

1. Project Data

GEF Project ID	2257
IA/EA Project ID	2933
Focal Area	Climate Change
Project Name	Demonstration for Fuel-Cell Bus Commercialization in China (Phase II)
Country/Countries	China
Geographic Scope	National
Lead IA/Other IA for joint projects	UNDP
Executing Agencies involved	China Ministry of Science and Technology (MoST); China International Centre for Economic and Technical Exchanges (CICETE)
Involvement of NGO and CBO	Not involved
Involvement of Private Sector	Yes- Beneficiary
Operational Program or Strategic Priorities/Objectives	OP 11: Promoting Environmentally Sustainable Transport
TER Prepared by	Joshua Schneck
TER Peer Review by	Neeraj Negi
Author of TE	Marcial Ocampo & Tian Guangyu
Review Completion Date	
CEO Endorsement/Approval Date	7/7/2006
Project Implementation Start Date	11/15/2007
Expected Date of Project Completion (at start of implementation)	5/13/2011
Actual Date of Project Completion	12/31/2011
TE Completion Date	12/25/2011
IA Review Date	
TE Submission Date	11/12/2012

2. Project Financing

Financing Source	At Endorsement (millions USD)	At Completion (millions USD)
GEF Project Preparation Grant		
Co-financing for Project Preparation		
Total Project Prep Financing	0.00	0.00
GEF Financing	5.77	5.76
IA/EA own	0.20	0.19
Government	11.44	11.44
Other*	1.22	1.22
Total Project Financing	18.63	18.61
Total Financing including Prep	18.63	18.61

*Includes contributions mobilized for the project from other multilateral agencies, bilateral development, cooperation agencies, NGOs, the private sector, and beneficiaries.

3. Summary of Project Ratings

Criteria	Final PIR	IA Terminal Evaluation	IA Evaluation Office Review	GEF Evaluation Office TE Review
Project Outcomes	S	S	Not Reviewed	S
Sustainability of Outcomes	N/A	S	Not Reviewed	S
Monitoring and Evaluation	S	S	Not Reviewed	S
Quality of Implementation and Execution	N/A	S	Not Reviewed	S
Quality of the Evaluation Report	N/A	N/A	Not Reviewed	MU

4. Project Objectives

4.1. Global Environmental Objectives of the project:

As stated in the Proposal Document submitted for CEO endorsement (ProDoc), the Global Environmental Objectives of the project are "to reduce greenhouse gas emissions and air pollution through widespread commercial introduction of Fuel Cell Buses in urban areas of China."

No changes in the Global Environmental Objectives of the project were noted in the Terminal Evaluation (TE) or Project Implementation Reports (PIRs).

4.2. Development Objectives of the project:

As stated in the ProDoc, the Development Objectives of the project are "to demonstrate the operational viability of Fuel Cell Buses (FCBs) and their refueling infrastructure under Chinese conditions." The project is the second phase of a four phase program which includes: (1) preparation, (2) demonstration, (3) expanded demonstration, and (4) mass production in China of cost competitive FCBs. In this second phase project, a small fleet of FCBs and related infrastructure in Beijing and Shanghai were to be demonstrated along with activities to strengthen the FCB capability in China.

As stated in the ProDoc, the three primary expected outcomes of the project (Phase II) are:

(1) Six to nine FCBs and two hydrogen refueling stations operational in Beijing and Shanghai (including 3 FCBs procured and 1 station constructed in Phase I);

(2) Knowledge accumulated, available and accessible for advancing commercialization of FCB technology and hydrogen refueling system; and

(3) Awareness promoted among stakeholders and creation of an enabling environment for FCB expansion and the Phase III (expanded demonstration) Project in China.

No changes in the Development Objectives of the project were noted in the Terminal Evaluation (TE) or Project Implementation Reports (PIRs).

