Report Number : ICRR0020325

## 1. Project Data

| | |
|---|---|
| **Project ID**<br>P119654 | **Project Name**<br>CN-GEF Green Freight Demonstration |
| **Country**<br>China | **Practice Area(Lead)**<br>Transport & ICT |

| L/C/TF Number(s) | Closing Date (Original) | Total Project Cost (USD) |
|---|---|---|
| TF-99076 | 15-Mar-2015 | 13,970,000.00 |
| **Bank Approval Date** | **Closing Date (Actual)** | |
| 12-Apr-2011 | 31-Dec-2015 | |

| | IBRD/IDA (USD) | Grants (USD) |
|---|---|---|
| Original Commitment | 4,200,000.00 | 4,200,000.00 |
| Revised Commitment | 3,681,061.66 | 3,681,061.66 |
| Actual | 3,681,061.66 | 3,681,061.66 |

| Prepared by | Reviewed by | ICR Review Coordinator | Group |
|---|---|---|---|
| Sama Khan | J. W. van Holst Pellekaan | Christopher David Nelson | IEGSD (Unit 4) |

## 2. Project Objectives and Components

### a. Objectives

The project development objective per both the PAD and the financing agreement was to:
**“Demonstrate the global and local environmental benefits of the application of energy efficiency vehicle technologies and operating techniques, and; (b) Support improving energy efficiency and reducing greenhouse gas emissions in the road freight transport sector in Guangdong province.”**
This PDO will be used to assess the project’s achievements

### b. Were the project objectives/key associated outcome targets revised during implementation?

No

### c. Will a split evaluation be undertaken?

No

### d. Components

The project had four components. Based on their description and appraisal costs in the PAD and ICR these components are briefly described below based on paras 1 to 14 of Annex 4 in the PAD and paras 11 to 14 in the ICR.

**Component 1: Green Freight Technology Demonstration** (appraisal cost: US$9.81 million; actual cost: US$2.27 million)

The purpose of this component was twofold i.e. to facilitate communication and cooperation among energy efficient vehicle technology suppliers, freight carriers, freight shippers and other primary stakeholders and provide project participants access to government and commercial financing through the provision of green freight technology rebates and performance based payments[1]. Activities included selection of eligible criteria (ii) supplier management through organization and implementation of trade fair (iii) selection of eligible technologies **(**iii) identification of suppliers and establishing initial contact (iv) providing incentives (v) drivers training curriculum development and implementation (v) vehicle monitoring and evaluation. During implementation, despite the promotional activities conducted, most of the transport enterprises were unsure about the project at the beginning and were reluctant to participate. Hence, the Bank and the Project Management Office decided to switch to a phased approach in which six technologies: low rolling resistance tires (LRRT); roof fairings (RF); tire pressure monitoring devices (TDMD); side skits (SS); gap fairings (GF), and driving behavior diagnose and operation monitoring system (DBDS) were tested in phase I. The Bank commissioned the Clean Air Asia to review the effectiveness and economics of green truck technologies applied in phase I and based on their recommendations, only three of the six technologies were adopted in phase II namely LRRT, RF and DBDS. In addition, light weighted semi-trailers (LWST) was also included to assess their energy efficiency impact[2]

The change in cost was due to the reduction in the demonstration technology packages implemented in phase II after a phased approach was adopted.

**Component 2: Green Freight Logistics Demonstration** (appraisal cost: US$1.90 million; actual cost: US$18.03 million)**.** The purpose of this component was to address the inefficiencies associated with "empty-miles" and lack of efficient and transparent bidding platforms for linking shippers and carriers, and minimal use of drop-and-hook[3] container techniques. Through this component, market studies for and logistics brokerage platforms and drop and hook methods were proposed i.e. to produce a detailed study of the logistics of the feasibility of introducing drop and-
hook methods on a wide scale in the Guangdong Province. In addition, through this component the project aimed to facilitate the implementation of these demonstration exercises through the provision of a financing plan for green freight technology rebates and performance based payments.

Due to the rapid development of the logistics sector in Guangdong, the planned activities were modified to suit the emerging situation and the changes were as follows.

