

Simplified Ex-Post Evaluation for Technical Cooperation Project

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Project Name	The Technology Center of Environmental Protection and Energy Saving of Metallurgical Combustion	January 2010 – December 2010

I Project Outline

Country Name	People's Republic of China			
Project Period	September 2002-August 2007			
Executing Agency	Central Iron & Steel Research Institute			
Cooperation Agency in Japan	The Japan Iron and Steel Federation			
Total Cost	844 million yen			
Related Projects (if any)	N.A			
Overall Goal	Technology for energy conservation and environmental protection in metallurgical combustion processing are widely accepted by the iron and steel industry in China.			
Project Objective(s)	Enabling the Energy Saving and Environmental Protection Center for Metallurgical Combustion (the Center) to teach technologies related to energy conservation in metallurgical combustion processing at ironworks in China.			
Output[s]	(0) Project becomes operational. 1. Equipment is furnished. 2. Capability to improve combustion technology is increased. 3. Exhaust gas treatment technology is mastered. 4. Factory audit technology for combustion and the environment are mastered. 5. Activities for dissemination of environmental protection and energy conservation technology in metallurgical combustion can be carried out.			
	Inputs (Japanese Side)		Inputs (Chinese Side)	
Experts	5 for long term, 27 for short term		Staff allocated	28
Equipments	194 million yen		Equipments	
Local Cost	123.4 million yen		Local Cost	22.07 million Chinese yuan
Trainees Received	50		Land etc provided	Management office; laboratory
Others			Others	

II Result of the Evaluation

Summary of the evaluation
<p>The relevance of this project is high. Also, in terms of effectiveness and impacts of this project, the objectives and outputs were essentially realized as planned. Although data related to the overall goal are not available, there are some indications of spillover effects of this project and therefore, it could be concluded that the anticipated effects of this project have been basically achieved. Regarding efficiency, in spite of the delay of equipment installation, which was caused by some incidents such as the outbreak of severe acute respiratory syndrome (SARS), these events did not hinder the project from achieving its accomplishment within the planned period. On the other hand, however, the project cost was considered not to be used efficiently. Even though there is some uncertainty regarding the financial aspect of the project, considering the other various factors taken together, it could be said the sustainability of the project effect is high.</p> <p>In light of the above, this project is evaluated to be highly satisfactory.</p> <p><Constraints of this evaluation study> The indicators set for the Overall goal of this project were reported to be achievable without intervention of this project. Therefore, there is a possibility that the indicators were inappropriate to be used to evaluate effectiveness and impact of this project.</p>

1 Relevance

(1) Relevance with the Development Plan of China

Rapid economic growth in China is increasingly aggravating air pollution in urban areas. As such, the Chinese government established the objective of saving energy equivalent to 400 million tons of standard coal* in total in the National Tenth Five-Year Plan (2001-2005). Achievement of this objective required improvement in thermal efficiency of industrial furnaces (30% energy saving) to improve air quality. Under these circumstances, the Technology Center of Environmental Protection and Energy Saving of Metallurgical Combustion was established within the organization of Central Iron and Steel Research Institute as a laboratory dedicated to development of environmental protection technologies required in the iron and steel industry, such as improved energy utilization efficiency and flue gas treatment. The subsequent National Eleventh Five-Year Plan (2006-2010) continued to emphasize the environmental protection policy and one of its priority objectives was intended to realize a recycling-oriented economy through environmental protection and energy saving during the period of this five-year plan. Other objectives include decrease of energy consumption rate per unit GDP by 20% (to be achieved by the end of the plan), and reduction of total emission of pollutants by 10%. The Iron and Steel Industry Development Policy framed by the National Development and Reform Commission (NDRC) of China in 2005 addresses the subject that companies in the iron and steel sector should make efforts towards self-active technological reform, optimal selection and replacement of outdated techniques and equipment, intensification of environmental conservation and promotion of efficient use of resources. Furthermore, the "Government Action Plan 2007" announced by Wen Jiabao (Premier of the State Council of the People's Republic of China) emphasizes efforts for energy saving, reduced consumption of raw materials, and environmental protection, and proclaims that the government will take a firm stand in exercising control of these issues, including issuance of business suspension or closing orders for companies with low production efficiency. As above, therefore, this project was relevant to China's development policy all the while during the implementation period.

*) Standard coal equivalent ton (in China): Energy quantity is calculated in terms of coal.