4.3. *Changes in the Global Environmental Objectives, Development Objectives, or other activities:*

Criteria	Change?	Reason for Change
Global Environmental Objectives	No	
Development Objectives	No	
Project Components	No	
Other activities	No	

5. GEF EO Assessment of Outcomes and Sustainability

5.1. *Relevance – Satisfactory*

This project seeks to advance a modal shift in the development and uptake of Fuel Cell Buses in both China and abroad, by helping to catalyze reductions in the cost of manufacturing these vehicles, improvements in the underlying technology, experience in operating and integrating these vehicles, and increased understanding of how FCB technology can contribute to mitigating climate change. Therefore it is highly relevant to Operational Program 11 of the GEF - Promoting Environmentally Sustainable Transport - as the transport sector in China and many other developing countries is responsible for an increasingly significant share of GHG emissions, as well as a source of particulate matter and other toxins. FCBs have the potential to be an integral part of sustainable public transport systems in China and elsewhere, provided the technology can be made cost-effective. This project works to advance that outcome.

In comparison with conventional diesel buses, FCBs powered by hydrogen can offer dramatic reductions in system-wide GHG emissions from the urban transport sector if the system is carefully designed (ProDoc, pg 23). However, such technology is not yet proven in real-world conditions and is currently too costly to be commercially competitive. As stated in the ProDoc, experience indicates that early investments in this technology, including the project under review, can help reduce costs and allow the technology to become commercially competitive within 7-15 years.

In addition to being consistent with GEF Operational Program strategies, the project is highly relevant to China's national priorities and strategies. Hydrogen and fuel cell technology research is a key part of the national scientific and technical development plan for 2005-2020. Country support is further demonstrated by a 2005 address by Premier Jiabao to the National People's Congress, during which he stated "New energy and renewable energy will be explored as important elements for a cyclic economy. The environmentally-friendly and energy-saving vehicles will be encouraged" (TE, pg 53).

5.2. *Effectiveness – Satisfactory*

As stated in the TE, the project was effective in achieving its expected outcomes and experienced only minor shortcomings in execution. In particular, it is the assessment of the TE that the project is expected to achieve its key development and environmental objectives,

including (1) helping catalyze cost reductions of FCBs for public transport in Chinese cities by the successful demonstration of FCBs and hydrogen refueling stations in Beijing and Shanghai; (2) enhancing scientific, technical and industrial capacity for commercializing FCB as well as the policy and planning capabilities of government institutes and public transport companies; and (3) increasing understanding of FCB technology's contribution to the mitigation of climate change among government, investors, financial institutions, media, and the public at large.

Over the course of both Phase I and II of the project, significant strides were made in bringing down the cost of FCBs through increased efficiency in energy utilization, reliability and safety. As reported in the TE, 2nd generation DaimlerChrysler buses procured in Phase I of the project were twice as expensive (5 million RMB) as 3rd generation domestically-manufactured buses procured in Phase II (2.6 million RMB). The newer buses also have more than double the life expectancy of their fuel cells, and require smaller power cells as a result of the use of regenerative braking and more efficient capacitors (TE, pg 18).

Targets for 16 activity indicators were met while those of 8 were exceeded. Targets for 6 activity indicators are expected to be realized five years after the close of the project (as anticipated in the ProDoc).

Highlights of the project, corresponding to the three primary expected outcomes identified above are:

- * 9 FCBs in operation, 3 in Beijing and 6 in Shanghai, serving nearly 150,000 passengers annually.
- * Average annual energy consumption of the FCBs beats the targeted value in both cities.
- * 3 hydrogen refueling stations installed and operational - 2 in Shanghai and 1 in Beijing.
- * A number of technical studies have been undertaken and materials made available to the public.
- * An FCB certification program was established in China by year 3 of the project.
- * A number of policy studies and promotion activities have been successfully undertaken.

As reported in the final PIR, the project has contributed to the boosting of the development of energy efficient vehicle demonstration projects in China. There are now 20 Chinese cities (inclusive of Beijing and Shanghai) that have become pilot cities for these demonstrations, supported by a national subsidy incentive of 600,000 RMB per FCB.

The only difficulty experience by the project reported in the PIRs and TE was a delay of several months in issuing permits for testing the FCBs on public streets in Shanghai. This led to a request to extend the project so that the target mileage for testing could be reached by the close of the project.

5.3. *Efficiency* – **Satisfactory**

As stated in the TE and PIRs, the project has been very successful in achieving its expected outcomes and utilizing the given resources for the project. The project met every one of its activity indicators. All reports of the sub-contractors (18 reports) were prepared and submitted, reviewed and accepted by a national expert panel, and are available for download on the project's website. The TE reports that the partnerships developed among the various project stakeholders as a result of the project (government agencies and ministries, central and municipal government units, academic institutes and private sector firms) have led to the project's significant achievements (TE, pg 19-20). Moreover, the TE notes that strong working relationships and effective communications procedures were established and present throughout the project, including consistent monitoring of project indicators (TE, pg 22).