**Change in scope of the logistics brokerage modernization and pilot implementation activity:** conducting studies to propose and design the pilot, the modified approach required proposals from more

than 10 logistical companies that had already contributed to and participated in the Ministry of Transport (MoT) logistics demonstration program to implement the logistics brokerage modernization pilot. The grant was used to upgrade the companies' logistics information platform which included online logistics transactions, logistics management (planning, dispatching and supervising) and mobile applications for truck drivers. Because of a strong enthusiasm from the trucking companies, an additional platform pilot was implemented but it was designed for individual's truck owners, the second pilot was used to assist the company to manage its drivers and fleets. The grant was used to subsidize half of the truck drivers' payment (US16 per trip) which helped attract more users.

**Change in scope of the drop-and-hook pilot:** It was not long after the project was implemented, that a nationwide drop-and-hook testing was conducted under the "China Green Freight initiative", which was announced by the Ministry of Transport. This sub-component was thus amended with the approval of the Bank to support the improvement of management and information technology among the enterprises participating in the drop-and-hook testing in the Guangdong province instead of conducting a study and a pilot to promote drop-and hook in Guangdong.

An increase in cost was due to the change in scope of the drop-and-hook pilot that resulted in a nine-fold increase in cost when the participating company decided to use imported trailers instead of domestic ones. It was mostly financed by the government. However, there is no information available as to why imported trailers were used instead of domestic ones.

**Component 3: Capacity building** (appraisal cost: US$1.65 million; actual cost: US$1.87 million) the purpose of this component was to provide technical advisory services for the preparation of green freight policy research papers, deliver trainings for government officials and enterprise managers and promotion of green freight development including support to the Guangdong green freight website

**Component 4: Project implementation support** (appraisal cost: US$0.56 million; actual cost US$1.01 million) technical advisory services for project implementation, stakeholder consultations, project results evaluation and dissemination, and project managemen

**Additional activities included during implementation:**

With the announcement of the **"Belt and Road initiative"[4]** by president Xi Jingping in 2013 and the importance of Guangdong as a transport hub on the economic corridor, the PMO proposed a study on "green freight sustainable development" under the initiative and thus a set of policies and measures for sustainable green freight transport development in Guangdong Province was proposed.

[1] Per the financing agreement, "Green Freight Technology Rebate is the payment to be made brokerage industry and a complete study to the participating company to assist it in purchasing and operating in green freight technology proposed by the project implementing entity and acceptable to the world bank. Similarly, Performance Based Payments are that made to the participating company after verifiable energy efficiency improvements have been achieved by the participating vehicle, and have been verified by the project implementing entity"

[2] For more information regarding the energy efficient vehicle technologies implemented during the project see webpage https://www.epa.gov/smartway/learn-about-smartway-verified-technologies

[3] Per the Project Appraisal Document, the "Drop and Hook" is a term used in the trucking sector, referring to a type of freight operations that can drop a loaded trailer at the consignee, hook to an empty or loaded trailer and not have to wait for the first trailer to be unloaded live before leaving.

[4] "Belt and Road Initiative was introduced to connect major Eurasian economies through infrastructure, trade and investment.

### e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

**Project Costs**: The project was appraised at a total cost of US$13.97 million. Though the actual cost when the project closed was US$23.21 million. The increase in total cost was due to an increase in contribution from the government and the private enterprises
**Financing**: At appraisal, the project was to be financed by a GEF grant of US$4.2 million. Nonetheless, at the project's close, US$3.71 million had been paid I.e. at grant closing US$0.5 million (11.9 percent of the original grant) was undisbursed. According to the ICR, the majority of savings was from undisbursed incentive payments due to differences (?) in demonstration technology packages implemented.
**Borrower contribution**: At appraisal, the Government was to contribute US$2.37 million, but by the project's close the contribution was US$11.47 million.
**Dates:** The Data Sheet in the ICR records that the date for the MTR was 03/31/2013, however paragraph 25 of the ICR states that the MTR was undertaken in June 2014.
**Restructuring**: The Project was restructured twice, once in December 2014 after the MTR to (a) extend the grant closing date by nine months from March 31, 2015 to December 31, 2015 to further allow the completion of all sub projects, (b) reallocate grant proceeds among disbursement categories. This was followed by another restructuring in November 2015 to reallocate grant proceeds among categories.

