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IMPLEMENTATION COMPLETION AND RESULTS REPORT

TF-014206

ON A

GRANT

IN THE AMOUNT OF US$18.18 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR THE

CHINA GEF LARGE CITY CONGESTION AND CARBON REDUCTION PROJECT

June 25, 2019

Transport Global Practice
East Asia And Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective May 30, 2019)

Currency Unit	=	RMB
RMB1.00	=	US$0.14
US$1.00	=	RMB6.90

FISCAL YEAR
July 1 - June 30

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ABBREVIATIONS AND ACRONYMS

BAU	Business-as-Usual
BRT	Bus Rapid Transit
CATS	China Academy of Transport Sciences
CO_2	Carbon Dioxide
CF	Counterpart Fund
CNG	Compressed Natural Gas
EIRR	Economic Internal Return Rate
GA	Grant Agreement
GEF	Global Environment Facility
GEO	Global Enviromantal Objectives
GIZ	Gesellschaft fur Internationale Zusammenarbeit
GHG	Greenhouse Gas
GoC	Government of China
IBRD	International Bank for Reconstruction and Development
ITS	Intelligent Transport System
MOT	Ministry of Transport
PAD	Project Appraisal Document
PDO	Project Development Objective
PIU	Project Implementing Unit
PMO	Project Management Office
PTM	Public Transit Metropolises
PTD	Public Transport Development
RIOH	Research Institute of Highway
TOR	Terms of Reference
TDM	Travel Demand Management
TPRI	Transport Planning and Research Institute
TransFORM	Transport Transformation and Innovation Knowledge Platform

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DATA SHEET

BASIC INFORMATION

Product Information

Project ID	Project Name
P127036	China GEF Large City Congestion and Carbon Reduction Project
Country	**Financing Instrument**
China	Investment Project Financing
Original EA Category	**Revised EA Category**
Partial Assessment (B)	Partial Assessment (B)

Organizations

Borrower	Implementing Agency
People's Republic of China	Ministry of Transport

Project Development Objective (PDO)

Original PDO

The development objectives of the project are to help establish a policy framework to alleviate traffic congestion and reduce greenhouse gas emissions in large cities in China primarily through public transport development and travel demand management, and implement such policy framework in pilot cities so as to demonstrate its local and global benefits.

The Global Environmental Objective of the project is to reduce greenhouse gas emissions directly from a business-as-usual scenario through improved bus speeds and modal shifts to public and non-motorized transport in the three pilot cities, and indirectly through replication of the successful pilotactions that would be supported by central policy, strategy and technical guidelines developed under the project.

PDO as stated in the legal agreement

The objectives of the Project are to help the Recipient establish a policy framework to alleviate traffic congestion and reduce greenhouse gas emissions in its large cities, primarily through public transport development and travel demand management, and implement such policy framework in Project Cities so as to demonstrate its local and global benefits.

FINANCING

	Original Amount (US$)	Revised Amount (US$)	Actual Disbursed (US$)
World Bank Financing			
TF-14206	18,180,000	18,180,000	17,612,833
Total	**18,180,000**	**18,180,000**	**17,612,833**
Non-World Bank Financing			
Borrower/Recipient	96,000,000	96,000,000	104,130,000
Total	**96,000,000**	**96,000,000**	**104,130,000**
Total Project Cost	**114,180,000**	**114,180,000**	**121,742,833**

KEY DATES

Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
29-Mar-2013	02-Sep-2013	10-Nov-2014	30-Jun-2018	31-Dec-2018

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Amount Disbursed (US$M)	Key Revisions
30-Sep-2016	5.70	Change in Results Framework Reallocation between Disbursement Categories Change in Institutional Arrangements
29-May-2018	12.37	Change in Loan Closing Date(s)

KEY RATINGS

Outcome	Bank Performance	M&E Quality
Highly Satisfactory	Satisfactory	Substantial

RATINGS OF PROJECT PERFORMANCE IN ISRs

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US$M)
01	25-Jun-2013	Satisfactory	Satisfactory	0
02	18-Dec-2013	Satisfactory	Satisfactory	0
03	21-Jun-2014	Satisfactory	Moderately Satisfactory	1.00
04	16-Dec-2014	Satisfactory	Moderately Satisfactory	1.00
05	19-Jun-2015	Satisfactory	Moderately Satisfactory	2.39
06	09-Dec-2015	Satisfactory	Moderately Satisfactory	2.69
07	27-Jun-2016	Satisfactory	Satisfactory	4.57
08	17-Dec-2016	Satisfactory	Satisfactory	7.30
09	29-May-2017	Satisfactory	Moderately Satisfactory	8.31
10	26-Dec-2017	Satisfactory	Satisfactory	10.52
11	11-Jun-2018	Satisfactory	Satisfactory	12.53
12	24-Dec-2018	Satisfactory	Satisfactory	17.70

SECTORS AND THEMES

Sectors

Major Sector/Sector	(%)
Public Administration	**10**
Sub-National Government	10
Transportation	**90**
Urban Transport	31
Public Administration - Transportation	45
Other Transportation	14

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3)	(%)

Urban and Rural Development	**65**
Urban Development	65
Urban Infrastructure and Service Delivery	65
Environment and Natural Resource Management	**35**
Climate change	20
Mitigation	20
Environmental Health and Pollution Management	15
Air quality management	5
Water Pollution	5
Soil Pollution	5

ADM STAFF

Role	At Approval	At ICR
Vice President:	Axel van Trotsenburg	Victoria Kwakwa
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I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

Context

1. **With rapid industrialization and urbanization, China faced major challenges in combating climate change and reducing greenhouse gas (GHG) emissions.** In 2009, the Government of China (GoC) announced the national target of reducing carbon intensity[1] by 2020 from the 2005 level by 40-45%. The 12th Five-Year Plan (FYP) for National Economic and Social Development (2011-2015) required all sectors, including transport, to establish their respective monitoring and evaluation systems and specify their respective targets for GHG reduction.

2. **At the time of project preparation, China's urban transport sector was a major and fast-growing source of GHG emissions with intensified traffic congestion in large cities.** The transport sector accounted for 35% of total crude oil consumption in China in 2005, and this figure was estimated to increase to 55% by 2030, contributing to more than two-thirds of the overall increase in Chinese oil demand. The continuing increases in private car ownership and usage drove the growth in oil demand and CO_2 emissions. This posed a serious challenge to the sector and the nation. The increases in private car ownership and usage were especially rapid in large Chinese cities, which were generally experiencing faster economic growth and enjoyed higher household disposable incomes than the country's smaller cities and rural areas. As a result, similar to what had already happened in other parts of the world, many large cities in China experienced severe traffic congestion and air pollution, and GHG emissions were intensified by the worsening traffic congestion[2].

3. **A vicious cycle emerged in large cities** - the service quality of public transport declined with growing traffic congestion, while the relative attractiveness of private cars and the cost of providing public transport services increased, thus worsening service quality. To reverse this vicious cycle had become a national priority. To cope with transport congestion problems, China firstly only focused on building more roads, which often displaced non-motorized transport and encouraged more private car usage. China later gradually shifted to invest in public transport.

4. **A comprehensive approach using Public Transport Development and Transport Demand Management was lacking in tackling the vicious cycle and reduce GHG emissions.** At the project preparation stage, the Ministry of Transport - GoC's line agency for urban transport operations - initiated a pilot program to promote the development of Public Transit Metropolises (PTM). Development of a PTM required demand side measures alongside supply side measures. However, knowledge and experience of demand side measures, and their integration with ITS and public transport development, were largely lacking in China. Both the national and local governments lacked the capacity to implement such measures to effectively tackle congestion. The cities were even less aware of the full menu of demand side interventions.

5. **Travel Demand Management was a relatively new practice for Chinese cities and would have to face the challenges of political will and public acceptance.** Based on international experience and the local context, it was foreseen that implementation of TDM measures would be challenging. In addition to extensive technical assistance at both the national and local levels, GoC needed to implement TDM as a series of incremental digestible steps, and tailor it to include the menu of pricing policies, restrictions and interventions modulated by the political and economic realities of each city.

[1] Defined as the amount of GHG emitted per unit of GDP.
[2] According to the International Road Transport Union statistics, fuel consumption and GHG emissions under congested conditions could be up to four times higher than under a free flow condition.

6. **Selecting large cities for demonstration.** A competitive selection process was launched at the preparation stage by MoT to select the pilot cities based on the level of public transport development, economic and social development status, geographic location and commitment to success. **Suzhou** in Jiangsu Province, **Chengdu** in Sichuan Province, and **Harbin** in Heilongjiang Province were selected[3]. The three pilot cities are among the largest Chinese cities, each with a population over 10 million that was still growing rapidly. Despite significant investment in urban public transport, the cites still suffered from traffic congestion. Public transport services suffered from poor coverage, accessibility, and comfort; low speed, poor reliability, and lack of convenience; and costly transfers. Although congestion levels in these cities were not the most serious in China, they had learned the hard lessons from Beijing[4], and were determined to prevent congestion from getting out of control. However, the knowledge of TDM and its integration with ITS and PTD were also largely lacking.

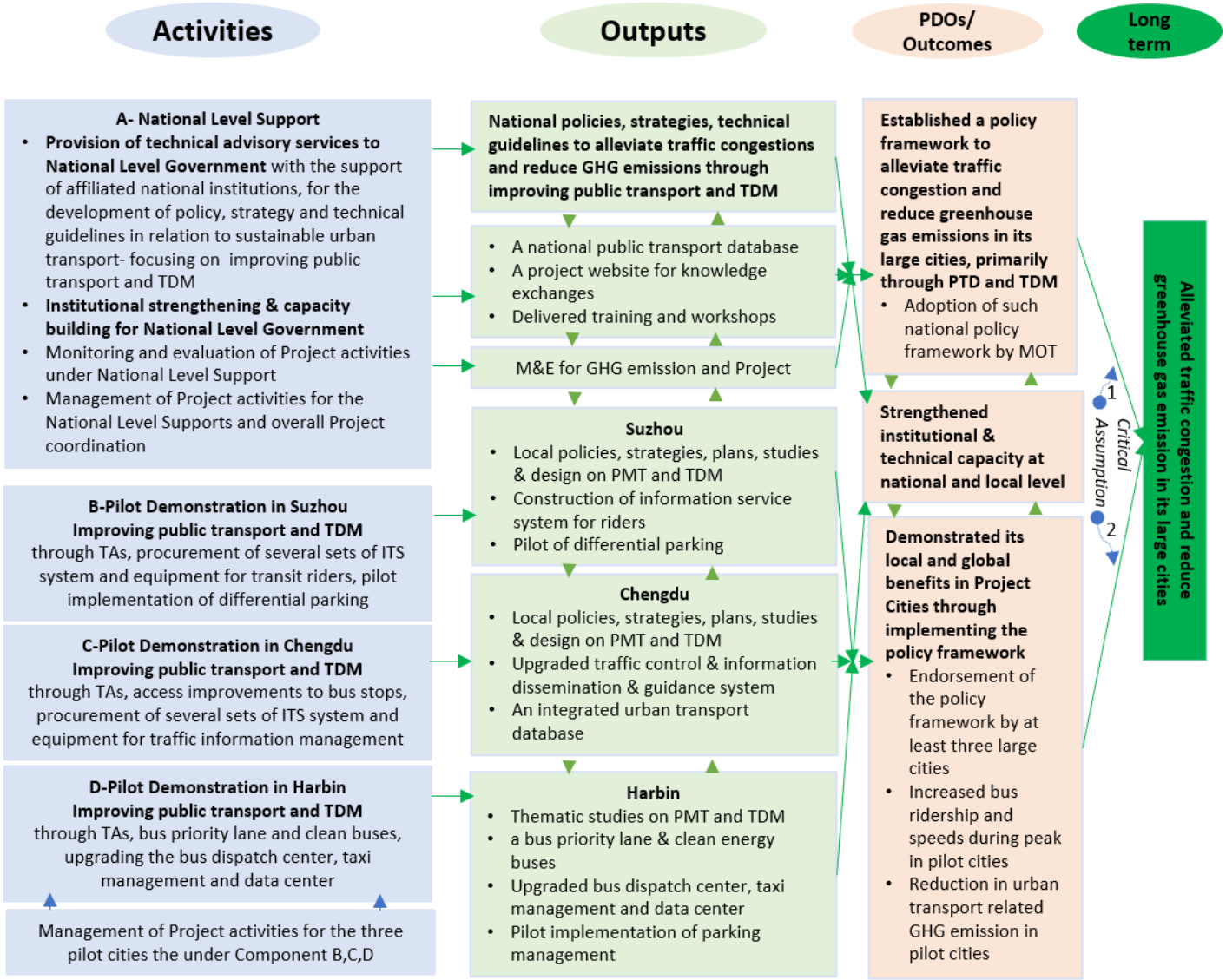
7. **This Project was the first urban transport project in China that focused on public transport development (PTD) and explicit TDM interventions simultaneously, through large scale upstream TA and institutional strengthening at both national and local levels, with downstream demonstrations.** The Project was fully aligned with the World Bank Group's China Country Partnership Strategy (CPS) for FY2013-16 that identified 'greener growth' as a key strategic pillar. The project design was aligned with the key intervention areas specified under the Outcome 1.3: (i) accelerating the shift to public transport and improving transport efficiency through city-specific transport investments, giving priority to large cities in the central and western regions; (ii) piloting institutional and technological innovations that have potential for scaling up in cities throughout China, such as public transport integration, transit-oriented development, and travel demand management; (iii) helping to establish a national policy framework that promotes efficient and low carbon urban transport, drawing on the experience of demonstration projects in pilot cities; and (iv) establishing a knowledge platform to disseminate best practices.

