan's ODA contribution to CO_2 emissions in Asia is likely to be significant.

This analysis throws into doubt the validity of Japan's promise to realize environmental sustainability in developing countries by means of its ODA energy program. To seriously address global environmental problems with ODA, Japan needs to establish a more effective project selection and design process and to monitor carefully its performance. Specifically, Japan needs to make a strategic shift from financing environmentally problematic fossil fuel–based and larger hydropower projects to support of energy efficiency and renewables-based options. Otherwise, Japan's ODA will fail to contribute to sustainable development in developing countries.

In assessing Japan's global environmentalism in the mid-1990s, Potter (1994) criticized Japan's ODA policy, indicating that "the perception of the importance of environmental issues has led to Japanese initiatives which affect the aid program, but the basic nature of the aid program remains" (Potter, 1994, p. 208). Unfortunately, this statement remains valid almost a decade later.

Appendix
Details of Total (CO_2) Emissions From Bilateral Official Development Assistance (ODA) Energy Projects Financed by JBIC During Fiscal Year 1993-2002 (unit = million tons of CO_2)

Bilateral Energy-ODA Loan Projects													
Conventional Energy Projects									Environmental Conservation–Related Projects				
Fossil Fuel Power Generation									Renewables				
Coal	Coal+Gas	Gas	Gas+Oil	Diesel/Oil/Nafta	Fossil Fuel Production	Fuel Switching	Hydropower	Transmission	Small Hydro	Wind+Geothermal	Mixed	Power Efficiency	Total
1,669	11	91	247	76	10	92	NA	NA	NA	NA	8	NA	2,204

Note: NA = not applicable.

Notes

1. Official development assistance (ODA) is defined as the flow of funds to developing countries and multilateral institutions from government institutions, including national and local governments or their executing agencies, meeting the following two criteria: (a) ODA is to be provided for economic development and promotion of welfare as the main objectives; (b) concessional financial terms with a grant element of at least 25%.

2. Exchange rates used in this article are as follows:

Fiscal year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	1993-2002
Yen/$	111	102	94	109	121	131	114	108	122	125	114

Source: Organization for Economic Cooperation and Development, 2005.

3. Carbon dioxide emission amounts are calculated based on the conversion rate provided by Sustainable Energy and Economy Network (www.seen.org). In terms of combined coal and gas projects, a conversion rate was obtained from the following procedure: [the coal conversion rate + the gas conversion rate] × 1/2. The same technique was used for combined gas and oil projects.

References

Castellano, M. (2000). Japan's foreign aid program in the new millennium: Rethinking "development" (No. 6A). Japan Economic Institute. Retrieved May 18, 2005, from http://www.jei.org/Archive/JEIR00/0006f.html

Energy Information Administration. (2005). [Statistical data]. Retrieved May 18, 2005, from http://www.eia.doe.gov

Japan Bank for International Cooperation. (2002). *Japan Bank for International Cooperation annual report*. Tokyo: Author.

Ministry of Finance. (2001). Economic cooperation (chapter 6). *The Japanese budget in brief 2001*. Retrieved May 18, 2005, from http://www.mof.go.jp/english/budget/brief/2001/brief13.htm

Ministry of Foreign Affairs. (1996). *Japanese economic cooperation in the environmental sector.* Retrieved May 18, 2005, from http://www.mofa.go.jp/policy/economy/summit/1996/evn_sect.html

Ministry of Foreign Affairs. (1998). Efforts in environmental conservation (sec. 8). *Japan's official development assistance summary 1998.* Retrieved May 18, 2005, from http://www.mofa.go.jp/policy/oda/summary/1998/8.html

Ministry of Foreign Affairs. (1999a). Japan's medium-term policy on official development assistance (reference 2). *Japan's official development assistance: Annual report 1999*. Retrieved May 18, 2005, from http://www.mofa.go.jp/policy/oda/summary/1999/ref2_01.html

Ministry of Foreign Affairs. (1999b). Japan's official development assistance charter (reference 1). *Japan's official development assistance: Annual report 1999*. Retrieved May 18, 2005, from http://www.mofa.go.jp/policy/oda/summary/1999/ref1.html

Ministry of Foreign Affairs. (1999c). Priority issues and sectors (sec. II). *Japan's medium-term policy on official development assistance (ODA)*. Retrieved May 18, 2005, from http://www.mofa.go.jp/policy/oda/mid-term/1999/priority_4.html

Ministry of Foreign Affairs. (2002). *Japan's official development assistance: Annual report 2002*. Tokyo: Author.

Organization for Economic Cooperation and Development. (2005). [Statistical data]. Retrieved May 18, 2005, from http://www.oecd.org/dataoecd/43/46/1894369.xls

Organization for Economic Cooperation and Development. (n.d.). [Statistical data]. Retrieved May 18, 2005, from http://www1.oecd.org/scripts/cde/queryScreen.asp?DSET=dac5_agr&SETNAME=Official+Commitments+%28or+Disbursements%29+by+Sector++%28Table+5%29+%28Bilateral+%26+Regional+Banks%29&DBASE=cde_dac&EMAIL=&DBNAME=Development+Assistance+Committee

Peng, Y. (1993). The earth summit and Japan's initiative in environmental diplomacy. *Futures*, *25*(4), 379-391.

Potter, D. (1994). Assessing Japan's environmental aid policy. *Pacific Affairs*, *67*(2), 200-215.

Yamaguchi, H. (2003). Whose sustainable development? An analysis of Japanese foreign aid policy and funding for energy sector projects. *Bulletin of Science, Technology & Society*, *23*, 302-310.

Yamamoto, W. (1994). *Japanese official development assistance and industrial environmental management in Asia*. Retrieved May 18, 2005, from http://www.nautilus.org/archives/papers/enviro/trade/odaasia.html