## 3. Relevance of Objectives & Design

### a. Relevance of Objectives

The proposed project was in line with the Global Environment Facility (GEF) climate change focal area through which GEF supports projects that "reduce or help eliminate greenhouse gas emissions in the areas of improved energy efficiency and sustainable transport and the GEF technology transfer Fund"
The project was designed around objectives that aimed to demonstrate a strategy for improving fuel consumption in long haul trucks and improving energy efficiency thereby reducing GHGs in the road freight sector which, despite being a weakly worded objective, remained relevant and consistent with the Government's priorities set out in China's 13th Five -Year Plan (2016-2020). The plan strongly addressed the on-going challenge of natural resource depletion and environmental pollution and gave greater importance to low carbon transport. The PDO is also consistent with Bank Group's China Country Partnership Strategy for 2013-2016 under the strategic pillar of supporting greener growth.
From a regional perspective, the objective remains highly relevant primarily to the priorities of the Guangdong Province. The PAD (Annex 7, para 4) states that Guangdong has the "largest road-based freight transport sector in China" as is a significant transport hub under the "the Belt and Road Initiative".
Guangdong province has also placed great emphasis on improving energy efficiency in the transport sector in its 13th Five- Year Plan. Additionally, on a global front, the project remains highly relevant to the current global efforts made to tackle climate change under the COP21 UN Conference on Climate Change and to the Bank's continuous commitment to increasing climate financing from the current 21 percent of its portfolio to 28 percent by 2020.

### Rating
Substantial

b. **Relevance of Design**

Per the PAD, fuel efficiency of Chinese trucks was 30 percent, lower than most Organization for Economic Cooperation and Development (OECD) countries. This was because fuel efficiency technologies had not been widely adopted in China. This market failure occurred due to (i) lack of information regarding energy efficient vehicle technologies leading to a reduction of GHGs, and (ii) lack of capital funding for trucking companies to adopt such technologies. The project team developed an innovative and market based design, including a price rebate at the time of purchasing the technology, a performance based award, and a collaborative partnership with the private sector stakeholders. The project design also incorporated a strong capacity building component to facilitate the dissemination of results from on-going pilots financed by this project, help government officials and managers learn good practices from other countries and enhance capacity for policy making, investment planning and operational management.
The project development objective to demonstrate energy efficient technologies was relevant to the emerging needs of the freight transport sector in Guangdong and the demonstration nature of the project. The PDO also committed to provide support for improving energy efficiency and GHG reduction in the province and appears ambitious. It appears that the project could have benefited from limiting its objective to the demonstration of the technologies alone.
The results framework in the PAD provided an inadequate summary of the project's design, listing only the objectives, indicators and targets. It failed to illustrate the interaction between the different components of the project and how they were expected to achieve the desired outcome.

### Rating
Substantial

## 4. Achievement of Objectives (Efficacy)

### Objective 1
#### Objective
Demonstrate the global and local environmental benefits of the application of energy efficiency vehicle technologies and operating techniques

#### Rationale
a) "**Demonstrate the global and local environmental benefits of the application of energy efficiency vehicle technologies and operating techniques".**
The project sought to demonstrate these benefits through the implementation of a number of pilot activities

i.e. implementation of energy efficient vehicle technologies and logistics brokerage platforms. The global and local environmental benefits of these activities will be measured by fuel savings and a reduction in GHG emissions as demonstrated by the technologies implemented.
The following section lists the outputs from the demonstration of vehicle technologies and logistics operating techniques

**Outputs**

10 pilot trucking companies with 145 trucks demonstrated six energy efficiency technologies that were verified by the US-EPA SmartWay Program in Phase I namely low rolling resistance tires (LRRT); roof fairings (RF); tire pressure monitoring devices (TDMD); side skirts (SS); gap fairings (GF), and driving behavior diagnose and operation monitoring system (DBDS)
11 pilot trucking companies with 1200 trucks demonstrated three of the six technologies that were implemented in phase I, as part of phase II. Low Rolling Resistance Tires (LRRT), Roof Fairings (RF) and Driving behavior diagnose and operation monitoring system (DBDS) along with light weighted semi trailors were added to test its energy efficiency
Three low-carbon logistics operating techniques were piloted: two logistics information platforms including online logistics transection, logistics management (planning, dispatching and supervising), Mobile app for truck drivers were upgraded and a drop-and-hook pilot was implemented. The drop-and hook pilot was completed with 54 truck tractors and 120 semi-trailers operating on three routes. 42.36 million ton of freight turnover volume was loaded using the information platform accounting for 92.1 percent of the total turnover for the trucking companies.
Green Freight website was established and managed by the Department of Transport (DoT). The internal website served as a database for all registered trucks in the province and was used as an online-management and monitoring platform and M&E system by the project management team
Two green freight trade fairs were organized and implemented in 2011 and 2014