Theory of Change (Results Chain)

8. **The Theory of Change (ToC) of the Project is illustrated in Figure 1.1.**

[3] Suzhou located in the coastal area, it was the most developed city in Jiangsu Province and a popular tourist destination, with GDP US$ 16,100 per capita. The auto ownership was 1.5 million in 2011, 20.5% more than the previous year; Chengdu was one of the financial and trade centers of South western China, with GDP US$ 7,800 per capita. The total auto ownership was 1.65 million in 2011, 25% more than the previous year; Harbin was a vital manufacturing base in the Northeastern China with GDP US$ 6,400 per capita. The total auto ownership was half million in 2011, increased by 20% over the previous year. The city plans to establish a comprehensive intelligent transport system within the next five years to help mange the urban transport operations.

[4] Beijing was considered the city with the most severe traffic congestion in China.



Critical Assumption: 1-The national policy will have strong top-down effects; 2-Some of the pilots will be successfully and will be replicated in other cities.

Figure 1.1 TOC

Project Development Objectives (PDOs)

9. As stated in the Grant Agreement (GA), the objectives of the Project are to help the Recipient establish a policy framework to alleviate traffic congestion and reduce greenhouse gas emissions in its large cities, primarily through public transport development and travel demand management, and implement such policy framework in Project Cities so as to demonstrate its local and global benefits.

10. Although not included in the GA, a Global Environmental Objective (GEO) is stated in the PAD, to reduce GHG emissions directly from a business-as-usual scenario through improved bus speeds and modal shifts to public and non-motorized transport in the three pilot cites, and indirectly through replication of the successful pilot actions that would be supported by central policy, strategy and technical guidelines developed under the project.

Key Expected Outcomes and Outcome Indicators

11. The achievement of the PDO is measured through a set of four PDO-level indicators as shown below.

Expected Key Outcomes	Outcome Indicator
PDO Element 1: To help the Recipient establish a policy framework to alleviate traffic congestion and reduce greenhouse gas emissions in its large cities, primarily through public transport development and travel demand management	1. PDO Level Results Indicator 1: adoption of the national policy framework by Ministry of Transport (MOT)
PDO Element 2: To help the Recipient implement the policy framework in Project Cities so as to demonstrate its local and global benefits.	2. PDO Level Results Indicator 2: Endorsement of the policy framework by at least three large cities. 3. PDO Level Results Indicator 3: Increase in bus ridership and speeds during peak periods in the project affected areas of the pilot cities. 4. PDO Level Results Indicator 4: Reduction in urban transport-related GHG emissions in pilot cities.

Components

Components	Description in the Grant Agreement and Project Appraisal Document	Cost (USD Million)
Component Part A: National Level Support	(i) Provision of technical advisory services to MOT, with the support of affiliated national institutions, for the development of policy, strategy and technical guidelines in relation to sustainable urban transport, including: (a) the development of policy and technical guidelines for TDM and TOD implementation; (b) the development of a policy for integrated urban transport and land use planning; (c) the establishment of a policy framework and evaluation system for sustainable urban transport, which includes PTM policies, and a statistical system for monitoring and evaluating urban transport energy consumption and CO2 emissions; and (d) the preparation of technical guidelines for ITS applications in public transport. (ii) Institutional strengthening and capacity building through, inter alia: (a) the establishment of a national public transport database; (b) the provision of technical advisory services for TDM, parking management, public transport service improvement, and urban transport CO2 emission monitoring and evaluation; and (c) the establishment of a Project website and organization of training and workshops. (iii) Monitoring and evaluation of Project activities, including: (a) the monitoring and evaluation of the Project's urban transport CO2 emissions reduction; (b) the provision of goods and equipment for monitoring and evaluation of urban transport CO2 emissions reduction; and (c) the monitoring and evaluation of the overall progress of Part A of the Project. (iv) Management of Project activities under Part A of the Project, and overall Project coordination.	**Total estimated amount: $13.01** Estimated GEF Grant: $8.18 Estimated Counterpart Fund (CF): $4.83 **Total actual amount: $12.52** Actual GEF Grant: $7.69 (94%) Actual Counterpart Fund: $4.83 (100%)
Part B: Pilot Demonstration in Suzhou, Jiangsu Province	(i) Improving public transport through, inter alia: (a) the construction of Suzhou's information service system for transit riders, including system design and acquisition of on-board devices; (b) assessment of express bus lines, development of concept design of bus lanes and preparation of environmental management plans as required for the future construction of such lanes, acquisition of clean-energy buses for operation, and carrying out of associated traffic management activities; and (c) the carrying out of TOD studies. (ii) Improving TDM through, inter alia: (a) the carrying out of TDM studies and parking system planning; (b) the formulation and pilot implementation of differential parking policy, including the acquisition of charging equipment; and (c) the development of a congestion pricing scheme in the ancient city of Suzhou. (iii) Monitoring and evaluation of Project activities, including the development of an urban transport monitoring system, and data collection for the urban transport CO2 emissions database of Suzhou. (iv) Management of Project activities under Part B of the Project.	**Total amount: $46.05** Estimated GEF Grant: $4.00 Estimated Counterpart Fund: $42.05 **Total actual amount: $52.06** Actual GEF Grant: $3.91 (98%) Actual Counterpart Fund: $48.15 (115%)

Part C: Pilot Demonstration in Chengdu, Sichuan Province	(i) Improving public transport through, inter alia: (a) the carrying out of junction channelization in selected areas, and upgrading of their traffic control system; (b) access improvements to bus stops; and (c) carrying out of studies on public transport optimization. (ii) Improving TDM through, inter alia, the development and implementation of: (a) traffic information dissemination and guidance systems using real-time data; (b) a parking policy and measures utilizing differential pricing mechanisms; and (c) congestion alleviation policies. (iii) Monitoring and evaluation of Project activities, including the development of an integrated urban transport database, and data collection for the urban transport CO2 emissions database of Chengdu. (iv) Management of Project activities under Part C of the Project.	**Total amount: $26.80** Estimated GEF Grant: $3.00 Estimated Counterpart Fund: $23.80 **Total actual amount: $28.83** Actual GEF Grant: $3.00 (100%) Actual Counterpart Fund: $25.83(109%)
Part D: Pilot Demonstration in Harbin, Heilongjiang Province	(i) Improving public transport through, inter alia: (a) the construction of a bus priority lane, including junction channelization, parking and associated traffic management improvements, and acquisition of clean energy buses; (b) the upgrading of the existing public transport dispatch center, taxi management and data center; and (c) carrying out of selected thematic studies. (ii) Improving TDM through, inter alia: (a) the carrying out of TDM and traffic impact studies; and (b) pilot implementation of parking management systems in selected areas. (iii) Monitoring and evaluation of Project activities through data collection for the urban transport CO2 emissions database of Harbin. (iv) Management of Project activities under Part D of the Project.	**Total amount: $ 28.32** Estimated GEF Grant: $3.00 Estimated Counterpart Fund: $25.32 **Total actual amount: $28.33** Actual GEF Grant: $3.01 (100.4%) Actual Counterpart Fund: $25.32 (100%)

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION (IF APPLICABLE)

Revised PDOs and Outcome Targets

12. The PDO and key associated outcome targets remained the same throughout the implementation of the project.

Revised PDO Indicators

13. The PDO indicators has remained unchanged. During the first restructuring in September 2016, the baseline and target value for PDO indicator 4: Reduction in urban transport-related GHG emissions in pilot cites, were updated, as the monitoring and evaluation methodology adopted during project implementation was more advanced than the one proposed at project appraisal.

Revised Components

14. The project components were not revised.

Other Changes

15. **During the first project restructuring (Level 2) in September 2016**:

    1) A new Project Implementing Unit (PIU) was designated to enhance the execution of knowledge dissemination under the institutional strengthening and capacity building activities.

    2) Minor reallocation of funds between Disbursement Categories.

    3) The intermediate result indicators were modified to better reflect the activities under Component A: (a) the target number of TA studies increased from 9 to 13; and (b) indicator five: Number of transport case studies updated in Transport Transformation and Innovation Knowledge Platform (TransFORM), by adding a baseline value of 0 and Year 5 target of 200;

    4) Intermediate results indicators for Component C were modified to better reflect the outputs of the project in the Pilot city Chengdu: 'Number of electronic bus signs and variable message signs installed' was added. Further, as the project only financed a TA on differential parking policy, 'Area that have implemented differential parking policy in Chengdu' was dropped.

16. **During the second project restructuring (Level 2) in May 2018,** a six-month extension of the Grant closing date was granted.

Rationale for Changes and Their Implication on the Original Theory of Change

17. The first restructuring was approved in September 2016 to utilize savings of US$1.4 million more efficiently, and four new TA activities were added to Component A. Planned dissemination activities under Component A were enhanced and integrated with MOT's TransFORM at both institutional and operational levels. Several target values of the intermediate results were increased to reflect greater ambition.

18. The second restructuring approved in May 2018 involved a six month extension of the Grant closing date to provide additional time to complete: ongoing TA activities (mostly the newly added TA initiated by the first restructuring); installation of goods at the pilot city level; and enable the pilot cities to endorse the policy frameworks following completion of the technical assistance on policy frameworks at the pilot city level.

19. All these changes are aligned with the original Theory of Change.

II. OUTCOME

A. RELEVANCE OF PDOs

Assessment of Relevance of PDOs and Rating

Rating: High

20. The PDO was clear and was appropriately ambitious: it tackles complex transport congestion issues by focusing on strengthening institutional and technical capacity at both national and local levels, and bringing innovations and global best practices; addresses climate change impacts from urban transport; and supports demonstration activities.

21. **The PDO remains highly relevant to GoC's priorities at the national and sectoral levels.** China's 13th FYP for Economic and Social Development, covering 2016-2020, dedicates a chapter on the development of a modern integrated transport system. The PDO is fully aligned with three of the four strategic themes outlined under the transport chapter: (i) build a modern and highly efficient intercity and urban transport system; (ii) develop

integrated and interconnected multimodal transport gateways/hubs; and (iii) promote low carbon and intelligent transport services. China's new development priority - *An Era of 'Ecological Civilization'* - requires further reduction of GHG emissions from transport. The PDO is also aligned with China's *New Growth Model*[5], which requires a 'modern and integrated transport and logistics system'. At the sectoral level, the PDO is highly relevant to MoT's 13th FYP and the priorities set out in various of key policy documents.

22. **The PDO is also aligned with China's global commitment to GHG emission reduction** in the priorities set in the Second National Communication on Climate Change of People's Republic of China to UNFCCC in November 2012 and China's Intended Nationally Determined Contribution (INDC) issued in 2015, calling for sustained efforts in GHG emissions control and energy conservation from transport sector.

23. **The PDO remains highly relevant to the World Bank Group's China Country Partnership Strategy (CPS) at the project completion.** As discussed earlier in the context section (paragraph 7), the PDO is fully aligned with the CPS for FY2013-16 (during the preparation and implementation of the Project, there was no updated CPS and the CPS for FY2013-16 was extended). The PDO is highly relevant to the Bank's engagement strategy with China under the new capital increase requirements[6]: (i) focus on interventions to strengthen policies and institutions required for sustainable IBRD graduation; (ii) delivery of regional and global public goods, such as reductions in GHG emissions and tackling climate change; (iii) innovative solutions to poverty and shared prosperity challenges that can be scaled up with non-WBG resources and generate lessons for lower income countries; and (iv) creating knowledge and sharing China's development experience.

24. **Finally, the PDO supports World Bank Transport Strategies.** The PDO supports the goals of Sustainable Mobility for All (Sum4All)[7], and is aligned with Sum4All's pillars: Universal Access - connect all people to economic and social opportunities; Efficient - optimize the predictability, reliability and cost effectiveness of mobility; and Green - minimize the environmental footprint of mobility (GHG emissions, noise and air pollution). It is also fully aligned with the recommended next steps for the World Bank urban transport portfolio[8]: (i) engage more comprehensively and continuously with clients on upstream policy and institutional support, as well as downstream operations; and (ii) identify opportunities for comprehensive engagements, particularly on issues related to urban mobility management and environmental sustainability.

B. ACHIEVEMENT OF PDOs (EFFICACY)

Assessment of Achievement of Each Objective/Outcome

Rating: High

25. This is the first urban transport project in China focusing simultaneously on PTD and explicit TDM interventions through large scale upstream TA and institutional strengthening at both national and local levels, along with downstream demonstrations. The project met or exceeded the targets of all PDO outcome indicators. In addition, of the 13 intermediate results indicators, the project exceeded eight end targets and fully achieved the other five.