In short, from the materials provided in the TE and PIRs, the project appears to be well-managed, with effective monitoring and evaluation systems, with adequate technical assistance and support from project partners, and effective use of communication technologies that reduced expected costs and expedited reporting (TE, pg 22). Using this evidence, project efficiency appears to be high.

No further information is provided in the TE of PIRs on the project's efficiency. Reporting deficiencies are discussed below in the section reviewing the Terminal Evaluation. Project efficiency is rated as satisfactory, with the qualification that more information should have been provided to support the claims main in the TE and PIR on this metric.

5.4. *Sustainability* – **Low/Moderate Risks**

Sustainability of project outcomes appear to face only low risks for a number of reasons:

- * As noted in the TE, there is strong political support in China for increasing the environmental performance of its public transport system, including through the promotion of Fuel Cell Bus technology, which currently receives a production subsidy from the national government. This interest is also linked to a desire to see China become a leader in the production of commercialized FCB and FC technology;

- * There is already substantial investment in FC technology by national auto manufacturers in China, both in FCB and FC automobiles (the domestic Shanghai Automobile Industry Corporation was a direct contributor of financial resources to the project, and manufactured the FCBs procured for this Phase II project);

- * There are currently two large-scale integrated urban and transport planning initiatives in Chinese cities underway that will help promote and sustain many of the advances and policy recommendations made under this project: The Eco-Transport in City clusters: Model Development & Pilots, and the GEF-World Bank-China Urban Transport Partnership Program (CUTPP);

TE notes that failure to fund the next phase of the project (Phase III) will result in a loss of momentum in terms of partnerships established by the project, forgone R&D innovations in the pipeline, and so forth, but the evidence cited above would suggest that much of this activity is likely to be sustained regardless of whether or not there is a Phase III. Sustainability of project outcomes is therefore rated as low risk.

6. Processes and factors affecting attainment of project outcomes

6.1. Co-financing

6.1.1. To what extent was the reported co-financing essential to the achievement of GEF objectives? Were components supported by co-financing well integrated into the project?

Reported co-financing was both well integrated and essential to achieving the GEF objectives in this project. Reported co-financing is nearly identical to that expected in the ProDoc, and facilitated all three primary project outcomes described above.

6.1.2. If there was a difference in the level of expected co-financing and actual co-financing, then what were the reasons for it? Did the extent of materialization of co-financing affect project's outcomes and/or sustainability? If it did, then in what ways and through what causal linkages?

No material difference in expected and realized co-financing was reported in the TE (TE, pg 18).

6.2. Delays

6.2.1. If there were delays in project implementation and completion, then what were the reasons for it? Did the delay affect the project's outcomes and/or sustainability? If it did, then in what ways and through what causal linkages?

Six-month delay in project completion was reportedly due to the halting of FCB demonstration activities in Shanghai, when the local government expressed concerns over the safety of testing FCBs on public roadways with passengers. Testing resumed using sand bag dummies, allowing for the target of 200,000 km to be achieved, given the six month extension. No impacts on project outcomes or sustainability are reported in the TE as a result of the delay.

6.3. Country ownership

6.3.1. Assess the extent to which country ownership has affected project outcomes and sustainability? Describe the ways in which it affected outcomes and sustainability, highlighting the causal links:

Country ownership of project outcomes is high, as evidenced by:

* Strong political support in China for increasing the environmental performance of its public transport system, including through the promotion of Fuel Cell Bus technology,

which currently receives a production subsidy from the national government (reported in the TE). This interest is also linked to a desire to see China become a leader in the production of commercialized FCB and FC technology;

* There is already substantial investment in FC technology by national auto manufacturers in China, both in FCB and FC automobiles (the domestic Shanghai Automobile Industry Corporation was a direct contributor of financial resources to the project, and manufactured the FCBs procured for this Phase II project);

* There are currently two large-scale integrated urban and transport planning initiatives in Chinese cities underway that will help promote and sustain many of the advances and policy recommendations made under this project: The Eco-Transport in City clusters: Model Development & Pilots, and the GEF-World Bank-China Urban Transport Partnership Program (CUTPP).