**Outcomes**

**Energy Efficient Vehicle technologies**

Low Rolling Resistance Tires (LRRT), Roof Fairings (RF), driving behavior diagnosis and operation monitoring system (DBDS) from phase I pilot performed the best with 3.91, 2.86 and 2.65 percent fuel savings, in terms of reduction in fuel consumption, LWST, the additional technology piloted in phase II had a fuel saving of 5.88 percent
According to the M&E report that was Phase I and II pilots achieved a total of 289,382.1 liters' fuel savings and 784.78 ton of CO2e emissions
As per the M&E report, fuel savings from green freight technologies led to a reduction in GHG (826 ton CO2 emissions during the pilot period and 8,662 ton CO2e emissions in 8 years, the average life span of a truck in China.

**Logistics information system**

Per the M&E repot use of logistics platform on average shortened the waiting period for loading by 56.8 percent from 16.3 hours previously to 7 hours, which was 56.8 percent shorter than the previous waiting time (16.3 hours
Logistic information platforms were upgraded to improve fuel efficiency through improved supply chain management and collaboration among supply chain partners. The Logistics information platform developed by in'AN Logistics
Company resulted in a 4 percent fuel efficiency gain, resulting fuel savings of 4.54 million liters and 12,100 tons of CO2 reduction during the pilot period, Logistics information platform developed by CITIC Xingtong

Logistics Company resulted in a fuel efficiency gain of 4.15 percent translating into 10.92 million liters in fuel efficiency and 29,200 tons of CO2e reduction

**Drop and hook logistics technique**

Drop and hook logistics technique was implemented to reduce empty backhaul, for increased operational efficiency of the participating trucks and reduce carbon footprint by creating a modern information system for the existing drop-and hook trucks. According to the M&E report, fuel efficiency obtained from the drop and hook pilot was between 1.1/70 - 1.242 liter/ton-100 KM for three trucking routes (Foshan-Shanghai, Foshan-Beijing and Foshan-Wuhan) compared to a baseline value between 1.233 – 1.314 L/ton-100 km achieving a 4.52 percent fuel efficiency gain. The total reduction in fuel consumption was 41, 000L and total C02e emissions reduction was 108.4 tons.

### Rating

Substantial

## Objective 2

### Objective

Support improving energy efficiency and reducing greenhouse gas emissions in the road freight transport sector in Guangdong province

### Rationale

b) "**Support improving energy efficiency and reducing greenhouse gas emissions in the road freight transport sector in Guangdong"**

Improved energy efficiency and reduced greenhouse gases were measured by the fuel economy and reduction in GHG emissions as a collective outcome of the entire project

**Outputs**

According to the ICR, all participating enterprises intended to use LRRT to replace old tires and one participant in the pilot planned to install DBDS in some 7,000 trucks, while RF was installed in almost all new trucks in Guangdong

1349 existing or newly purchased trucks installing green truck technology as opposed to 1200 as set out at appraisal, exceeding the target by 12 percent

Two research programs were conducted which resulted in three reports namely Green Freight Policy Research, Green Freight Policy Proposal, and Promotion of Sustainable Development Plan of Green Freight along with the "sustainable development research on green freight of Guangdong province as part of the "Belt and Road initiative" introduced by the Chinese government.

The financing mechanism used to upgrade pilot trucks: it was proposed and developed under a separate World Bank Analytical and Advisory Assistance project to mobilize funds from commercial financing institutions for a wider application of energy efficient technologies in the trucking sector

The project was successfully able to leverage US$8.02 million from the private sector investment (eight times the estimate at the time of appraisal) with an original target of US$ 1 million

According the ICR, trainings were conducted with 3272 drivers, 200 government officials and 2000

enterprise managers as participants to learn about new technologies and international good practices in green freight and logistics development

**Outcomes**

Per the revised values calculated in the ICR, the project achieved 3.3 percent reduction in fuel economy versus 5 percent planned at appraisal. The original values were calculated based on a weighted average of 24 percent small trucks, 45 medium larger trucks and 31 percent heavy trucks. However, the composition of participating trucks was 28 percent small trucks, 46 percent medium-large tucks and 26 percent heavy trucks. In addition, the technology combination implemented varied substantially from that planned at appraisal.