26. The PDO has been unpacked into two elements and the achievements of each PDO element is discussed below.

[5] Shifts economy from export led to productivity and private consumption.
[6] Capital increase requirements (Paragraph 32). Broadly, the requirement is to expand World Bank activities with less financing and more knowledge while taking a selective and sophisticated approach to financing activities in graduation-eligible countries, which tend to have relatively stronger ability to mobilize domestic resources and access to capital markets.
[7] Sum4All, a global multi-stakeholder partnership, initiated by the World Bank, aims to improve the lives of billions of people—their health, their environment, and their quality of life—and help minimize the effects of climate change
[8] Key findings and Management Responses, Page xxii, Mobile Metropolises: Urban Transport Matters: An IEG Evaluation of the World Bank Group's Support for Urban Transport

PDO ELEMENT 1: TO HELP THE RECIPIENT ESTABLISH A POLICY FRAMEWORK TO ALLEVIATE TRAFFIC CONGESTION AND REDUCE GREENHOUSE GAS EMISSIONS IN ITS LARGE CITIES, PRIMARILY THROUGH PUBLIC TRANSPORT DEVELOPMENT AND TRAVEL DEMAND MANAGEMENT

27. The achievement of PDO Element 1 is measured by Outcome Indicator 1: adoption of the national policy framework by MOT. Through activities under the Component A: National Level Support, the project completed all planned activities, and utilized savings to carry out additional TA and knowledge sharing activities. The main outputs funded by GEF Grant include 14 national level TAs, one national public transport database, 39 workshops and 10 international study tours with 2,277 government officials and technical staff trained, and a dissemination website with 201 case studies[9] and regular updates of project and sectoral news. Table B-1 summarizes the achievement of PDO Element 1 vs-a-vis the outcome and intermediate indicators.

Table B- 1 Results Indicators for PDO 1

Indicators		Unit	Baseline	Target (Dec.2018)	Actual (Dec.2018)	Achievement
PDO Outcome Indicators: Adoption of the national policy framework by MOT		Text	No policy framework	Policy framework endorsed by MOT	Policy framework endorsed and adopted by MOT	100%
Intermediate results indicator	Number of TA studies completed at national level	number	0	13 (original target was 9)	14	107%
	Number of cities whose data is available on the national public transport database	number	0	3	31	310%
	Number of workshops held	number	0	30	39	130%
	Number of government officials and technical staff trained	number	0	700	2277	325%
	Number of transport case studies updated in TransFORM platform	number	0	200	201	100%

28. **The policy framework was developed to address the deficiencies.** The work on developing the policy framework was defined in the PAD as "The technical assistance at the national level will develop national policy framework on four aspects: integrated transport and urban planning, TOD, Public Transit Metropolises (PTM) and urban transport energy consumption statistics." The 14 TAs delivered under the Project developed policies, strategies and technical guidelines at the national level, combining both supply and demand side approaches. Those TAs helped shape the frontier of urban transport development in China: on the supply side, the TA focused on Public

[9] The 201 cases include the Project specific experiences and broader practices in China with 25,000 annual pageviews.

Transport Development to complement the implementation of PTM; and on the Travel Demand Management side, they focused on urban transport and land use integration, operational, fare and physical integration of public transport services, TOD, explicit measures to shift transport from private cars to public transport, and ITS integrated with PTD and TDM. In addition, a monitoring and evaluation system for urban transport was also developed, including performance evaluation, energy consumption, and emission reduction.

29. **The policy framework has been adopted by the national government.** Most of the TAs were adopted by the national government as critical inputs for various key national policies, technical standards and guidelines. **Five TA outputs were directly issued by the national government as national standards, industry standards and technical requirements**; they are listed below with underscoring. The forward-looking design of the policy interventions successfully equipped MOT with more comprehensive tools early on to proactively deal with challenges in traffic congestion and greenhouse gas emissions in large cities.

30. **The highest level of blueprint documents covering 2016-2020 for the entire transport sector, '*13th Five Year Plan of the Modern Comprehensive Transport Development*' (13th FYP-MCTD), issued by the State Council, explicitly adopted recommendations from several TAs[10].** The plan highlighted the targets for improving coverage of public transport services in urban areas; building modern integrated high-quality passenger hubs; reducing carbon emissions from the transport sector 7%; improving the coverage and usage rate of ITS; and enhancing the coordination between the city's master plan and transport plan. It is mandatory for all levels of local government to act on these common targets and priorities.

31. **Public Transport Development.** The major outcomes of the TAs under PTD category are as follows:

- *TA - Evaluation Index System for City Public Transportation Development and Performance*: The output was directly issued by the national government in 2017 as the national standard, *GB/T35654-2017*. MOT has been using it as the standard to assess the development level and performance of all cities, identify issues, and assist in setting national subsidies.

- *TA - Study of Urban Passenger Transport Statistics Database*: The output was directly issued by the MOT as *Urban Passenger Transport Reporting Regulation*. It institutionalized the data collection and reporting responsibilities of cities and procedures to report statistics biannually to MOT and the State Statistics Bureau. Under this TA, the Urban Passenger Transport Statistics Database was also developed and operationalized in MOT; 31 transport authorities at the provincial and city levels have been reporting the data to the system.

- *TA - Research on Guidelines for Urban Intelligent Public Transport System Construction and Application*: The output was directly issued by MOT as the three technical requirements for urban intelligent public transport system, published in December 2015: (i) *Technical Requirements on ITS Applications Installed on Bus Fleet*; (ii) *Technical Standards on the Data Communication Protocol of Data-Bus-Interface on Bus Fleet*; and (iii) *Technical Requirements on the Data Communication Protocol Between the ITS Applications Installed on Bus Fleet and the Dispatching Center*.

32. **Travel Demand Management (TDM).** The major outcomes of the TAs under the TDM category are as follows:

- A comprehensive *Urban Transport Demand Management Manual* has been developed. It was the first manual developed at the national level on explicit TDM measures. The study is a reference document for MOT and city decision makers on a spectrum of travel demand management measures to mitigate traffic congestion and carbon emissions.

[10] The following TAs funded by the GEF Grant served as critical inputs: 1) Concept Paper for 13th Five-Year Plan of Transport Development; 2) Study of Synergy Policies between City's Transport Planning and City's Master Plan; and 3) Integrated Passenger Hub Layout Planning and Function Optimization Guidelines. MOT issued official letters to certify the contribution.

- *TA - Study of Synergy Policies between City's Transport Planning and City's Master Plan*. The output was adopted by four key national policy documents and a large scale PTM program*:* (i) *Comprehensive Transport Network Plan 2014-2020 For Urban Area* issued by MOT and NDRC*;* (ii) *13th FYP for Urban Public Transport Development Plan* issued by MOT; (iii) *13th FYP-MCTD*; and (iv) *National Urban and Town System Plan*, under development by MOT and the Ministry of Housing and Construction. The adopted recommendations cover the integration of the land use plans and transport plans in the planning documents, enhancing the cross-agency coordination mechanism, enhancing coordination between the city's master plan and transport plan, invigorating the enforcement process of implementing the plan, improving the non-motorized transport environment, TOD, enhancing transport calming measures, operationalizing traffic impact evaluation for construction projects in urban areas, and several congestion reduction measures.
- *TA - Integrated Passenger Hub Layout Planning and Function Optimization Guidelines.* Three key national policies adopted the outputs of the TA are: (i) *Regulation of Investment Subsidy on Integrated Passenger Hub*, *[2015]35 Notice,* issued by MOT in 2015, which lists the incentive packages and associated criteria for integrated passenger hub investment; (ii) *13th FYP for Integrated Passenger Hub Development Plan* issued by MOT*,* which guides overall nation-wide planning and investments in integrated passenger hubs*; and* (iii) *13th FYP-MCTD*.
- *TA - Research on Technical Standard on Information Exchange and Service Mechanism for Urban Integrated Passenger Hub.* The output was directly issued by MOT as industry standard - *Integrated Passenger Hub Intelligent System Information Exchange Technical Specification* (JT/T 1117-2017). The outputs also contributed to another industry standard: *Integrated Passenger Hub Intelligent System Construction General Technical Requirements* (JT/T 980-2015).

33. **Urban Transport Energy Consumption and GHG emissions.** The major outcomes of the TAs under this category are as follows:

    - *TA-Urban Transport Energy Consumption Reporting System.* MOT issued the revised *Transport Sector Energy Consumption Statistic Reporting Regulation* in 2014 by adopting the outputs of this TA. It institutionalized and operationalized energy consumption data collection from operators nation-wide.
    - *TA-Urban Transport Carbon Emissions Monitoring and Evaluation System Study.* This TA established the first comprehensive model for urban transport carbon emission monitoring and evaluation system in China. A Guideline and a copyrighted software on Urban Transport Carbon Emissions Monitoring and Evaluation has been developed for national, provincial and city level transport authorities.
    - The New Energy Bus Operation Evaluation Framework Study developed an evaluation framework for new energy bus operation performance, which serves as a critical input for the MoT (the administration body for bus service) to assess the efficiency and performance of new energy bus operations and define the associated subsidy policy.

34. The details of the outputs and associated impact of the national level TAs are listed in ANNEX 1. The national policy developed under this Project is listed in ANNEX 7. The official endorsement letters from the national government confirming the contributions are listed in ANNEX 8.

35. **Institutional and technical capacity has been improved at MoT, PIUs and pilot cities to implement measures to tackle congestion and reduce emissions.** The Project surpassed all of the targets around institutional and technical capacity building, measured by the intermediate indicators listed in Table B-1.

- **This Project created a unique platform to engage all the major players in the eco-system to deliberate on the policy formation and strengthen institutional and technical capacity. The major beneficiaries include:** (i) **MoT** - the Comprehensive Planning Department (which is in charge of drafting comprehensive and sub-sector planning strategies, vetting planning and strategy documents and investment plans, and managing the overall statistics to monitor the performance of the sector, also hosts the National PMO), and other departments under MoT; (ii) **PIUs** - which are national research institutes affiliated with MOT and carrying out research activities for MOT in the areas of transport policy, strategy, technical guidelines, technologies, M&E and maintain information and databases for MOT's sectoral management (China Academy of Transport Sciences, Transport Planning and Research Institute, Research Institute of Highway, and China Transport News - an affiliated journal and dissemination channel of MOT); and (iii) **Pilot cities,** including the Transport Bureau/committee(s) of Suzhou, Chengdu and Harbin, and other departments and research institutes in pilot cities; and (iv) **Universities and academic societies,** such as Tsinghua University, Beijing Jiaotong University and Chinese Overseas Transport Association**.**
- **Institutional and technical capacity improvement was achieved through:** (i) development of the 14 TAs at the national level, which strengthened the technical capacity to manage traffic congestion and emission reduction through demand and supply measures; (ii) mobilization of external international and national consultants (including the Bank team) to provide advisory services to MOT and the PIUs to transfer global knowledge to local context and contribute to the behavior changes[11]; (iii) extensive consultations, awareness raising and consensus building across the MoT, PIUs and other stakeholders during the development of the 14 TAs[12]; (iv) extensive and well-planned knowledge sharing and dissemination events leveraging global best practices and peer-to-peer learning (see paragraph 36); and (v) effective feedback loops set up under the arrangement between MoT, PIUs and pilot cities, by involving the cities at an early stage of national policy development and testing out the draft policy in the pilot cities.[13] Sustainability was also guaranteed by the continuous involvement of government officials and technical staff in MOT, PIUs and PMOs.

36. **Extensive knowledge-sharing and dissemination activities anchored under TransFORM strengthened the replication effects of the pilot city demonstration.** Two elements are worth noting on these achievements: (i) Integration with MoT and the Bank's TransFORM platform[14], enabled the Project to engage with a wider network and broader audience inside and outside China; and (ii) activities were centered around the global best practices of TDM and PMT for traffic and GHG emission reduction, as well as experiences developed under the national TA and pilot cities.

PDO ELEMENT 2: TO HELP THE RECIPIENT IMPLEMENT THE POLICY FRAMEWORK IN PROJECT CITIES – SUZHOU, CHENGDU, AND HARBIN SO AS TO DEMONSTRATE ITS LOCAL AND GLOBAL BENEFITS

37. The PDO Element 2 is measured by three outcome indicators: Outcome indicator 2: Endorsement of the policy framework by at least three large cities; Outcome indicator 3: Increase in bus ridership and speeds during peak periods in the project affected areas of the pilot cities; and Outcome Indicator 4: Reduction in urban transport-related GHG emissions in the pilot cities. It was achieved through activities under Components B, C and D. The

[11] Based on the interviews, they appreciated the technical innovation and hands-on learning from working with the World Bank teams and external international consultants funded through projects as it was not easy for them to mobilize without the Project.
[12] Recorded in AM, Client's ICR, Endorsement letters from MOT and Pilot Cities and ISR
[13] Proved by Client's ICR, interviews with PMO, PIUs and Pilot cities.
[14] A knowledge sharing, and dissemination platform jointly established between Bank and MOT in 2014 and managed by China Transport News (CTN) is a newspaper office affiliated with MOT

outputs combined both upstream TA and downstream investments at the local level through PTD, TDM, M&E for GHG, and other completion measures, which corresponded to the national policy framework. All of the outcome indicators were either achieved or exceeded. In addition to the counterpart funds mobilized for the project, substantial funds were leveraged from outside the Project.