(2) Relevance with the Development Needs of China

Urban air pollution in China is a matter of grave concern. According to the air pollution monitoring and assessment research conducted by the World Health Organization (WHO) covering 54 countries throughout the world, 7 cities out of the 10 worst air-polluted cities in the world were in China (1998). In keeping with the nation's rapid economic growth, the iron and steel industry maintained high growth, and the industry's flue gas emissions accounted for 15% of the whole industrial sector, whilst its emissions of sulfur dioxide (SO₂), which is one of the major air pollutants, accounted for about 7% of the whole industrial sector. Furthermore, as compared with other industrial sectors, the desulfurizing percentage of the iron and steel industry was low (16%) and the industry also fell behind in SO₂ control. In addition, while its energy consumption accounted for 10.6% of the whole industrial sector, its energy efficiency was very low (30%), and thus it was said that China's iron and steel industry was 20 years behind counterparts in developed countries. As mentioned above, China's iron and steel industry was in need of achieving technical development for environmental protection, and requisite human resources development for achieving that end. Further, it was necessary to act on internal dissemination of localized technologies as quickly as possible. Therefore, the project was relevant to the development needs of China.

In 2009, China produced approximately 570 million tons of crude steel, which accounted for 46.6% of total global steel output in that year. Today many steelmakers in China are furnished with state-of-the-art equipment and facilities to comply with the legal requirements set in the specifications for installing equipment for environmental protection. Nevertheless, energy consumption per ton of crude steel production in China is still about 30% higher than that of Japan's steel industry. Therefore, it can be said that there is much need for the project even at the time of this ex-post evaluation.

(3) Relevance with Japan's ODA Policy

Of the environmental protection issues required for the iron and steel industry, this project focuses on global warming gas (greenhouse gas) emission reductions agreed upon by the signatories to the Kyoto Protocol and on reductions of SO_x emissions that physically affect Japan through acid rain, etc. The Japanese government's Economic Cooperation Program for China also focuses on the cooperation in resolving the global issues including environmental issue in particular. This project comes under the aforementioned focus issue. Therefore, the project was relevant to the Japanese government's ODA policy in view of the fact that Japan can contribute by using its state of the art technology in the field of the environmental protection and energy saving of metallurgical combustion.

This project has been highly relevant to China's development plan, development needs, as well as Japan's ODA policy; therefore, its relevance is high.

2 Effectiveness / Impact

(1) Achievement of Project Outputs and Objective(s)

The results of each indicator which was set for each achievement (output) in PDM of this project are as follows.

The verifiable indicator for Output 1: "the entire equipment is perfectly furnished by December 2003 as planned and becomes operational," it has been achieved as initially planned, except for delays in the installation of some equipment (8-month delay for multifunction combustion experimental oven, 2-month delay for ABB automatic gas analyzer, etc.) partly because of the belated procurement and partly due to the prevalence of the severe acute respiratory syndrome (SARS)(terminal evaluation report). The achievement level is judged to be medium.

The indicator 2-1 for Output 2: "At least 90% of the Chinese-side staff will understand/master new knowledge and technical skills of combustion improvement technology in comparison with those they had before the implementation of the project," has been achieved (the achievement level: 100%)(terminal evaluation report). The indicator 2-2 for Output 2: "At least 90% of the Chinese-side staff will perform operations using the new knowledge and technical skills they mastered under the project," it has been achieved as they can operate the newly installed multifunction combustion experimental oven and carry out necessary experiments on their own (according to information from JICA).

The indicator for Output 3: "At least 90% of the Chinese-side staff will understand/master flue gas treatment technologies in comparison with those they had before the implementation of the project," has been achieved (the achievement level: 100%)(terminal evaluation report).

The indicator 4-1 for Output 4: "At least 90% of the Chinese-side staff will understand/master factory audit technologies for combustion and the environment in comparison with those they had before the implementation of the project," has been achieved (the achievement level: 100%)(terminal evaluation report). The indicator 4-2 for Output 4: "factory audit of 6 industrial furnaces will be performed," has been achieved as the factory audit of 6 furnaces was performed and completed before the terminal evaluation (the achievement level: 100%). The indicator 5-1 for Output 5: "At least 8 seminars, factory visits, demonstrations and technical presentations will be held for steelmaking engineers," has been achieved perfectly as more than 30 sessions of symposiums, lectures, presentations, technical guidance, etc. were given (terminal evaluation report). The indicator 5-2 for Output 5: "positive opinions and comments (such as "I've learned new lessons, thank you") are received from at least 75% of the participants in the seminars, etc.," it can be judged to have been achieved since it has a favorable feedback from participants in the hearing survey (17 participants in the guidance for flue gas treatment technology and 7 participants in the guidance for slag treatment technology) (terminal evaluation report).

With respect to the verifiable indicator for project objective: "10 improvement proposals related to environmental protection in steelmaking industry are submitted to ironworks or steelmakers," it has been achieved as a total of 15 improvement proposals were prepared, submitted and approved before the terminal evaluation.

As above, the achievement level of the project outputs and project objective is very high.