The project achieved a 4 percent reduction in operating costs versus 5.1 percent at appraisal. The originally defined operating cost of truck fleets included fuel consumption cost, administrative expenses, office expenses and personnel cost. During implementation, it was difficult for the PMO to collect data on operating costs, except fuel consumption cost since the companies did not share the other data

Total amount of C02 reduction during the demonstration period was 3.3 percent for technology demonstration and 4.1 percent for logistics demonstration.

However, it is difficult to assess the extent to which the project could contribute to improvement in energy efficiency and reduction in GHGs in the entire road freight sector in Guandong province given that the outcomes are based on the participating trucks only and not for the entire fleet of trucks in the province and only limited to the duration of the period. There is insufficient comparative data on efficiency improvements elsewhere in the region and in the data provided for both pre-project trends and in neighboring areas. This makes the outcome claims marginal at best.

**Rating**

Modest

## 5. Efficiency

**To measure this project's efficiency the PAD and the ICR adopted an incremental cost analysis was conducted both at appraisal and completion.**

**At appraisal**

An incremental cost analysis was conducted only for **component 1: Green Truck Technology Demonstration.** The assessment was conducted using a sample scenario, where US$ 1.8 Million in GEF funding was used to leverage US$ 3 Million in new investments across the eight proposed technologies of over 1800 vehicles. In addition, per the PAD "using the US EPA SmartWay verification and results from the Pilot testing in Guangzhou province, a conservative estimation of efficiency gains from these packages (along with trainings) was used in the assessment that ranged between 7-26 percent."

Taking into account the expected efficiency gains and financial incentives (rebates and performance-based payments) provided through the GEF grant the assessment in the PAD concluded that:

(a) the net project benefit from fuel savings would be about 14 million i.e. four times the total cost (including

GEF grant and financial contributions from trucking companies).
(b) the same set of packages would reduce greenhouse gas emissions by about 40,000 tons CO2 emissions (carbon equivalent).
(c) when factoring in the long-term benefits of component 2, a fleet wide 10 percent fuel efficiency was achieved over 60 percent of registered trucks in Guangdong province (PAD, para 28)
(d) a constant 2009 fleet size, annual CO2 emission reductions were expected to be about 1.2 million tons per year.
(e) with an average 8-year life span for a truck in China, the project was expected to reduce CO2 emissions by 9.6 million tons.
In conclusion, according to the PAD, if the project were to achieve a 10 percent emission reduction for 60 percent of the registered fleet, then emission reduction would be at US$3.5 per ton, which is considered a low cost for the transport sector (Annex 7, para 9)

**At completion:**

An incremental cost analysis was also conducted at completion, fuel savings were calculated for component 1 and component 2. Under component 1, the effects of fuel savings of the installed technology packages were calculated for all trucks that participated in Phase I and Phase II. Similarly, for component 2, fuel saving effects of a 50-truck sample was calculated for the logistics platforms. Additionally, for the drop- and hook pilot, transport volume, distance traveled and fuel consumption was calculated for all the three routes (Foshan-Shanghai, Foshan-Beijing and Foshan-Wuhan) They were closely monitored and fuel savings were calculated. In addition, an estimation for CO2 emission reduction was calculated with direct impacts from component 1 and 2 using the same set of assumptions as in the PAD i.e. (a) emission factor of 2.77 CO2e per liter diesel combusted (b) average life span of a truck of 8 years (c) fuel price of US$ 1.05/L, the average fuel price between 2011 and 2015.
Ultimately, the assessment concluded that the:
Short term benefits from fuel saving from component 1 and component 2 approximately totaled to US$ 61.2 Million, which was three times the total project cost at appraisal i.e. US $ 13.97 Million. (ICR, para 46)
The project compared well in comparison to the other GEF projects in China, e.g. the GEF City Cluster Eco-Transport Project, where the GEF contribution per ton of CO2 directly reduced, was US$24.5 However, more information is required to assess the relevance of this to the project (ICR, para 46)
The project resulted in a reduction of CO2 emissions by 161,430 tons. With the GEF grant of US$ 3.71 Million, the cost of GHG reduction was calculated as US$ 23 per ton which is higher than the US$ 3.5/ton calculated at appraisal. This was because the ICR calculated only the direct CO2 emission reduction from project vehicles for which data were available and excluded emission reductions from project replication effect of the project and the range of energy efficiency improvements from the application of seven technologies was 1-6 percent which was much smaller than the 7-26 percent estimated at appraisal. This was because the trucks in the pilot did not reach average speeds of 75 km/hour which was needed to achieve fuel saving potentials. This failure was attributed to speed limits on the roads, traffic congestion and road pavement conditions. (ICR, para 47)