38. **The national policy framework has been endorsed by the three large cities and beyond.** In addition to the top-down effects of the national policy framework covering all large cities, the official endorsement letters provided by the three pilot cities acknowledged these national level policy studies as the key reference for the formation of local level strategy and policy, as well as implementation. Some key examples include:

- Suzhou, Chengdu, and Harbin have adopted recommendations from the national level TA-*Study of Synergy Policies between City's Transport Planning and City's Master Plan* in the formation of new masterplans under development to improve the integration of urban planning and transport planning.
- The national level *TA - Integrated Passenger Hub Layout Planning and Function Optimization Guidelines* has been applied in: (i) Suzhou, for building the Suzhou railway station and the Suzhou North railway station; (ii) Chengdu, for building the Jinsha bus terminal, the Chengdu East passenger hub and the Chengdu North passenger hub; and (iii) Harbin, for optimizing local passenger hubs as well as in the compiling municipal-level integrated transport hub development plan.
- The *Technical Standard on Information Exchange and Service Mechanism for Urban Integrated Passenger Hub* has been applied in constructing the Haxi Passenger Hub in Harbin, the Sihui Passenger Hub in Beijing, and the Sanya Airport terminal in Sanya.

Pilot City Suzhou, Jiangsu Province (GEF Grant: $3.91 million; Counterpart Funds provided: $48.15 million)

39. **Overall achievements of Suzhou: The Project demonstrated city-wide improvement in public transport mobility and traffic congestion, as well as GHG reduction in Suzhou.** Suzhou applied city-wide supply and demand measures, such as PTD, TDM and ITS in the historical city center of Suzhou and beyond, by utilizing the GEF Grant, counterpart funds, and leveraging investments from outside the Project. Table B-2.1 demonstrates the achievements through the outcome indicators and intermediate indicators. Details of the outputs and associated impacts are listed in ANNEX 1. The following sections discuss the key achievements beyond the indicators.

Table B-2.1 Outcome and Intermediate Result Indicator for PDO 2-Suzhou

	PDO Outcome Indicators	Unit	Baseline	Target (Dec.2018)	Actual (Dec.2018)	Achievement
Suzhou	***Outcome Indicator Three:*** increase in bus ridership and speeds during peak periods in project affected area in Suzhou (city-center area) [15]	Passengers per hour	170,000	220,000	255,863	116%
		Km/h	21.2	24	25.3	106%
	Outcome Indicator Four: Reduction in urban transport-related GHG emissions in Suzhou	Million ton	0 (Actual: 2.01)	0.41 (BAU:3.81; WP 3.39)	1.02 (BAU:3.81; WPA 2.79)	248%

[15] To complement this indicator: the public transport mode share has increased to 61% during the Project cycle. The city-wide user satisfaction survey of bus riders indicated improvement in the service level: from the average rating of 74.09 (out of 100) in 2013 to 82.99 in 2018. Suzhou has also passed the evaluation of MoT's evaluation on PTM. Although the mode share, user satisfaction increases and PTM development cannot be fully attributed to the Project, it provides a reference to assess the achievements.

	Intermediate Result indicator one: number of on-board information service devices procured in Suzhou	#	0	4,400	4,400	100%
	Intermediate Result indicator Two: Number of parking spaces that adopt differential parking policy in Suzhou	#	0	2,000	6,000	300%
	Intermediate Result indicator Three: Number of TA studies completed in Suzhou	#		6	12 (6 by GEF Grant; 6 by counterpart fund)	200%

40. **Substantial improvements in the city-wide bus network.** Four local level TAs[16] on hierarchical bus network planning and design laid the foundation for city-wide bus optimization. Based on the TA recommendations, three Bus Rapid Transit lanes selected from the study were put into operation with a daily passenger volume of 50,000, using counterpart funds and leveraging investments outside the project. The public embraced the new routes, and there was widespread media coverage. More broadly, supported by the four TAs, Suzhou took concreate actions to implement these plans by mobilizing additional investment, and added 112 new bus routes and optimized 218 bus routes (including 87 bus routes adjusted to complement the newly opened urban rail lines), with a daily passenger volume of 1.5 million.

41. **Operating the 280 CNG buses reduced energy consumption and pollution, and built up operational experience for future expansion** (using counterpart funds). Early adoption of the large clean energy bus fleet provided know-how and built confidence in Suzhou[17]. By the end of the project, with follow-on investments by Suzhou, 80% of the bus fleet was powered by clean energy sources (840 CNG, 1642 hybrid, 790 electric buses). The historic city center area is entirely served by clean energy buses.

42. **The management capacity and efficiency of transport agencies and bus companies have been considerably enhanced by advanced ITS, which is integrated with PTD and TDM.** The Project funded the design of Suzhou's information management and service system for transit riders; procurement of large sets of traffic monitoring systems and equipment; new e-card based ticketing system and 4,000 onboard information displays; a study of IC card-based demand analysis; and a traffic performance evaluation indicator system. Building on the Project investments, with additional investments by the city, the Travel Information System, the Traffic Control Center, and the Bus Dispatching Center were put into operation. The outcomes of these activities include: (i) improved the ticketing efficiency and user satisfaction; (ii) increased punctuality of bus operations to 93% on-time dispatching rate; (iii) better matching of bus supply and demand in real-time (congestion rate in buses reduced to 67.3% during peak hours); (iv) dramatically improved dispatching efficiency (78% reduction in terms of cost) by using an ITS based dispatching system; and (v) more than a million travelers benefited from enhanced travel information through the mobile app;

43. **Built on the ITS systems, the traffic police and other transport agencies are able to use real-time traffic information to better perform traffic management tasks.** It also largely strengthened the enforcement capacity of traffic police on regulating the right of way of bus priority lanes; 30,000 tickets were issued to private cars for

[16] 1) Assessment of Bus Rapid Transit lanes and planning design for two dedicated BRT Lanes and additional study for detailed planning of another 2 BRT lines (GEF); 2) The implementation plan of urban arterial bus route network (Counterpart fund); 3) the study of integration of urban rail and conventional bus (Counterpart fund); and 4) detailed design of 2 BRT lanes in city center (Counterpart fund).

[17] Client ICR report and interviews with transport authorities and bus operators.

illegally occupying the dedicated bus lanes. 108 roads were optimized using follow-on investment to operate as one-way, resulting in a 21% reduction in traffic congestion and 23% reduction in accidents.

44. **Differentiated parking policy has been developed, adopted and implemented in Suzhou, resulting in substantial congestion reduction.** The Project funded a TDM strategy and parking planning study, a differentiated parking policy with a pilot implementation plan, and a parking management system with 230 mobile charging devices. The outcomes include:

    - **The recommended differentiated parking fee structure[18] has been adopted by the relevant authorities:** 6,000 parking spaces have been designated to comply with the differentiated parking fee structure (three times the targets). After implementation, the number of cars entering the city center area has been significantly reduced, and the daily turnaround of parking slots increased from 2.22 to 2.59 times.
    - **Promoted modal shift and reduced congestion through Parking + Ride (P+R):** Guided by the TDM strategy and parking planning study, Suzhou has further invested/ configured 24 P+R parking lots, with 10,916 spaces added in the outskirts of the city to encourage commuters to transfer from private cars to urban rail; the daily usage is more than 60,000.

45. **Several TDM strategy was developed and adopted by Suzhou:** In addition to the TDM and parking policy studies mentioned above, the project also funded a TOD study and a congestion pricing study.

    - **Cross-sectoral local strategies were developed to integrate land use and transport planning.** The output of the TOD study contributed to the refinement of the existing "Suzhou Urban Plan" and "Suzhou Urban Comprehensive Transport System Plan", led by the Suzhou Planning Bureau.
    - **Mind-set changes to congestion pricing.** At project preparation, Suzhou was quite hesitant to allocating the GEF grant to a congestion pricing TA, as it felt that this would never be put into operation. The TA illustrated the effectiveness of pricing and developed several options for implementation, which raised awareness among stakeholders. At closing, Suzhou greatly appreciated this forward-looking study which has prepared Suzhou for its implementation in the future.

46. **Suzhou - Institutional and Technical capacity. The major beneficiaries in Suzhou are**: Transport Bureau, City Planning Bureau, Traffic Police, Public Transport Companies, Finance Bureau, Parking Management Office, and Environment Bureau. Capacity was strengthened through implementing local level TAs and other activities, involvement in national level TA development, and specific capacity development activities. In addition to participating in the events organized by the national PMO, Suzhou organized 10 knowledge sharing and dissemination events with more than 2,000 participants. The forward-looking design of using both PTD and TDM equipped Suzhou to be a step ahead when dealing with emerging issues. The project played an important role in awareness raising and gaining practical technical know-how from the international platform created by the Project.

Pilot City Chengdu, Sichuan Province (GEF Grant: $3.00 million; Counterpart Funds at completion: $25.83 million)

47. **Overall achievements of Chengdu: The Project demonstrated improvement in public transport mobility and traffic congestion, as well as GHG reduction.** Chengdu delivered nine TAs and several sets of ITS systems and equipment (funded by GEF and counterpart funds). It also led to several major follow-on policy formation and investments. Table B-2.2 demonstrates the achievements through outcome indicators and intermediate

[18] 55 different fee levels differentiated by region, vehicle type, and time

indicators; details of the outputs and associated impacts are listed in ANNEX 1. The following sections discuss the key achievements beyond the indicators.

Table B-2.2 Outcome and Intermediate Result Indicator for PDO 2-Chengdu

PDO Outcome Indicators		Unit	Baseline	Target (Dec.2018)	Actual (Dec.2018)	Achievement
Chengdu	***Outcome Indicator Three**:* increase in bus ridership and speeds during peak periods in project affected area in Chengdu [19]	Passengers per hour	20,000	30,000	33,300	1 11%
		Km/h	13	16	18	113%
	Outcome Indicator Four: Reduction in urban transport-related GHG emissions in Chengdu	Million ton	0 (Actual: 3.17)	0.63 (BAU:6.15; WP 5.52)	1.33 (BAU:6.15; WPA:4.82)	211%
	Intermediate Result indicator Four: Number of junctions upgraded in Chengdu	#	0	2	55	27.5 times
	Intermediate Result indicator Five: Area that have implemented differential parking policy in Chengdu[20]	Km2	0	50	597	11.94 times
	Intermediate Result indicator Six: Number of TA studies completed in Chengdu	#	0	5	9 (GEF)	180%
	Intermediate Result indicator New: Number of electronic bus signs and variable message signs installed	#	0	500	702	140%

48. **Chengdu - Public Transport Development Integrated with ITS.**

- **The integrated database and comprehensive transport model** funded by the Project enabled data collection and monitoring of the level of public transit development, evaluation of policy effects on urban transport improvements, and provision of data support for transport planning, traffic impact analysis, public transit optimization, public transit prediction, and decision making.
- **City-wide bus network optimization and planning updates have been supported by the TA and deployed ITS.** Major optimization and planning updates were performed for the city center, medium capacity public transit corridors, Tianfu New Zone and Tianfu International Airport. Implementation of the optimization was followed up by specific additional investments from the respective transport agencies and bus operators.
- **Bus operations have been given priority on the road network** through junction channelization in selected areas, and the systematic upgrade of the Area Traffic Control system (funded by the Project). 55 junctions have been upgraded (27.5 times the target) to increase the operational efficiency of the main road and to support bus priority by utilizing counterpart funds and other funds.

[19] To complement this indicator: the public transport mode share (among the motorized modes) has increased from 45% to 53% during the Project cycle. the city-wide user satisfaction survey of bus riders indicated improvement in the service level: from the average rating of 92.92 (out of 100) in 2016 to 93.21 in 2018. (Earlier surveys were not available/ comparable). The Air Quality index has improved from 4.69 to 4.21. Although the mode share, user satisfaction increases, and air quality improvements cannot be fully attributed to the Project, it provides a reference to assess the achievements. From 2013-2018, Chengdu's total auto ownership increased 46%.
[20] Although dropped during the first restructuring, the project exceeded the original end target.

- **Service quality at bus stops has been improved by real-time bus arrival information**. Bus users are served by real-time bus arrival information at more than 700 bus stops (financed from counterpart funds) which increased user satisfaction and punctuality.

49. **Chengdu - Travel Demand Management.** TA at the local level - *The Congestion Alleviation Policy* provided a comprehensive toolkit and analysis for Chengdu to reduce congestion by leveraging global best practices and adapting them to the local context. Fourteen local policies and measures recommended by the TA have been further developed and implemented by Chengdu using its own funds[21]. These include: (i) Established steering committee for traffic alleviation at the top level of Chengdu government and established steering committees at each district level of governments; (ii) Differentiated parking policy has been implemented covering 597 km^2 (12 times higher than the original targets); (iii) Promoted TOD principles and invested in TOD projects (signed MOU for implementing TOD around Chengdu's urban rails system in 2018, the government and railway companies have issued many RFP for TOD design and implementation); (iv) Issued *Technical Guideline on Promoting Small blocks in Urban Areas* in 2016; (v) Piloted HOV lane in 2017; (vi) Optimized the city-wide bus network and improved the services quality; (vii) Optimized the bus dedicated lane networks; (viii) Promoted and invested in non-motorized transport system; (ix) Implemented the city-wide junction channelization and signal optimization; (x) Two urban public transport express corridors (K3 and K11) are in operation; (xi) The urban traffic index system is in operation; and (xii) Improved the traffic management around construction sites.