The strong support for project outcomes was clearly a factor in helping the project achieve its targets, from facilitating the FCB demonstration activities, to policy support that has created an enabling environment for FC technology in China. This includes the FCB certification program set up during the third year of this project.

7. Assessment of project's Monitoring and Evaluation system

7.1. M&E design at entry – *Satisfactory*

As assessed in the TE, the project's indicators and targets are specific, measurable, achievable, reasonable, and time-bounded to give an appropriate indication of project outcomes (TE, pg 48). Moreover, M&E activities are clearly budgeted, and parties responsible for monitoring are identified. More indicators tracking the knowledge generation and promotion activities of the project would have been helpful in understanding the impact of these project components.

7.2. M&E implementation- *Satisfactory*

TE reports that all of the monitoring called for in the ProDoc took place and on schedule. However, PIR reports reviewed by the GEF EO lack the level of detail and candor that would provide for a clearer understanding of any project issues. For example, the withdrawal of operational testing permits for the FCBs in Shanghai is never fully explained in any of the PIRs.

8. Assessment of project's Quality of Implementation and Execution

8.1. Overall Quality of Implementation and Execution – *Satisfactory*

8.2. Overall Quality of Implementation- *Satisfactory*

The design of the project appears to be sound, and as reported in the TE, the project was very successful in achieving all of its expected outcomes. Project's M&E plan was of high quality and appears to have served the project well in providing a set of indicators that clearly tracked project performance relating to the operation of the FCBs. As noted above, additional indicators tracking the knowledge generation components of the project would have been

useful as these components constituted a significant portion of project expenditures (25% of GEF project funding in the ProDoc).

Very little information is provided the TE or PIRs on the level of oversight provided by UNDP - TE simply notes "the project is well managed at all levels," (TE, pg 22) and it is assumed this includes the implementing agency.

8.3. Overall Quality of Execution- **Satisfactory**

The project is reported to have been well managed at all levels, and this is reflected in the success of the project in meeting all of the project indicators. TE reports that the project benefited from strong relationships with project stakeholders, and that the project was able to effectively draw upon partners and consultants for technical assistance and support throughout the project. Moreover, the EA is to be commended for faithfully executing all of the monitoring and evaluation called for in the ProDoc.

Areas where EA performance could be improved include ensuring that the project's website is up to date and includes all of the relevant project outputs that are cited in the TE as having been successfully produced. Also, translation from Mandarin to English of the two documents surveyed for this TER (see above) are of poor quality. Whether this extends to all the reports produced was not evaluated. Lastly, project PIR reports lack the level of detail and candor that would provide for a deeper understanding of project issues including the withdrawal of testing permits for the FCBs in Shanghai.