## Efficiency Rating

Substantial

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

| | Rate Available? | Point value (%) | *Coverage/Scope (%) |
|---|---|---|---|
| Appraisal | | 0 | 0<br>☐Not Applicable |
| ICR Estimate | | 0 | 0<br>☐Not Applicable |

* Refers to percent of total project cost for which ERR/FRR was calculated.

## 6. Outcome

The relevance of both the objectives and design was substantial. The efficacy of achieving the project's objectives was substantial for objective one, but modest for objective two since the project couldn't attribute the improvement in energy efficiency and reduction in GHGs to the project. An incremental cost analysis was calculated both at appraisal and at completion and thus the efficiency of the project was rated substantial. Overall, the outcome of this project was rated moderately satisfactory.

### a. Outcome Rating

Moderately Satisfactory

## 7. Rationale for Risk to Development Outcome Rating

According to the ICR, there is no doubt that the Guangdong Government will continue to build low carbon transport systems especially in the freight sector. Guangdong has set targets for reducing energy intensity and CO2 emissions of trucks by 18 percent and 20 percent respectively, by 2020. Green truck technologies and logistics platforms have been widely endorsed by the Government as the most effective approach to tackle energy efficiency, air quality and climate change issues in the road freight sector. A concern for the project was the lack of a financing mechanism that would enable the private trucking companies to adopt energy efficient technologies after the project concludes. This has been mitigated through financing mechanism whereby the industrial Bank will mobilize funds from financial institutions for a wide application of energy efficiency technologies in the freight sector

### a. Risk to Development Outcome Rating

Negligible

## 8. Assessment of Bank Performance

### a. Quality-at-Entry

The Bank was able to mobilize a wide range of expertise from green energy organization (US EPA SmartWay Program, Clean Air Asia, Energy Foundation) during project preparation. As a result, and in collaboration with the Government, the Bank was able to facilitate the preparation of an innovative and market oriented incentive based intervention that offered concessional financing to trucking companies and created a technology dissemination platform.

The project benefitted from sound background analysis and stakeholder consultations on which the government and Bank were able to adjust the scope of the project based on the priorities of the Guangdong Province. In addition, during preparation, the Bank was able to provide training on fiduciary arrangements, financial and procurement procedures, environmental and social safeguards and technical considerations. However, there was weakness in the project design and the results framework was inadequate. The causal links between the activities and the outcomes was not clear

#### Quality-at-Entry Rating

Moderately Satisfactory

### b. Quality of supervision

Per the ICR during the four and half years of implementation, the Bank undertook 10 implementation supervision missions. The Bank actively identified and helped to resolve problems and ensure compliance with Bank policies. For example, the Bank team responded promptly to the slow momentum at the start of the project and offered appropriate remedial measures such as adopting a phased approach, providing greater rewards for and expanding outreach to encourage trucking companies to participate in the pilot which resulted in an increase in participation in the longer term.

The Mid Term Review was held on schedule. It evaluated phase I of the technology pilot and adjustments were made to phase II of the technology pilot, in which it was decided that the top performing technologies were to be implemented. Problems with the original results framework were identified at the MTR but they were not resolved which had implications for the measurement of the individual PDO indicators. The Bank's response to Government requests were timely. According to the ICR, all supervision reports were adequate in terms of the issues raised and solutions identified. Fiduciary and safeguard aspects were supervised closely. The Bank worked closely with the Guangdong province on post-completion operations and in the development of the proposed follow- on GEF activities in the province.