50. **Chengdu - Institutional and Technical capacity. The major beneficiaries in Chengdu are:** Transport Commission, City Planning Bureau, Traffic Police, Bus Companies, Finance Bureau, Urban Rail Company, Bus terminal companies, and the Environment Bureau. In addition to participating in the knowledge sharing and dissemination events organized by the national PMO, Chengdu PMO organized and attended an additional 24 training events. Interviews and the Client's ICR indicate that the transport agencies involved in the project benefited a great deal from the advanced and innovative project design and the advisory services mobilized through the international platform and national level support. The client emphasized that the Project helped Chengdu to build ITS capacity from scratch. All key staff received extensive training and on-job learning through the project. Many of them have been promoted to more important positions within the transport agencies, where they will continue to apply the comprehensive approach to sustainable urban transport development.

Pilot City Harbin, Heilongjiang Province (GEF Grant: $3.01; Counterpart Funds at completion: $25.32 million)

51. **Overall achievements in Harbin: The Project demonstrated improvements in public transport mobility and traffic congestion, and GHG reduction.** Table B-2.3 demonstrates the achievements through the outcome indicators and intermediate indicators; details of the outputs and associated impacts are listed in ANNEX 1. The following sections discuss the key achievements beyond the indicators.

Table B-2.3 Outcome and Intermediate Result Indicator for PDO 2-Harbin

PDO Outcome Indicators		Unit	Baseline	Target (Dec.2018)	Actual (Dec.2018)	Achievement
Harbin	***Outcome Indicator Three:*** increase in bus ridership and	Passenger per hour	64,000	96,000	94,000	98%
		Km/h	18	22	23	105%

[21] Based on Client's ICR, Chengdu PMO's presentation at the final project dissemination workshop, and interviews.

	speeds during peak periods in project affected area in Harbin					
	Outcome Indicator Four: Reduction in urban transport-related GHG emissions in Harbin	Million ton	0 (Actual: 2.78)	0.4 (BAU:4.53; WP 4.13)	0.48 (BAU:4.53; WPA:4.05)	120%
	Intermediate Result indicator Seven: Length of bus dedicated lanes developed in Harbin	km	0	6	6 (counterpart funds)	100%
	Intermediate Result indicator Eight: Number of TA studies completed in Harbin	#	0	5	5 (GEF)	100%

52. **Harbin - Public Transport Development Integrated with ITS.** Under this category, the Project funded two TAs, 6 km bus priority lanes and 300 CNG buses, upgrades of the existing public transport dispatch center, taxi management system and data center including software and hardware procurement. In addition, it also leveraged additional investments by the city.

- **The 6 Km dedicated bus lane on Heping-Haping Road increased bus operation efficiency and speed** from less than 12 km/hour on average to 40 km/hour on some routes and received positive feedback from bus drivers and passengers. The newly procured 300 CNG buses have largely improved the riding experience of passengers and the working environment for drivers. As Harbin experiences extreme cold weather in winter, the buses are now equipped with heating for passengers and drivers.
- **The findings of the channelization study have been adopted by the traffic police** in April 2017 **for upgrading the Lesong Plaza junction**. The city followed up with investments in channelization. After reconstruction, the traffic capacity of the junction increased from 9,000/hour to 12,000/hour, and significantly alleviated congestion in the junction and nearby.


Before


After

- **The public transport dispatch center and taxi management system were strengthened through hardware and software upgrades** (funded by the Project). These improvements have built a strong foundation in terms of system structure and operational experiences for designing and implementing the later approved Bank financed project. The taxi management division under the transport agency speaks highly of the system upgrades.
- **Improved capacity regulates shared-mobility services based on data analytics.** Most of the shared-mobility services operated in Harbin are monitored through the platform. Harbin is better able to manage the roles under the government's mandate – safety, security, avoidance of monopoly, and equity of taxi and shared-mobility services.

53. **Harbin - Travel Demand Management.** The bus station parking management system (funded by the Project) has been monitoring illegal street parking around major bus stations. Cameras are deployed at key transport corridors and ring roads to enforce the right of way for buses and ensure passenger safety while boarding buses.

54. **Harbin - Institutional and Technical Capacity. The major beneficiaries in Harbin are:** Transport Bureau, Taxi Management Department, Traffic Police, City Planning Bureau, Bus Companies, and Finance Bureau. Interviews

and client statements in the closing workshop indicated that the overall management capacity of the transport system and project management capacity have been significantly enhanced through implementing this GEF project, benefiting from World Bank and national PMO' international operational expertise including social and environmental safeguards and procurement. A follow-up Bank supported project has commenced with the same implementing agency.

Achievement of Global Environmental Objective

55. **The Project has successfully reduced GHG emissions from a business-as-usual scenario directly through improved bus speeds and modal shifts to public and non-motorized transport in the three pilot cites, indirectly through replication of the successful pilot actions that would be supported by central policy, strategy and technical guidelines developed under the project.** Global benefits of GHG reduction of 2.93 million-tons have been achieved at project closing, which will accumulate to 56.63 million-tons by 2028[22]. The improved bus speeds and increased bus ridership are recorded in Tables B 2.1 to 2.3. Public transport mode share[23] has increased from 45% at appraisal to 53% at Project closing in Chengdu[24], and has reached 61% in Suzhou in 2018. Actions have been taken by the three pilot cities and beyond to develop corresponding local policies in a holistic manner, followed up by strategic plans and specific investment outlined in the national and local policy. The Project has therefore fully achieved its GEO.

Justification of Overall Efficacy Rating

56. **Based on the discussions above,** the project has exceeded the targets of several outcome and intermediate indicators that measure the achievement of the two PDO Elements. The project also fully achieved the GEO based on the above discussions. The targets set in the M&E were particularly ambitious, as they required the adoption of complex policies at national and local levels, as well as substantial pilots in three large cities, all within a six-year implementation period. In view of the above, the overall efficacy is rated **High**.

C. EFFICIENCY

Assessment of Efficiency and Rating

57. Economic analysis was not carried out at appraisal, as the project supported policy and strategy formulation at the national level and tested a range of policy and technological interventions in a holistic manner at the three pilot cities; however, the project did not directly support major transport infrastructure. The ICR assesses the project's efficiency based on three factors: cost effectiveness of the GEF Grant for CO2 emission reduction; administrative efficiency (compared to other similar projects); and an ex-post cost benefit analysis of selected interventions in the pilot cities. Details of the analysis are presented in ANNEX 4.

58. **Cost Effectiveness of the GEF Grant for emission reduction**. The GEF Grant of US$17.6 million has resulted in reducing CO2 emissions by 56.6 million tons, based on conservative estimates. The GEF contribution per ton of CO2 is US$0.31. The unit cost of CO2 reduced against the total project cost (GEF and counterpart funds) of US$121.7 million is US $2.2 per ton. This is a conservative estimation for two reasons: (i) the pilot cities have follow-on investments to further implement the national and local policy, which will generate on-going emission reduction benefits, however, these are not quantified in this analysis; and (ii) although the project has substantial nation-wide policy impact on large cities, the ICR only calculated direct emission benefits from the three pilot

[22] Detailed calculation is described in ANNEX 6.
[23] As the Project did explicitly monitor the mode share changes in project affected area, the city-wide mode share changes serve only as reference point. It cannot be fully attributed to the Project. But the increased bus ridership is a result of preventing the modal shift into the private car.
[24] For Chengdu, the public transport mode share data is defined as the public transport mode share among the motorized trips. The data is provided by the Chengdu PMO. re

cities. Despite the conservative estimation, the project has proved to be more cost-effective, compared to similar GEF transport projects in China, India and Latin America.

Comparing similar GEF projects in the transport sector	The GEF contribution -Cost-Effective ratio: US$ per ton of CO_2
China- GEF-Large City Congestion and Carbon Reduction Project (GEF Grant US$17.6 million, US$ 121.7 million total cost)	US$0.31 (GEF), US$ 2.2 (total)
China- GEF Urban Transport Partnership Program (IEG rating MS) (GEF Grant US$17.3 million, US$ 27 million total cost)	US$4.14 (GEF)[25]
China-GEF City Cluster Eco-Transport Project (IEG rating S) (GEF Grant US$ 4.53 million, US$ 34.12 million total cost)	US$ 24.5 (GEF)[26]
China-GEF Guangdong Green Freight Demonstration Project (IEG rating MS) (GEF Grant US$ 3.7 million; US$ 13.97 million total cost)	US$ 23 (GEF)[27]
India: GEF-Sustainable Urban Transport Project (ICR rating MS) (GEF Grant US$ 10.5 million; US$ 318 million total cost)	US$ 12.9(GEF)[28]
Mexico-GEF Sustainable Transport and Air Quality (IEG rating MS) (GEF5.2 million; US$ 36.78 million total cost)	US$ 0.95 (GEF); US$84.4 (Total)[29]

59. **Ex-post cost-benefit analysis for selected interventions in the pilot cities**. The ICR selected two interventions from among the interventions in the three project cities for the ex-post analysis. (a) The dedicated 6 km bus lane in Harbin – The improvements could largely be attributed to the project. The M&E data captured changes. (b) The entire pilot in Suzhou – Suzhou implemented a holistic city-wide improvement and the M&E captured city-wide data. However, as Suzhou also substantial investments in this area beyond the project, the EIRR of this intervention cannot be fully attributed to the project.

60. As shown in table below, the Economic Internal Rate of Return (EIRR) estimates for the two interventions range from 26% to 47%.

[25] ICR and IEG report of GEF GEF Urban Transport Partnership Program
[26] ICR and IEG report of GEF City Cluster Eco-Transport Project
[27] ICR and IEG report of GEF Guangdong Green Freight Demonstration Project. At the appraisal, it was estimated at US$ 3.5 per ton. However, at the completion, it was much higher – US$ 23 per ton.
[28] Based on author's calculation
[29] IEG report of GEF Mexico-GEF Sustainable Transport and Air Quality. It was estimated around US$ 4-15-5.20 at the ex-ante analysis. However, at the ex-post cost-effectiveness analysis, the result was much higher.

The dedicated 6 km Bus lane in Harbin	EIRR (%)	NPV (USD million)	The Component B- pilot in Suzhou	EIRR (%)	NPV (USD million)
Base	47%	44.91	Base	26%	134.71
Project costs increase by 25% (to capture additional investment made outside the project)	38%	42.31	Project costs increase by 200% (3 times, to capture additional investment made outside the project)	11%	59.49
User benefits reduced by 25%	34%	30.14	User benefits reduced by 50%	16%	48.55
Operator costs increase by 50%	46 %	44.83	Operator costs increase by 200% (3 times)	26%	132.66

61. **Administrative Efficency**. The PMOs and the PIUs procured 71 contracts in all. All planned activities were completed at a high quality, within estimated costs. Savings due to competitive bidding were utilized for additional activities. Only a six month extension of the grant closing date was required. Knowledge sharing activities were very efficient through integratin with TransFORM. Staff time and costs were lower than those of comparable projects (see Annex 4).

62. Taking into account the above factors, **efficiency is rated Substantial.**

D. JUSTIFICATION OF OVERALL OUTCOME RATING

63. The overall outcome of the project is rated Highly Satisfactory, based on Relevance of the PDO and Efficacy being rated High, and Efficiency being rated Substantial.

E. OTHER OUTCOMES AND IMPACTS (IF ANY)

Gender

64. The TOC of gender mainstreaming of this project was that project benefits will accrue slightly more to women than men, in part because women are currently discouraged from taking public transport, as they perceive the service to be less comfortable. As such, the project's contribution to improving bus operations on the selected corridors will mean an increase in women's use of buses in the pilot cities increased. A substantial number of key technical staff in the National PMO and city level PMOs, as well as PIUs, were female. Interviews indicate that the technical and project management capacity of female technical staff was enhanced through the project. This is evident from the promotion rate of the female staff[30].

Institutional Strengthening

65. The project substantially strengthened institutional and technical capacity at the national and local levels. One of the highlights was not envisioned at the beginning of the project, i.e., the integration of the knowledge events with TransFORM. This proved to be a big success and improved the overall efficiency, effectiveness and

[30] Take Chengdu for example, the female staff in the PMO accounts for 61.5% (8 out of 13). Two of the key female staff got promoted before the project ended. There are 31 technical staff continuously participated in the TA project implementation and capacity building component. 17 of them are female (55%). They valued highly of the opportunities to get extensive exposures to international and national best practices, as well as the on-job-training of

sustainability of knowledge sharing and dissemination. It in turn scaled up the demonstration effects of national and local level activities. (refer to paragraph 36)

Mobilizing Private Sector Financing

66. Although the project did not identify this as a specific concern in the PAD, two activities facilitated the mobilization of private sector financing: (i) in Chengdu, the TOD study developed under the Traffic Alleviation TA was endorsed by the government with a signed MOU for implementing TOD around Chengdu's urban rail system, which encouraged market participation in TOD projects and improved market readiness[31]; and (ii) through the shared-mobility IT platform, Harbin was able to better manage the roles under the government's mandate, which included, *inter alia*, equity of the taxi and shared-mobility services.