(2) Achievement of Overall Goal, Intended and Unintended Impacts

With respect to the indicator for overall goal: "furnace with regenerative burner accounts for 30% of the total number of furnaces equipped at member companies of China Steel Industry Association," no numerical data was obtained from the Association at the time of terminal evaluation however the Association commented that it was certain that the intended target of 30% would be achieved by the end of the project. Nor any numerical data was given during this ex-post evaluation. On the other hand, however, it is reported that the project made ironworks/steelmakers aware of the importance of environmental protection and energy saving of metallurgical combustion, so as to lead them to take positive action on their own or to introduce effective environmental protection technologies by themselves (executing agency). Therefore, although quantitative analysis is not possible, it could be said that the effects of the project are evident to a certain extent.

This project has largely achieved its objectives; therefore, its effectiveness is high.

3 Efficiency

(1) Outputs

As mentioned in the "Effectiveness and Impacts" section, the intended outputs have been produced.

(2) Elements of Inputs

The inputs for this project are as shown in the "Project Outline". According to the initial plan, the long-term experts specializing in environmental protection technologies in the iron and steel industry were intended to arrange and supervise the project operations. However, in view of the actual workload, the operations coordinators were dispatched only after 2005. Short-term experts are being dispatched as needed basis. In addition to the delays in installation of some units of the equipment, caused by the belated procurement and the prevalence of SARS, it happened that the experimental oven had to be moved to another location because of the redevelopment of the laboratory building of the Central Iron and Steel Research Institute. This, however, did not affect achievement of the final outputs of the project because minor arrangements were enough to deal with the change.

(3) Project Cost, Period of Cooperation

Both the original plan and actual project period were 5 years. The project was accomplished as planned (100%).

Total project cost was 844 million yen; the planned amount was 550 million yen, so the project was completed at 153% of the planned amount. Although details are unclear, the discrepancy between the planned cost and the actual cost might be attributable to some additional equipment (simultaneous thermogravimetry and differential scanning calorimetry, automatic fuel gas analyzer, and non-mixture burner head) whose supply was decided after the commencement of the project, or to a partial change of inputs as described above.

Some of the inputs are not appropriate for producing outputs and achieving the project objective; therefore, efficiency of the project is fair.

(1) Related Policy towards the Project

The Flue Gas Desulfurization Project for Coal Fired Power Plants and Iron Ore Sinters (sulfur dioxide from existing power generating units is reduced by 4.9 million tons; desulfurizing equipment capacity is enhanced to 213 million kw; desulfurizing capacity is raised to 300 thousand tons) is included in the priority projects covered by China's Tenth Five-Year National Environmental Protection Program together with the priority investment areas. Although details of the National Twelfth Five-Year Plan (2011-) are unknown, according to the responses from the executing agency, the regulations for environmental protection are increasingly severe, and rigorous restrictions have been established for emissions of pollutants; strict criteria have been set not only for the total emissions but also for emission rate, its time, and its emission concentration, etc. In addition, critical emission units of equipment are under regular monitoring and surveillance. Judging from the above, it could be said that Chinese government will continue to impose restrictions on emission substances and energy-saving policy.

(2) Institutional and Operational Aspects of the Executing Agency

No detailed data were available, but according to the executing agency, currently the Technology Center of Environmental Protection and Energy Saving of Metallurgical Combustion have 7 dedicated experts. Since no particular change is observed in the organization of the Central Iron and Steel Research Institute. There seems to be no specific problem in sustaining the effects of the project.

(3) Technical Aspects of the Executing Agency

There is no particular problem in technical aspects as the executing agency is in a position to play the central role in national-level technical researches, as described in the Continuity of Effectiveness and Impacts below.

(4) Financial Aspects of the Executing Agency

No detailed data about settlement of the accounts of the project were available, but according to the executing agency, 3 million yuan was funded from the Science Research Fund of the National Development and Reform Commission (NDRC) from 2007 to 2009, whilst others say that it constantly faces a shortage of funds (500 thousand yuan/year).

(5) Continuity of Effectiveness and Impacts

According to the information from the executing agency, the center is taking an active role in carrying out R&D activities for "System Integration for High Efficiency Combustion Equipment," which is one of the major industrial issues designated by the National Development and Reform Commission (NDRC), technical exchange with ironworks/steelmakers about combustion testing, paper presentation at symposiums, promotion for construction of combustion test facilities at large steelmakers, and so on. On the other hand, implementation and PR activities for the guidance of factory audit technologies for combustion and the environment, which were expected much at the time of the terminal evaluation, have been suspended; this is because leading steelmakers have already organized their proper expert teams (according to the executing agency).

R&D activities based on the technology transfer by the project are still ongoing and show some positive results, as some of which have grown to joint research projects with external organizations. Therefore, it could be concluded that the effects of the project will be sustained.

It is expected that the impact of the project will be positively sustained in the future in spite of some unclear financial aspects of the project.

No major problems have been observed in the policy background, the structural, technical, financial aspects of the executing agency; therefore, sustainability of the project effects is high.