#### Quality of Supervision Rating

Satisfactory

#### Overall Bank Performance Rating

Moderately Satisfactory

## 9. Assessment of Borrower Performance

### a. Government Performance

According to the ICR, the Guangdong Government showed high levels of commitment to the project both during preparation and implementation. A Project Leading Group (PLG) of senior officials from various relevant government departments including Department of Transport (DoT), Development and Reform Commission (DRC), Department of Finance (DoF), Department of Public Security, Environment Protection Bureau, and the Economic and Information Commission was established during the preparation phase. This enabled a fair amount of governmental support and coordination among the line departments. In addition, not only did the Government provide the initial counterpart funding of US$2.37 million but it was also able to provide additional funds of US$9 million to fully leverage the GEF grant.

#### Government Performance Rating

Satisfactory

### b. Implementing Agency Performance

At appraisal, the Project Management Office was established under the DoT and was designated as the agency for coordination of project implementation. It was staffed with employees who had previously worked with World Bank projects. The PMO was proactive in responding to challenges as and when they arose. Project accounts were properly managed and audited and all required project reports were submitted to the Bank on time, where it was ensured that the project complied with Bank policies on procurement and safeguards.

Moreover, according to the ICR, during the MTR when problems with the original results framework became apparent, the Bank advised the PMO to propose a modified framework. However, the Bank received the request in September 2015 which was only three months prior to the closing date and thus the results framework was not amended.

#### Implementing Agency Performance Rating

Satisfactory

#### Overall Borrower Performance Rating

Satisfactory

## 10. M&E Design, Implementation, & Utilization

### a. M&E Design

According to the ICR, causal links between the PDO and the PDO level indicators were weak. For a demonstration project such as this, the focus should have been on the demonstration effect of the project rather than the fuel saving potential of each of technology and operating technique.

Because the results framework was weak the M&E framework was also weak. All three PDO indicators measured achievement in absolute values, which proved to be too rigid during implementation. The design of the results framework should have been more flexible to be able to incorporate changes that often occur during

a demonstration project. It would have been better had the project used relative values (percentages) to measure improvement in efficiency gains and fuel economy. In addition, data for one of the indicators used to measure reduction in the operation cost of truck fleets was not available since the trucking companies did not reveal their financial information. Furthermore, the baseline and target values for the indicator set to measure reduction in CO2 emission was miscalculated.

### b. M&E Implementation

A team from Guangdong University of Technology was hired as a Third Party to monitor the implementation and evaluate the effectiveness of the demonstrations of the green truck, drop-and-hook and brokerage platform. Monitoring was carried out in two stages - baseline data were collected during the preparation period and monitoring data were collected during the implementation period. Problems with the results framework appeared towards last year of the of the project of the implementation during the MTR, because the PMO found it difficult to report and evaluate results against the targets The Project Management Office found it difficult to report and evaluate results against the targets,

### c. M&E Utilization

According to the ICR, even though the M&E design was flawed, it still proved to be a useful tool for project management and decision making. For example, due to the initial low response from trucking companies to participate in the energy efficient technology demonstration, it was decided that the pilot of green freight technology was to be conducted in two phases. Clean Air Asia carried out an independent evaluation to assess the energy efficiency of the six technologies piloted in the first phase, which led to a focused design for Phase II pilot.

According to the ICR, the website that was established as part of the project was used as an on-line management and monitoring platform and M&E system by the project management team. It is still being maintained by the DoT, the internal website is used by the staff to access a database of all registered trucks in the province. The external website provides relevant industry information regarding laws and regulations etc. The DoT expressed interest in the expansion of the website to cover all green freight activities to be undertaken by the Department and set aside a separate budget for on-going maintenance and operations.