Poverty Reduction and Shared Prosperity

67. The project's contribution to improving access to public transport and the quality of the public transport services are all expected to be pro-poor, as the poor are more likely to travel by public transport. Suzhou and Chengdu have already implemented the differentiated parking policy in a number of parking spaces across the city, which results in greater equality among the users of infrastructure and services.

Other Unintended Outcomes and Impacts

68. **Air pollution reduction** resulting from the measures taken to reduce the GHG emissions is a major co-benefit of the project[32]. The government also raised awareness on improving public transport and encouraging modal shift as a means to tackle both GHG emissions and local air pollution. More importantly, the governments gained experience in implementing these measures and tested their effectiveness.

69. **South- South Exchange.** The project facilitated South-South Exchange, which supported the achievement of the Pillar 3 under the CPS: "Advancing mutually beneficial relations with the world through supporting China's South-South Cooperation and Supporting China as a Global Stakeholder". It facilitated many two-way exchanges through knowledge events [33]. TransFORM's new mandate includes the sharing of China's experience with the world.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

70. **Clear, appropriately ambitious and responsive PDO.** The PDO responded to the priorities defined in the CPS, the national and the transport sector strategies, and the GEO. The PDO was clear and was appropriately ambitious. The challenges were clearly identified and well communicated with MOT, national PMO, PIUs, and local governments.

implementing the project using World Bank procedure.

[31] In Feb. 2019, Chengdu hosted a high-level TOD business development conference aimed to attract global investment to popularize integrated TOD development in Chengdu. Four major projects were signed at the conference, with an investment of RMB 24 billion. News link: The Chengdu TOD Business Development Conference *http://cd.newssc.org/system/20190301/002617722.html*

[32] Although it is not explicitly quantified in the project, it is at least approximately proportional to the energy consumption reduction.

[33] e.g. high-level study tour to Brazil and Colombia to learn the traffic congestion reduction measures through PTD and inviting experts to China to introduce the experiences from other developing countries. The Bank team invited the government officials who were implementing a similar GEF project in India to China and also got invited to India to exchange the experiences

71. **Soundness of the design, with effective forward-looking policy interventions and demonstrations:**

- **Combining upstream and downstream interventions.** The components were well structured with clear operational logic, combining both upstream and downstream interventions, which then created an overarching platform for enhanced policy dialogue and peer-learning.
- **The World Bank leveraged its global knowledge in the design of the project.** Recognizing the importance and political difficulties of TDM implementation in China, the project adopted a ladder approach to implement TDM measures through a series of incremental steps, and tailored the design for different cities. Extensive awareness raising events and technical assistance during the project preparation helped to fill knowledge gaps and gain buy-in from national and pilot cities to implement unconventional and politically sensitive measures, which need mind-set changes (such as integrating land use and transport, differentiated parking policy, integrating ITS with PTD and TDM, and GHG monitoring).
- **Lessons learned in past projects were also reflected in the design** by limiting the number of pilot cities to reduce the project complexity[34], and through review and guidance in shaping the project concept.

72. **Strong government commitment and appropriate selection of stakeholders:** (i) the national government demonstrated its strong commitment and ownership to the project, given its high relevance to meet the government's priorities; (ii) the major think tanks proved to be highly effective in influencing and deliberating the policy agenda for the national government and ensuring the suitability of the outcome; (iii) the competitive selection of pilot cities ensured that they were committed to take initiatives to carry out project activities; (iv) MOT collaborated effectively with the pilot cities and the World Bank team in project preparation; and (v) the pilot cities provided sufficient counterpart funding (five times larger than the GEF Grant).

73. **Adequacy of risk and mitigation measures.** Risks and mitigation measures were adequately identified. While procurement risks were identified and partially mitigated by enhanced support from the national PMO to the and City PMOs[35], as well as extended support from the Bank, the efforts needed to manage the large number of contracts was underestimated. Contract packaging could have been streamlined by consolidating some of the individual expert contracts into firm contracts.

B. KEY FACTORS DURING IMPLEMENTATION

Factors subject to the control government and/or implementing entities

74. **Coordination and engagement**. Overall, coordination and engagement were carried out as designed. There was high capacity at the national PMO with a project champion (the project director), and relatively high capacity at the pilot cities. Suzhou PMO demonstrated outstanding capacity to manage cross-agency coordination and engagement, given that the urban transport function was dispersed in multiple agencies in Suzhou.

75. **Commitment and leadership**. The national government and pilot cities kept their strong commitment and leadership over the entire project, except for the period where when changes were made to management positions. Given that the project was implementing unconventional but innovative measures, it took additional time for the new management to absorb the original concept, in particular the activities around the TDM measures. Moreover, consolidation was needed to seek synergies and avoid repetition of a few national level TAs for timely contribution to national policy.

[34] The GEF urban transport partnership project included 14 pilot cities. It was recommended to include fewer demonstration cities to reduce project complexity.

[35] The national PMO was familiar with the Bank's fiduciary and safeguard policies. The City PMOs, however, had not worked on Bank projects before. Therefore, the national PMO was tasked to support the City PMOs in procurement.

76. **Additional activities**. During the first restructuring, four additional TA activities and knowledge dissemination activities added to Component A: National Level Support, using projected savings of US$1.4 million from the procurement of other TA and capacity building activities as a result of competitive bidding. These packages helped scale up the impact of the project.

77. **Effective quality assurance for TA activities.** The quality and applicability of the outputs to the policy making process were ensured by MOT's internal and external expert review panels, consultations with relevant authorities and cities (including the Pilot cities), and the Bank's team, at each stage of development.

78. **Procurement.** There were some delays in procuring large TA contracts at national and local levels, and equipment in Chengdu and Harbin, as the PMOs were not familiar with Bank procedures. After the National PMO gained additional support from individual procurement consultants and extended support to the local PMOs, procurement capacity improved substantially.

Factors subject to the control of the World Bank

79. **Implementation support from the Bank**
    - **The project benefited from close and proactive implementation support** from the task team that had strong global knowledge and operational expertise, enabling timely communication and technical support. The Bank added value by mobilizing global knowledge and through its unbiased convening power to engage multiple stakeholders. The Bank also effectively monitored the 71 contracts under the Project and ensured that the ToRs and outputs from the TAs had been discussed and reviewed in workshops organized by MOT, together with the expert panel.
    - **Policy influence was strengthened by integrating the TransFORM platform with the Project.** The Bank was mobilized resources from outside this project to support the TransFORM platform, and thus contributed to creating a sustainable framework and platform for knowledge sharing from the project and beyond.

Factors outside the control of government and/or implementing entities

80. **Transferring the Designated Account (DA).** The PMO was informed by MOF that the DA at the national level needed to be transferred from MOF to the line ministry of this project, MOT. It was reported by the PMO that the DA stopped disbursing in March 2017, which resulted in difficulties in project implementation. The ISR recorded that "challenges on the procurement and disbursement ('force majeure' outside of the control of the PMO) due to MOF's unilateral decision to transfer all GEF DA accounts, which needed time to be resolved and find a host that was satisfactory to the Bank."

81. **Policy and institutional changes on cross-ministerial issues where coordination from the highest government is needed.** It was a remarkable achievement for MOT to establish the policy framework; however, some remaining ambitious tasks could have been completed if higher level government had convened other line-ministries, coordinated the policy formation process, and made decisions. For example, the TA on integrating the City Master Plan and Transport Plan recommended that the national government change the approval procedure to make integration a mandatory requirement. Despite political consensus having been reached among the stakeholders and sound technical design having been proposed during the implementation of the TA, the institutional changes did not occur[36]. However, based on interviews, it is expected that the foundation laid by the analysis and this particular recommendation will have a profound impact in the future[37].

[36] This needs joint efforts from MOT, local transport authorities, Ministry of Housing and Construction and respective local authorities, Ministry of Land resources and respectively local authorities.

[37] A very recent reform gives the Ministry of Natural Resources of the People's Republic of China the overall coordination and oversight role for all type of

IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

A. QUALITY OF MONITORING AND EVALUATION (M&E)

M&E Design

82. **A logical, comprehensive results framework (RF) was designed at appraisal to monitor progress towards achieving the PDO.** The RF was appropriate, although the targets were ambitious. The indicators, measurement and data collection methods were adequate, clearly defined, quantifiable and time-bound. Most of the PDO level results indicators (except for the GHG reduction indicator) were straightforward, and both the national and local PMOs had the capacity to collect the data required. The city-wide improvement targets for Suzhou and GHG emission reductions to linked with city-wide data collection effects- it outperformed the World Bank Group's urban transport portfolio as most of the projects were intended to achieve city-wide mobility improvements, nonetheless in fact measured mobility within specific systems or geographic area with the interventions[38].

83. **Effective M&E arrangements were proposed**, which assigned main responsibility to the national PMO to monitor the overall M&E of the project, with inputs from the City PMOs. The design was very explicitly about tracking the status of policy framework development and adaptation[39]. It was better than the World Bank urban transport portfolio, as most projects did not track the outputs of policies, planning and strategies[40]. The institutional arrangement was well designed: the national PMO was tasked for overall M&E, with support from the pilot cities on data collection.

84. **The Bank team properly addressed the challenges of M&E of GHG emissions reduction**, and laid the foundation for the integration with national and local M&E systems. Globally, at Project preparation, the methodology for urban transport GHG emission was still at the development stage and was a cutting-edge topic. The Bank team provided extensive assistance to the MOT and the pilot cities to develop the methodology for future estimation and to collect the data for a baseline calculation. The project explicitly included technical assistance (implemented by PIU-CATS) on developing the statistical mechanism and evaluation method for urban transport-related energy consumption and GHG emissions, as well as support for data collection for the three cities.

M&E Implementation

85. **M&E implementation was satisfactory.** Despite an initial delay in implementing the GHG emission part, data on project implementation were reported to the Bank regularly in the required templates. The collected data were adequate for the assessment of the achievement of the PDO and intermediate indicators. During the restructuring, the M&E indicators were revised slightly to reflect the greater ambition and changes due to the adoption of more advanced data collection. The Project not only tracked the policy outputs, but also provided evidence as to whether plans, policies or strategies were adopted, through official endorsement letters. It is an outstanding achievement, as based on IEG evaluation across the World Bank Group's urban transport portfolio, only 36% the projects tracked outputs, and far fewer projects provided evidence.

planning documents. On May 28, 2019, the Ministry of Natural Resource issued a directive rolling out 'multi-to-one plan', which means from now on all urban plans submitted for approval need to include all aspects.

[38] Page 25. *An IEG Evaluation of the World Bank Group's Support for Urban Transport.*

[39] The National PMO was responsible for keeping track of the status of the policy framework and document the official notice when they have been adopted by MOT.

[40] Page 46. *An IEG Evaluation of the World Bank Group's Support for Urban Transport.*

M&E Utilization

86. **The M&E data and performance were effectively used to inform project management and decision making.** The M&E framework was proactively used to deal with identified issues and support the MOT and the Bank in project restructuring and making decisions on project implementation. At the ICR stage, one indicator for monitoring the pilot in Chengdu was no longer directly linked with Bank's specific physical intervention due to changes during implementation. However, this was neither identified nor modified during implementation.

87. **Tracking policy outputs and implementation status enhanced the impact of M&E, and provided lessons for future interventions.** Two outcome indicators were related to the adoption of the policy framework by MOT and endorsement of the policy framework by cities. As policy development and implementation took time, it was difficult to track progress during the six years of the project's life. But the Task team advised the national PMO to provide official endorsement letters from MOT, and the local governments outlined the achievements of most of the national TAs. Although this was done only around 2016, it was very helpful for analyzing the effectiveness of the TA and associated project arrangements.

88. **Through the Project, the first comprehensive model for urban transport carbon emission monitoring and evaluation was established in China.** A Guideline and a copyrighted software on Urban Transport Carbon Emissions Monitoring and Evaluation has been developed for national, provincial and city level transport authorities.

Justification of Overall Rating of Quality of M&E

89. Based on the assessment above, the overall quality of M&E is rated **Substantial**.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

90. **Social**. All project activities were limited to the right-of-way of existing urban streets, and neither land acquisition nor involuntary resettlement was expected. Hence, the Bank safeguards policy OP/BP 4.12 was not triggered. Throughout the project cycle, the rating for safeguards were satisfactory. The project was in compliance with the social safeguards policies.

91. **Environment**. The project triggered OP4.01 Environmental Assessment, and was classified as a Category B project. Due to the minor environmental impacts which could be avoided, minimized and mitigated with good design and construction management, an Environmental Management Plan (EMP) was developed by Chengdu and Harbin. The EMPs included screening of potential environmental impacts and a set of standard Environmental Code of Practices (ECOP) that were included in contracts to mitigate potential environmental and social impacts. For the feasibility study of two bus lanes in Suzhou, an Environmental Management Framework (EMF) had been prepared to guide the Environmental Assessment (EA) during the feasibility study. The EMPs and EMF were publicly disclosed locally through the city government websites (June 2012), and the World Bank Infoshop (June 2012). The implementation of these EMPs was satisfactory during project implementation stage, and no legacy environmental issues were identified in any of the three cities.