9. Quality of the Terminal Evaluation Report

Criteria	Rating	GEF EO Comments
To what extent does the report contain an assessment of relevant outcomes and impacts of the project and the achievement of the objectives?	Moderately Unsatisfactory	The TE provides a clear accounting of the extent to which the project succeeded in meeting its activity indicators. However, the overall analysis of the project's outcomes and long-term impact is quite limited. For example, the TE notes that the cost of domestically produced FCBs acquired for this phase of the project (Phase II) are substantially lower in cost and more efficient than those procured in Phase I. However, links to this outcome and the project are never clearly discussed or substantiated. Likewise, much of the project's work on knowledge generation and promotion activities is mentioned but never described in any detail that would allow for an understanding of whether and how these activities may have had in impact. The TE should to be more than a simple accounting of what activities have taken place and outputs produced. An assessment of the quality of outputs, and their impact is what is required and what is absent here.
To what extent does the report contain an assessment of relevant outcomes and impacts of the project and the achievement of the objectives?	Moderately Unsatisfactory	<p>As noted above, this TE provides little beyond a list of what project activities were completed, followed by a general assessment of the project's outcomes. Links to project outcomes and impacts are never drawn out in any detail, nor substantiated adequately. This particularly applies to the project's knowledge generation and promotion activities. No narrative is provided on these events, how knowledge outputs were used, and what links could be drawn to developments in the regulatory and policy environment in China for FCBs, as well as the commercialization of this technology. There is also little to no information on the project hurdles that are listed in the TE and PIRs. For example, no information is given on why the price of FCBs was far greater than expected in the ProDoc, necessitating the shifting of GEF resources to this component as well as additional expenditures by the Shanghai government. Considering the gains noted in reducing the costs of third generation FCBs, there seems to be a disconnect here. Similarly, no information is given about how project reports produced for the other two major components of the project were achieved using far less expected resources. The reports that the GEF EO downloaded and reviewed for this evaluation, "A Study on Roadmap for Development of Fuel Cell buses in China," and "Summary Report on FCB Demonstration Operation Programs in China and Abroad" are both poorly translated, which may be indicative of the quality of some of the reports prepared for this project. No information is given on the relationship between the private sector firm, DaimlerChrysler, that provided the FCBs, and the relevant manufacturing entities in China that are seeking to commercialize this technology in a number of applications (cars, buses, power generation). Finally, insufficient information is provided in the TE and PIRs about why safety concerns prompted the Shanghai government to withhold operational permits for FCB busses for some time while those in Beijing were allowed to proceed with testing on public streets.</p> <p>The lack of information on these aspects of project performance and management limits the degree to which outside evaluation can effectively take place.</p>
To what extent does the report properly assess project sustainability and/or project exit strategy?	Moderately Unsatisfactory	Beyond mentioning a loss in "momentum" and some relationships that were established by this project, the TE provides little evidence to support its claim that a Phase III of the project is needed. The picture presented in the TE is that of a highly supportive environment for FCBs and FC technology developing in China. It is also not clear from the TE on whether or not emission monitoring of the FCBs acquired in this project will continue, and what, if any, agency has the mandate and responsibility to do so.
To what extent are the lessons learned supported by the evidence presented and are they comprehensive?	Moderately Unsatisfactory	Lessons learned are not sufficiently detailed nor substantive for a full size, four year+ project. For example, the TE notes that there was a delay in issuing permits for FCB demonstrations in Shanghai, but never discusses whether or not the PMU or UNDP could have done anything to prevent this from happening. Moreover, many of the recommendations for Phase III are common sense and not of much additional value. For example, it's no surprise that FCB technology should be compared against conventional and CNG busses. What would be more valuable is a discussion of some of the FCB-specific issues and experiences brought out in this project, and that could help inform a Phase III project or similar undertaking. Issues to be addressed could include more discussion of the hydrogen fuel cell lifecycle, delivery issues, and establishment of the fueling stations for example.
Does the report include the actual project costs (total and per activity) and actual co-financing used?	Satisfactory	Yes, the project includes both actual project costs and co-financing. More discussion of why GEF funds were reallocated to the different components, and any impact this may have had, would have been informative.
Assess the quality of the report's evaluation of project M&E systems:	Moderately Satisfactory	Report provides a general stamp of approval for the project's M&E systems, but fails to note the limitations of the M&E design with respect to informing about the impact of the project's knowledge generation and promotion activities.

10. Other issues to follow up on

11. Sources of information

Annex I – Project Impacts as assessed by the GEF Evaluation Office

Did the project have outputs contributing to knowledge being generated or improved?

Yes

WHAT OUTPUTS CONTRIBUTED TO KNOWLEDGE BEING GENERATED OR IMPROVED?

Outputs that contributed to knowledge being generated and improved, and that are noted in the TE include:

- * 18 reports on various aspects of hydrogen fuel cell, hydrogen fuel cell vehicles, and policies for promoting the adoption and integration of fuel cell vehicles in China (both public and private vehicle fleets), as well as surveys of FCB programs worldwide (TE, pg 84);
- * 15 project newsletters, 7 annual reviews, and 9 study tour reports made available for the public on the project website (not all of this information currently appears on the website (Josh Schneck, accessed 2/5/2013)).

Is there evidence that the knowledge was used for management/ governance?

Yes

HOW WAS THIS KNOWLEDGE USED AND WHAT RESULTED FROM THAT USE?

TE notes that the establishment of a certification program for FCBs in China by the third year of the project was tied to the knowledge outputs produced for this project:

Did the project have outputs contributing to the development of databases and information-sharing arrangements?