### M&E Quality Rating

Substantial

## 11. Other Issues

### a. Safeguards

Per the PAD, the project would result in various positive social impacts in the Guangdong Province. No impact on ethnic minorities was foreseen and It was expected that it would not cause the resettlement of people or the acquisition of land. The ICR confirmed that there were no negative impacts on ethnic

minorities and it did not involve involuntary resettlement of people and there was no land acquired during the project implementation.
**Environmental Safeguards:** The project was identified as a **category C**, since no negative environmental impacts were envisaged. An environmental screening was conducted which concluded that the project would bring significant positive environmental impacts, including reduction of GHGs. An Environmental Management Manual (EMM) was prepared to help the PMO manage environmental issues, take preventive and mitigation measures, monitoring measures and training required during the implementation and operation to either eliminate or minimize the negative impacts. According to the ICR, there was compliance with the EMM during project implementation

### b. Fiduciary Compliance

At project appraisal, a financial management capacity assessment of the DOT/PMO was conducted which concluded that the project's financial management arrangements would satisfy the Bank's minimum requirements under OP/BP 10.02. At the time, actions to strengthen the FM capacity were agreed with the implementation agencies.
According to the ICR, during implementation the FM system was continuously maintained by the PMO. Funding from the Guangdong Government was disbursed in a timely manner. Project accounts were audited by the Guangdong Provincial Audit Office annually as had been agreed upon during appraisal and the reports were submitted to the Bank on time, were unqualified and were acceptable to the Bank. All of the Bank's FM requirements were complied with.
The PMO was responsible for preparing the procurement plan and for procurement. The procurement capacity assessment at appraisal concluded that the PMO had adequate experience and capacity to carry out project procurement. All procurement activities were documented according to the procurement plan, which were cleared by the Bank at appraisal. The project procurement plan was updated several times based on changes in procurement requirements. procurement for activities financed by the grant were carried out in compliance with Bank procurement guidelines

### c. Unintended impacts (Positive or Negative)

The project was responsible for initiating a number of other initiatives in the sector including a similar green freight initiative in Brazil and the "China Green Freight initiative"

### d. Other

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## 12. Ratings

| Ratings | ICR | IEG | Reason for Disagreements/Comment |
|---|---|---|---|
| Outcome | Satisfactory | Moderately Satisfactory | The project couldn't attribute the improvement in energy efficiency and reduction in GHGs to the project alone. |
| Risk to Development Outcome | Negligible | Negligible | --- |
| Bank Performance | Moderately Satisfactory | Moderately Satisfactory | --- |
| Borrower Performance | Satisfactory | Satisfactory | --- |
| Quality of ICR | | Substantial | --- |

**Note**
When insufficient information is provided by the Bank for IEG to arrive at a clear rating, IEG will downgrade the relevant ratings as warranted beginning July 1, 2006.
The "Reason for Disagreement/Comments" column could cross-reference other sections of the ICR Review, as appropriate.

## 13. Lessons

The lessons proposed by the ICR are:
**Project Development Objective indicators should be clear, measurable and flexible**: the indicators should be flexible and enable the adaptation to changes in circumstances especially in demonstration projects as such. In addition, all the data necessary for measuring the indicators should be available and values properly assessed.
**Strong government leadership is important for successful implementation of projects**: The project was considered to be of high priority by the provincial government and sufficient time was spent communicating between the line departments for smooth coordination
**The design of a demonstration project should be flexible** and include a strong outreach component: It is important in the case of demonstration projects, that extensive outreach activities are embedded within the project design. In the case of this project, since the project activities were not rigidly defined at appraisal, it offered flexibility to adopt a phased approach and, add new activities to further enhance the project design.
**Careful consideration need to be given to local context** such that even though all the technologies implemented during the project were verified by the US EPA and some of them had proven to be energy efficient in the Guangzhou demonstration pilot project, some of the technologies proved to be less energy efficient in the context of the Guangdong.

## 14. Assessment Recommended?

No

## 15. Comments on Quality of ICR

The ICR was well written and complied with the OPCS guidelines. The information presented throughout the ICR was comprehensive but concise and was consistent. The shortcoming was the lack of an adequate assessment and
discussion of the project's results framework which in effect appears to be a Monitoring and Evaluation framework and does not clarify the casual links between the input, intermediate outputs and the outcomes of the project. In addition, there was a lack of rigor in separating the demonstration from the improvement in fuel efficiency.While there is a dedicated component for capacity building and training for the primary beneficiaries of the project appeared to be an important part of the project design and the achievement of the its objective, there is very little information regarding the types of trainings that were conducted. No attempt was made to understand the effectiveness of the trainings and how they were being utilized.

**a. Quality of ICR Rating**
Substantial