92. **Procurement**. Procurement under the project complied with Bank Procurement Guidelines and procurement performance was satisfactory.. In total there 71 contracts were procured, including 17 consultancy service

contracts with firms, 34 contracts engaging individual experts, three non-consulting service contracts, and 17 goods contracts. All contracts were completed before the project closed. There were delays in selection for large TA contracts due to the lack of familiarity with Bank procurement policies and procedures. However, these were addressed by additional support from the national PMO and the Bank team. The national and pilot city PMOs hired individual procurement experts or procurement agents to enhance their knowledge and expertise. Sporadic cases of irregularities by consulting firms were identified by the government auditor; these were mostly associated with the authenticity of information provided in the proposals and contract administration. The PMO followed up on these matters and took prompt remedial actions.

93. **Financial Management (FM).** Throughout the project, FM was rated satisfactory. The project complied with all applicable FM polices. Although some project interim financial reports (IFRs) were submitted to the Bank with slight delay, they were of sound quality and were acceptable to the Bank. All audit reports were unqualified (clean) and no significant FM related control weaknesses were highlighted. Delays caused by transferring the DA from MOF to MOT was outside the control of the implementing agency.

C. BANK PERFORMANCE

Quality at Entry

94. The project was built on the government's development priorities and was closely aligned with the Bank's engagement strategy. The Bank worked effectively with the government to design this project, which was instrumental in shaping the frontier of urban transport and addressed challenges in reducing congestion and GHG emissions in large cities. The project design was sound, and covered all required aspects for project implementation, with effective forward-looking interventions and clear guidance for project implementation. The institutional arrangements were well-designed, with strong commitment from the client. Safeguard and fiduciary aspects were thoroughly prepared. The M&E design was sound and contributed to the national system beyond the Project. The risk mitigation measures were well-designed and incorporated lessons learned.

95. The Bank mobilized its global network and provided extensive assistance to the MOT to develop the Terms of Reference (TOR) for technical assistance on the national TDM policy framework and technical guidelines. The different TDM programs were tailored to the needs of the three pilot cities. The inputs from Bank team were considered as instrumental in project preparation and the smooth implementation. The client speaks highly of the design of the Project, which truly brought added value to the national and local governments.

Quality of Supervision

96. The World Bank team supervised the project implementation closely and effectively by focusing on technical aspects and project management, and provided timely and adequate support to the clients to strengthen progress toward achieving the PDO. Given that the Project involved four PMOs and four PIUs with 71 contracts in all, the task team carried out two regular missions annually, as well as technical missions and meetings as required, to support the client in addressing issues and conducted review meetings to ensure the quality of the TAs. Bank supervision also benefited from the presence of the TTLs and key members in Beijing, as this facilitated day-to-day implementation support.

97. The Bank team emphasized the importance of quality control of the TAs (14 National level and 26 Local level TAs) by mobilizing the Bank's global knowledge throughout the project and spending tremendous efforts in procurement support. The team engaged policy makers and leaders in MoT and the pilot cities during the

implementation of the various studies, including when ToRs were prepared and when various outputs were delivered by the consultants and research institutes. This created a platform for the Bank to bring international experience in the formulation of future policies for the transport sector in China[41]. The Bank also combined the resources of several other projects to bring top experts to the project throughout the project cycle[42].

98. **The World Bank deepened the engagement with the national government and strengthened its convening power in the transport sector through the platform created by the Project.** This Project is the Bank's first comprehensive engagement with MoT, after MoT became the line ministry managing the urban transport agenda. Therefore, in particular, this engagement at the national level and the pilot cities was instrumental in providing the World Bank "a place at the table", where the World Bank also became one of the most influential voices on policy and technical direction in China. As one active player in the whole eco-system, the Bank contributed to China's paradigm shift in public transport development and advancement in travel demand management to alleviate traffic congestion and reduce GHG emissions. As discussed earlier, the national level TAs have shaped the frontier of urban transport development in China.

Justification of Overall Rating of Bank Performance

99. Overall, Bank performance is rated Satisfactory, given the level of performance in both preparation and supervision of this complex Project.

D. RISK TO DEVELOPMENT OUTCOME

100. The risk to development outcome is negligible for the following reasons: (i) the Project is still highly relevant to the national and city's priorities, and the policies established as a result of the project will be continued and scaled up (as set out in the highest level of blueprint documents, i.e., 13th Five Year Plan for China's Social and Economic Development covering 2016-2020 and the 13th Five Year Plan for the Transport Sector); (ii) the national policy framework has provided the government a comprehensive approach to deal with traffic congestion and GHG emissions, many of which have been rolled out to all Chinese cities, while the rest will be rolled out within the next few years; (iii) actions have been taken at the national level and by the three pilot cities to develop corresponding local policies in a holistic manner, followed up by strategic plans and specific investments outlined in the national and local policy, even before the project closing; (iv) at the national level, this Project is also supporting the PTM initiative to transform Chinese cities into cities where public transport is the preferred means of transport, as MOT will continue to implement PTM; (v) the project fits MOT's broader plan to reduce energy consumption and GHG emissions in the transport sector; and (vi) operations and maintenance arrangements are in place; e.g., the ITS system is designed to have the capability of integrating with new systems/ upgrades.

101. The MOT and the pilot cities have also built capacity to implement the more sensitive TDM measures through a ladder approach by breaking down TDM into a series of incremental steps, each of which is politically acceptable and would build awareness and acceptance for stronger steps in the future.

[41] For example, quite a lot of high-level round tables/ workshops were organized for the client on global experiences of congestion reductions by gathering the top decision makers from large metropolitans around the World.

[42] For example, the GEF- City Cluster Project also extended invitations to the client of this Project for knowledge sharing events. Task teams share the supervison cost by combining several missions.

V. LESSONS AND RECOMMENDATIONS

102. **Focusing on bringing added value to upstream policy dialogue and institutional and technical capacity building can enhance development impact.** It is a cost-effective approach to transfer global best practices and knowledge to policy formation and strengthen the institutional and technical capacity, especially when the knowledge was lacking within the country. The project provided extensive assistance to the national and local government[43] in: (i) identifying the critical development challenges; (ii) preparation of a targeted, effective policy framework, and a practical technical guideline to facilitate any initiative to be taken at the local level; and (iii) strengthened the capacity of both national and local level governments. Integrating advisory services with major national think tanks[44] also proved to be a very effective and sustainable way of building institutional and technical capacity; given their mandate, they have more ownership and convening power in the policy formation process.

103. **Although it is challenging, a comprehensive approach, using both demand and supply side measures is required to achieve better results in reducing transport congestion and GHGs.**

- As documented in the IEG's evaluation of the World Bank Group's urban transport portfolio, projects that use a comprehensive approach to improve mobility are more likely to be successful[45]. This project further proved that relatively small financing, when well designed and implemented with both supply and demand side instruments and adequate capacity building, can unlock and boost follow-on policies and investments to achieve remarkable city-wide mobility improvement.
- IEG had also found that World Bank Group had yet to broadly apply city-wide demand management activities (such as integrated planning or modal shift polices within the urban transport portfolio), and it will be unlikely to see mobility improvements beyond the areas treated with improved public transport supply or traffic management. Tested by the national government and the three pilot cities, a country can use an incremental TDM approach (which includes the menu of pricing policies, restrictions, and interventions), modulated by the political and economic realities of each city.
- While every large city is overwhelmed by the delivery of various public transport services, knowledge and experience of demand side measures and their integration with ITS and public transport development are largely lacking. External assistance from the central government and international organizations serves as an effective catalyst for awareness rising and translation of knowledge into practice.

104. **Involving both national and local governments through upstream and downstream interventions is effective to implement the PTD and TDM approaches.** The influencing power of national policy on cities can incentivize local governments to take action. This is cost-effective, compared to dealing with individual cities one by one. The demonstration at the pilot cities created a feedback loop to deliberate on national policy, as the national government and major think tanks involved the pilot cities in consultations during policy formation. The competitive selection of pilot cities by considering different economic and geographic characteristics was instrumental to success. Absorbing the concept of the comprehensive approach, in particular TDM measures,

[43] The recent IEG review of the whole World Bank urban transport portfolio also urges the Bank to engage more in the upstream policy dialogues.

[44] Many of the large TA at the national level were carried out and integrated with PIUs which the major think tanks for forming the transport policy, strategy, technical guidelines, technologies for the national government.

[45] For those projects that included demand management measures, IEG found that 42 percent committed to mobility improvement in the project development objective. On the other hand, only 13 percent of those project without demand management had improved mobility in the PDO. Moreover, IEG found that when projects incorporated and implemented demand management activities, 77% were successful in improving mobility. By contrast, only 60% of projects which either did not incorporate or did not implement demand management activities were able to improve mobility.

takes time. It is important to combine TDM with quick-win infrastructure and service improvements, as the local governments are under pressure to deliver visible results. Including multiple pilot cities alongside the national component also strengthened peer to peer learning among the pilot cities and beyond.

105. **Leveraging existing knowledge sharing and dissemination channels.** Added value is created when helping the client tackle complex challenges in urban transport with forward-looking interventions by mobilizing global best practices and knowledge sharing channels. MOT has ownership over TransFORM, which enabled the Project to effectively engage a wider network and broader audience in China at much lower cost. In turn it scaled up the demonstration effects of national and local activities.

106. **The World Bank deepened the engagement with the national government and strengthened its convening power in the transport sector through the platform created by the Project.** The World Bank increased its role in impacting policy development in MoT: the project provided MoT leadership with key inputs to deliberations on policy development, including for the preparation of the 13th FYP and several key policy documents. The team continued to engage policy makers and leaders in MoT, PIUs, pilot cities and academia during the preparation of various studies, including when ToRs were prepared and when outputs are delivered by the consultants and research institutes were discussed. Working with all the major stakeholders in the eco-system, this has created a platform for the Bank to bring international experience in the formulation of future policies for the transport sector in China[46].

[46] ISR 2015 Dec.

ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: To help establish a policy framework to alleviate congestion GHG emissions in its large cities

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Adoption of the national policy framework by MOT	Text	Not yet existed 29-Mar-2013	Endorsed by MOT 30-Jun-2018		Endorsed and adopted by MOT 14-Dec-2018

Comments (achievements against targets):
Achieved.

Objective/Outcome: To implement such policy framework in pilot cities to demonstrate its local and global benefits

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Endorsement of the policy	Text	0	3		3

framework by at least 3 large cities		29-Mar-2013	30-Jun-2018		14-Dec-2018

Comments (achievements against targets):
Achieved.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Increase in bus ridership and speeds during peak periods in project affected areas in pilot cities; and – Suzhou (Passenger per hour)	Number	170000.00 29-Mar-2013	220000.00 30-Jun-2018		255863.00 14-Dec-2018

Comments (achievements against targets):
exceeding the target of 116%

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Increase in bus ridership and speeds during peak periods in project affected areas in pilot cities; and – Suzhou (km/h)	Kilometers	21.20 29-Mar-2013	24.00 30-Jun-2018		25.30 14-Dec-2018

Comments (achievements against targets):
exceeding the target of 106%

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
increase in bus ridership and speeds during peak periods in project affected areas in pilot cities; and - Chengdu (Passenger per hour)	Number	20000.00 29-Mar-2013	30000.00 30-Jun-2018		33300.00 14-Dec-2018

Comments (achievements against targets):
exceeding the target of 111%

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
increase in bus ridership and speeds during peak periods in project affected areas in pilot cities; and – Chengdu (km/h)	Kilometers	13.00 29-Mar-2013	16.00 30-Jun-2018		18.00 14-Dec-2018

Comments (achievements against targets):
exceeding the target of 113%

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
increase in bus ridership and speeds during peak periods in project affected areas in pilot cities; and – Harbin (Passenger per hour)	Number	64000.00 29-Mar-2013	96000.00 30-Jun-2018		94000.00 14-Dec-2018

Comments (achievements against targets):
98% of the target due to competing routes established during the project implementation.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
increase in bus ridership and speeds during peak periods in project affected areas in pilot cities; and – Harbin (km/h)	Kilometers	18.00 29-Mar-2013	22.00 30-Jun-2018		23.00 14-Dec-2018

Comments (achievements against targets):
exceeding the target 105%

Objective/Outcome: GEO: to reduce GHG emissions from a business-as-usual scenario in three pilot cities

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Reduction in urban transport-related GHG emissions in pilot cities – Suzhou	Text	0 (Actual 2.01 million ton) 29-Mar-2013	0.48 million tons (with Actual 2.66 million tons; BAU:3.14 million tons) 30-Jun-2018	0.41 million tons (with Actual 3.39 million tons; BAU:3.81 million tons) 31-Dec-2018	1.02 million tons (with Actual 2.79 million tons; BAU:3.81 million tons) 14-Dec-2018

Comments (achievements against targets):

Exceeding both the original and revised targets. exceeding the revised target of 248%.