Yes

WHAT OUTPUTS CONTRIBUTED TO INFORMATION BEING COMPILED AND MADE ACCESSIBLE TO MANY?

A project website, holding many (but not all) of the project's reports and newsletters was created, and is currently running. It's not clear from the TE or from visiting the site whether or not resources have been allocated for the regular maintenance and upkeep of the site. The website address is: <http://www.chinafcb.org/chinafcb/index.html>

Is there evidence that these outputs were used?

No

TO WHAT EXTENT HAVE THESE OUTPUTS BEEN USED?

WHAT HAS RESULTED FROM INFORMATION BEING MADE ACCESSIBLE TO OTHERS?

No information on the downloading of information from the project website is provided in the TE or PIR. However, it can be assumed from the level of interest and development of FC technology in China, as described in the TE, that utilization of the website has indeed taken place.

Did the project have activities that contributed to awareness and knowledge being raised?

Yes

WHAT ACTIVITIES CONTRIBUTED TO AWARENESS AND KNOWLEDGE BEING RAISED?

The TE notes a number of exhibitions and road shows, conferences and workshops that were part of this project. These include (TE, pg 79):

- * Service for the 2008 Olympics (3200 participants)
- * Shanghai World Expo (60 participants)
- * Launch Ceremony for Project Phase II (250 participants)
- * Fuel Cell & New Energy Vehicle of 2009 SAE-China Congress (300 participants)
- * The New Energy Vehicles Demonstration & Batteries Technology Session of 2011 SAE-China Congress (500 participants)
- * 6 workshops with 730 participants, from 2007-20011.

Was any *positive* change in behavior reported as a result of these activities?

No

WHAT BEHAVIOR (POSITIVE OR NEGATIVE) HAS CHANGED AS A RESULT?

Did the project activities contribute to building technical/environmental management skills?

Yes

WHAT ACTIVITIES CONTRIBUTED TO *TECHNICAL/ENVIRONMENTAL MANAGEMENT SKILLS* BEING BUILT OR IMPROVED?

Activities that contributed to building technical/environmental management skills include:

- * Operational testing of 9 FCBs, 6 in Shanghai and 3 in Beijing, on public streets and with public customers throughout the project;
- * Construction and operation of 2 hydrogen refueling stations in Shanghai and operation of 1 existing (Phase I) refueling station in Beijing throughout the project;
- * Training of 21 FCB drivers;
- * Training of 20 hydrogen refueling station operators;
- * Training of FCB mechanics (unclear from TE and PIRs how many)

Is there evidence of these skills being applied by people trained?

Yes

HOW HAVE THESE SKILLS BEEN APPLIED BY THE PEOPLE TRAINED?

As reported in the TE, all of the FCB demonstration activities were undertaken successfully by project-trained individuals, and these demonstration activities have yielded important knowledge on how FCBs can be made more cost effective, reliable, safe, integrated within public transport systems, and contribute to GHG reductions and other environmental benefits.

Did the project contribute to the development of legal / policy / regulatory frameworks?

Yes

Were these adopted?

Yes

WHAT LAWS/ POLICIES/ RULES WERE ADOPTED AS A RESULT OF THE PROJECT?

As reported in the TE, the project led to the establishment of a certification program for FCBs in China.

Did the project contribute to the development of institutional and administrative systems and structures?

No

Were these institutional and administrative systems and structures integrated as permanent structures?

NA

WHAT OFFICES/ GOVERNMENT STRUCTURES WERE CREATED AS A RESULT OF THE PROJECT?

Did the project contribute to structures/ mechanisms/ processes that allowed more stakeholder participation in environmental governance?

No

Were improved arrangements for stakeholder engagement integrated as permanent structures?

NA

WHAT STRUCTURES/ MECHANISMS/ PROCESSES WERE SUPPORTED BY THE PROJECT THAT ALLOWED MORE STAKEHOLDERS/ SECTORS TO PARTICIPATE IN ENVIRONMENTAL GOVERNANCE/ MANAGEMENT ACTIVITIES?

Did the project contribute to informal processes facilitating trust-building or conflict resolution?

No

WHAT PROCESSES OR MECHANISMS FACILITATED TRUST-BUILDING AND CONFLICT RESOLUTION?
WHAT RESULTED FROM THESE?

Did the project contribute to any of the following:

- Technologies & Approaches
- Implementing Mechanisms/Bodies
- Financial Mechanisms

Yes

Please specify what was contributed:

Awareness and knowledge on how FCB technology can be made more cost-effective, and awareness and knowledge on how FCBs can be integrated into public transport systems in China and elsewhere.

Did **replication** of the promoted technologies, and economic and financial instruments take place?

No

SPECIFY WHICH PLACES IMPLEMENTED WHICH TECHNOLOGIES/APPROACHES OR ASPECTS OF A TECHNOLOGY/APPROACH.

WHAT WAS THE RESULT IN THOSE PLACES (ENVIRONMENTAL & SOCIOECONOMIC)?

Did **scaling-up** of the promoted approaches and technologies take place?

SPECIFY AT WHAT ADMINISTRATIVE & ECOLOGICAL SCALE AND WHICH TECHNOLOGIES/APPROACHES OR ASPECTS OF A TECHNOLOGY/APPROACH WAS ADOPTED.

HOW WAS IT MODIFIED TO FIT THE NEW SCALE? WHAT WAS THE RESULT AT THE NEW SCALE/S (ENVIRONMENTAL & SOCIOECONOMIC)?

Did **mainstreaming** of the promoted approaches and technologies take place?

SPECIFY HOW (MEANS/ INSTRUMENT) AND WHICH ASPECTS OF THE TECHNOLOGY/APPROACH WAS INCORPORATED INTO THE EXISTING SYSTEM. WHAT WAS THE RESULT OR STATUS (ENVIRONMENTAL & SOCIOECONOMIC)?

Did **removal of market barriers** and sustainable market change take place?

SPECIFY HOW DEMAND HAS BEEN CREATED FOR WHICH PRODUCTS/ SERVICES THAT CONTRIBUTE TO GEBs.

Based on most of the project's components and/or what it generally intended to do, what type of project would you say this is?

<--dropdown menu

If "combination", then of which types?

&

<--dropdown menu

*QUANTITATIVE OR ANECDOTAL DETAILS ON HOW ENVIRONMENTAL **PRESSURE HAS BEEN REDUCED/PREVENTED** OR ON HOW ENVIRONMENTAL **STATUS HAS CHANGED** AT THE DEMONSTRATION SITES AS A CONTRIBUTION/RESULT OF PROJECT ACTIVITIES. FOR SYSTEM LEVEL CHANGES, SPECIFY THE ADMINISTRATIVE AND/OR ECOLOGICAL SCALES.*

Was stress reduction achieved?

If so, at what scales?

Please mark 'x' for all that apply

Local Intended (local) Unintended (local)

Systemic Intended (systemic) Unintended (systemic)

How was the information obtained? Measured Anecdotal

Was there a change in environmental status? Yes No

If so, at what scales?

Please mark 'x' for all that apply

Local Intended (local) Unintended (local)

Systemic Intended (systemic) Unintended (systemic)

How was the information obtained? Measured Anecdotal

Evidence of intended stress reduction achieved at the **local level**

TE reports annual CO2 emissions reductions achieved through FCB demonstration activities (279 tons total for the project). It can also be assumed that the FC buses, which emit no emissions other than water vapor, along with the hydrogen refueling operations (2 use by-product of steel manufacturing in Shanghai, and Beijing is powered through the grid), have resulted in reduced emission of particulate and other local level toxins produced by displaced conventionally powered buses. However, this information is not measured or provided in the TE.

Evidence of intended stress reduction at a **systemic level**

Evidence of intended changes in environmental status at the **local level**

Evidence of intended changes in environmental status at a **systemic level**

Evidence of unintended changes in stress or environmental status at the **local level**

Evidence of unintended changes in stress or environmental status at the **systemic level**

Were arrangements to collect data on stress reduction and environmental & socioeconomic status in place during the project?

Environmental Yes

Socioeconomic No

To what extent were arrangements in place and being implemented during the project? Briefly describe arrangements.

Measurements of CO2 emissions associated with FC bus operations compared against conventionally-powered diesel buses was collected and reported throughout the project according to a pre-defined protocol called for in the ProDoc.

To what extent did these arrangements use parameters/ indicators to measure changes that are actually related to what the project was trying to achieve?

Project focus on CO2 emission reductions is clearly related to GEF objective and overall project objective. However, project failed to provide a full life-cycle analysis of emissions for hydrogen refueling operations.

Were arrangements to collect data on stress reduction and environmental & socioeconomic status in place to function after the project?

UA

To what extent were arrangements put into place to function after GEF support had ended? Briefly describe arrangements.

TE recommends that monitoring of CO2 emissions from FCBs procured in the project continue after the project, but it is unclear from the TE, PIRs or ProDoc if this will take place.

Was there a government body/ other permanent organization with a clear mandate and budget to monitor environmental and/or socioeconomic status?

Not clear from the TE. The Executing Agency, China Ministry of Science and Technology is apparently responsible for monitoring the project's emissions,. TE also notes that "the operating parameters monitored, stored and analyzed shall be reported to the PMO, UNDP, GEF and central GHG emission monitoring body of the China central government in charge of GHG emission inventory (as agreed or identified in the SNC Project) (TE, pg 74).

Has the monitoring data been used for management?

No

How has the data been used for management? Describe mechanisms and actual instances.

Has the data been made accessible to the public?

Yes

How has the data been made accessible to the public? Describe reporting systems or methods.

Emissions reductions from the project have been reported in publicly-accessible websites with links to the project, including UNDP, and the project's own website.

“SOCIOECONOMIC” REFERS TO ACCESS TO & USE OF RESOURCES (DISTRIBUTION OF BENEFITS), LIVELIHOOD, INCOME, FOOD SECURITY, HOME, HEALTH, SAFETY, RELATIONSHIPS, AND OTHER ASPECTS OF HUMAN WELL-BEING .AS MUCH AS POSSIBLE, INCLUDE “BEFORE” AND “AFTER” NUMBERS, YEARS WHEN

DATA WAS COLLECTED, AND DATA SOURCES.

Did the project contribute to **positive** socioeconomic impacts?

No

If so, at what scales?

Please mark 'x' for all that apply

Local Intended (local) Unintended (local)

Systemic Intended (systemic) Unintended (systemic)

How was the information obtained?

Measured Anecdotal

Did the project contribute to **negative** socioeconomic impacts?

No

Briefly describe the key lessons, good practice or approaches mentioned in the terminal evaluation report

Following is a summary of the key lessons and best practices noted in the TE:

- * Strong technical support from universities and industry associations was key to successful project implementation in this project, as it provided the fuel cell and hybrid bus fabricators and systems integrators with much useful assistance.
- * Public demonstration activities at high profile events were useful in spreading the word about FCBs.
- * Operational permits for FCB demonstrations should have been obtained at an earlier juncture in the project as this would have prevented a delay in testing that was experienced by the project.
- * Greater effort should have been made in estimating the future cost of FCBs to ensure that adequate funding is available for their procurement.

Briefly describe the recommendations given in the terminal evaluation

Following is a summary of the recommendations given in the TE:

In the case that there is no Phase III of the project, TE recommendations are:

- * Municipal service permits for FCBs acquired through this project be obtained and FCBs continue to be operated as part of the regular bus fleet.
- * Fuels costs, operating costs and maintenance costs should be monitored by the fleet operator using FCB project staff who will continue to get paid by the FCB project using funds provided by the Chinese central government.
- * Operating parameters allowing for CO2 calculations should be monitored for the next 5 years, and shall be reported to the PMO, UNDP, GEF and central GHG emission monitoring body of the China central government in charge for GHG emission inventory.

In the case that there is a Phase III of the project, TE recommendations are:

- * Project team should evaluate which FC hybrid technology/manufacturer to commercialize in China in order to adopt the most optimal and economical FC hybrid technology in China's cluster cities and urban areas.
- * There is a need to conduct parallel tests between the baseline diesel-fed bus, the CNG-fed bus and its hybrid variants, and the alternative hydrogen fuel cell hybrid buses that will be procured in FCB III.
- * Government regulatory, permitting and taxation policies for FCB, FCEV, FCHV and other clean energy vehicles for both private and public transport in China need to be reviewed and expanded.
- * Commercial demonstration activities with different driving modes (long distance vs stop-and-go shorter routes).
- * The hydrogen fuel source route and lifecycle need to be further studies.