The baseline and target value for Reduction in urban transport-related GHG emissions in pilot cites were updated during the first restructuring as the monitoring and evaluation methodology adopted during project implementation is more advanced and accurate than the one proposed at the project appraisal stage.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Reduction in urban transport-related GHG emissions in pilot cities – Chengdu	Text	0 (with Actual 3.17 million tons)	0.61 million tons (with Actual 3.3 million tons; BAU:3.91million tons)	0.63 million tons (with Actual 5.52 million tons; BAU:6.15 million tons)	1.33 million tons (with Actual 4.82 million tons; BAU:6.15 million tons)

		29-Mar-2013	30-Jun-2018	14-Dec-2018	14-Dec-2018

Comments (achievements against targets):
exceeding both the original and revised target. exceeding the revised target of 211%

The baseline and target value for Reduction in urban transport-related GHG emissions in pilot cites were updated during the first restructuring as the monitoring and evaluation methodology adopted during project implementation is more advanced and accurate than the one proposed at the project appraisal stage.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Reduction in urban transport-related GHG emissions in pilot cities - Harbin	Text	0 (with Actual 2.78 million tons) 29-Mar-2013	0.51 million tons (with Actual 2.82 million tons; BAU: 3.33 million tons) 30-Jun-2018	0.40 million tons (with Actual 4.13million tons; BAU: 4.53 million tons) 14-May-2019	0.48 million tons (with Actual 4.05 million tons; BAU: 4.53 million tons) 14-Dec-2018

Comments (achievements against targets):
exceeding the revised target of 120%

The baseline and target value for Reduction in urban transport-related GHG emissions in pilot cites were updated during the first restructuring as the monitoring and evaluation methodology adopted during project implementation is more advanced and accurate than the one proposed at the project appraisal stage.

A.2 Intermediate Results Indicators

Component: National Level Support

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
number of TA studies completed at national level	Number	0.00 29-Mar-2013	9.00 30-Jun-2018	13.00 14-Dec-2018	14.00 14-Dec-2018

Comments (achievements against targets):
exceeding the original target of 56% and 7% of the updated target. All of the 14 studies were funded by the GEF Grant.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of city whose data is available on the national public transport database	Number	0.00 29-Mar-2013	3.00 30-Jun-2018		31.00 14-Dec-2018

Comments (achievements against targets):
exceeding the target of 310%

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of workshops held	Number	0.00 29-Mar-2013	30.00 30-Jun-2018		39.00 14-Dec-2018

Comments (achievements against targets):
exceeding the target of 130%

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of government officials and technical staff trained	Number	0.00 29-Mar-2013	700.00 30-Jun-2018		2277.00 14-Dec-2018

Comments (achievements against targets):
exceeding the target of 325%

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of Case Studies updated on TransFORM platform	Number	0.00 01-Jan-2016	200.00 30-Jun-2018	200.00 31-Dec-2018	201.00 14-Dec-2018

Comments (achievements against targets):
100% achieved.

Component: Pilot Demonstration in Suzhou

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of on-board information service devices procured in Suzhou	Number	0.00 29-Mar-2013	4400.00 30-Jun-2018		4400.00 14-Dec-2018

Comments (achievements against targets):
100% achieved

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of parking spaces that adopt differential parking policy in Suzhou	Number	0.00 29-Mar-2013	2000.00 30-Jun-2018		6000.00 14-Dec-2018

Comments (achievements against targets):
exceeding the target of 300%

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of TA studies completed in Suzhou	Number	0.00 29-Mar-2013	6.00 30-Jun-2018		12.00 14-Dec-2018

Comments (achievements against targets):
exceeding the target of 200%. 6 studies were funded by the GEF Grant and 6 were funded by counterpart fund.

Component: Pilot Demonstration in Chengdu

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of junctions upgraded in Chengdu	Number	0.00 29-Mar-2013	2.00 30-Jun-2018		55.00 14-Dec-2018

Comments (achievements against targets):
27.5 times higher than the target.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion

Number of electronic bus signs and variable message signs installed in Chengdu	Number	0.00 29-Mar-2013	500.00 30-Jun-2018	500.00 14-Dec-2018	702.00 14-Dec-2018

Comments (achievements against targets):
exceeding the target of 140%

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of TA studies completed in Chengdu	Number	0.00 29-Mar-2013	5.00 30-Jun-2018		9.00 14-Dec-2018

Comments (achievements against targets):
exceeding the target of 180%. 5 studies were funded by the GEF Grant. 4 studies were funded by counterpart fund.

Component: Pilot Demonstration in Harbin

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Length of bus dedicated lanes developed in Harbin	Kilometers	0.00 29-Mar-2013	6.00 30-Jun-2018		6.00 14-Dec-2018

Comments (achievements against targets):
100% achieved.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Number of TA studies completed in Harbin	Number	0.00 29-Mar-2013	5.00 30-Jun-2018		5.00 14-Dec-2018

Comments (achievements against targets):
100% achieved. All studies were funded by the GEF Grant.

A. KEY OUTPUTS BY COMPONENT

Objective/Outcome 1 To help the Recipient establish a policy framework to alleviate traffic congestion and reduce greenhouse gas emissions in its large cities, primarily through public transport development and travel demand management	
Outcome Indicators	1. adoption of the national policy framework by MOT
Intermediate Results Indicators	1. Number of TA studies completed at national level 2. Number of cities whose data is available on the national public transport database 3. Number of workshops held 4. Number of government officials and technical staff trained 5. Number of transport case studies updated in TransFORM platform
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	1. 14 TA studies completed: 6 of them were directly issued as national policy documents. (see details below) 2. 39 workshops and 10 study tours held 3. 2277 government officials and technical staff trained 4. 201 case studies available on the TransFORM platform
Objective/Outcome 2 To help the Recipient implement the policy framework in Project Cities so as to demonstrate its local and global benefits.	
Outcome Indicators	1. Endorsement of the policy framework by at least three large cities; 2. Increase in bus ridership and speeds during peak periods in the project affected areas of the pilot cities; and 3. Reduction in urban transport-related GHG emissions in pilot cities.
Intermediate Results Indicators	1. Number of on-board information service devices procured in Suzhou 2. Number of parking spaces that adopt differential parking policy in Suzhou 3. Number of TA studies completed in Suzhou

	4. Number of junctions upgraded in Chengdu 5. Area that have implemented differential parking policy in Chengdu[47] 6. Number of TA studies completed in Chengdu 7. *Number of electronic bus signs and variable message signs installed* 8. Length of bus dedicated lanes developed in Harbin 9. Number of TA studies completed in Harbin
Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	1. 26 TA completed in the three pilot cities 2. A 6 km bus priority lanes, various bus network optimizations implemented and clean buses (funded through counterpart fund) 3. Established and upgraded several sets of ITS systems in pilot cities with procurement of equipment for the transport agencies, transit riders and citizen. 4. Piloted differentiated parking in Suzhou with procurement of charging equipment

DETAILS OF THE OUTPUTS AND IMPACT

Component A- National Level Support

Final Outputs	Outcome and Impact
Concept Paper for 13th Five-Year Plan of Transport Development (GEF)	The study was adopted by MOT, and ultimately NDRC and the State Council in developing the *'13th Five Year Plan of the Modern Comprehensive Transport Development'* (*"十三五"现代综合交通运输体系发展规*, the highest level of blueprint documents covering 2016-2020 for the entire transport sector, issued by the State Council) as well as other associated national guidelines. The 13th FYP for transport sector highlighted the targets for improving the public transport services coverage in urban areas, building modern integrated high-quality passenger hubs, reducing 7% of carbon emissions from transport sector, and improving coverage usage rate of ITS. The key intervention areas includes a), b), d), e) and f) defined in the national policy framework under the Project.

[47] Although dropped during the first restructuring, the project exceeded the original end target.

Study of Synergy Policies between City's Transport Planning and City's Master Plan. (GEF) • Coordination mechanism between Transport plan and City's Master plan • International Best practices in integrating transport and Land use planning • TOD applications in China • Policy framework • Policy recommendations	The study outcomes have been adopted by four national policy documents and one large-scale program: 1. MoT and NDRC issued the *'Comprehensive Transport Network Plan 2014-2020 For Urban Area'* (城镇化地区综合交通网规划 2014-2020) in Dec. 2015. It adopted the recommendations on integrating the land use plan and transport plan in the planning documents, enhancing the cross-agency coordination mechanism, improving the enforcement process of implementing the plan. 2. MoT issued the *'13th FYP for Urban Public Transport Development Plan' (城市公共交通 "十三五" 发展纲要)* in July 2016. It adopted the recommendations on improving the non-motorized transport environment, TOD, enhancing the transport calming measures, operationalize the traffic impact evaluation for construction projects in urban areas, and several congestion reduction measures. 3. The *'13th FYP for Modern Integrated Transport System Development Plan' ("十三五" 现代综合交通运输体系发展规划)* adopted the recommendation on enhancing the coordination between the city's master plan and transport plan. 4. MOT and the Ministry of Housing and Construction are drafting the *'National Urban and Town System Plan' (全国城镇体系规划)*. It adopted the recommendation on enhancing the coordination between the city's master plan and transport plan. 5. MOT also adopted into the implementing the large-scale nation-wide Transit Metropolitan Program.
Integrated Passenger Hub Layout Planning and Function Optimization Guidelines. (GEF) • It provides planning and technical guidelines for passenger hub layout planning and function optimization to promote the development of modern sustainable passenger hubs.	The study outcomes have been adopted by three national policy documents to promote the development of modern sustainable passenger hubs. In addition, it also directs the investment approval process for passenger hub development. 1. MOT issued *'Regulation of Investment Subsidy on Integrated Passenger Hub-[2015]35 notice'* (*综合客运枢纽投资补助项目管理办法-交规划发[2015]35 号*) in March 2015. It adopted the recommendations on optimization principles of interchange between modes and several evaluation criteria and associated technical parameters. 2. MOT issued the *'13th FYP for integrated Passenger Hub Development Plan' ("十三五" 综合客运运输枢纽建设方案)*. It adopted the recommendations on emphasis of service quality, maximizing the multi-modes connectivity & integration and customer coverage, and establishing the coordination mechanisms to operationalize the integrated planning and construction cross modes and entities. 3. As mentioned earlier, the recommendation on developing integrated passenger hub was adopted in the *'13th Five Year Plan of the Modern Comprehensive Transport Development' issued by MOT, NDRC and State Council.* (In both targets and key intervention sections.)

Research on Technical Standard on Information Exchange and Service Mechanism for Urban Integrated Passenger Hub (GEF): It provided the technical standards and guidance on developing and operating the ITS for integrated Passenger Hubs.	1. The study output directly became one of the industry standards in transport sector: *'Integrated Passenger Hub Intelligent System Information Exchange Technical Specification'* – JT/T 1117-2017 (*综合客运枢纽智能化系统信息交换技术规格*). 2. The output also contributed to another standard: 'Integrated Passenger Hub Intelligent System Construction General Technical Requirements' - JT/T 980-2015(*综合客运枢纽智能化系统建设技术总体要求*).
Chinese Urban Transport Demand Management Manual (GEF)	1. The Urban Transport Demand Management Manual has been developed. With the national buy-in by MOT, the Manual can be promoted throughout China serving as an implementation reference for transport demand management. 2. The study outcome provides good references to city decision makers for various options of travel demand management, to mitigate the traffic congestion and carbon emission.
Evaluation index system for city public transportation development performance (GEF)	The index system became the national standard- ***'Evaluation index system for city public transportation development performance*** -GB/T 35654-2017***'*** (*城市公共交通发展水平评价指标体系*)
The study of urban passenger transport statistics database (GEF) • The study analyzed the existing problems in urban transit information statistics, optimized data collection and storage structures.	1. The outcome of the study includes institutionalizing the updated data collection and reporting responsibilities and procedure into the *'Urban Passenger Transport Reporting Regulation'* (*城市（县城）客运报表制度*), which regulates the cities to report the statistics in a bi-annual basis to the central government (MOT and the State Statistics Bureau). 2. The key technical outputs including the database framework, data searching and querying methods, and automatic data checking were adopted and implemented in MOT's statistics reporting system in Nov.2015 *(交办规划[2015]175 号)*. 31 transport authorities at the provincial level have been reporting the data to this system.
Urban transport energy consumption reporting system (GEF)	1. The outcome of the study includes the recommendations adopted by MOT in revising the '*Transport Sector Energy Consumption Statistic Reporting Regulation* '(*交通运输能耗统计监测报表制度*) in 2014. 2. The updated system has been adopted by MOT to collect energy consumption data from operators nation-wide.
Urban Transport Carbon Emissions Monitoring and Evaluation System Study (GEF)	1. A Guideline on Urban Transport Carbon Emissions Monitoring and Evaluation has been developed for national, provincial and city level transport authorities. 2. One copyright for software application of Urban Transport Carbon Emissions Monitoring and Evaluation and several publications on top academic journals and conference.

• The study established the first comprehensive model for urban transport carbon emission monitoring and evaluation system in China's context	
Urban Transport Carbon Emissions Monitoring and Evaluation System Study for Pilot Cities Assessment (GEF)	1. Built on the Urban Transport Carbon Emissions Monitoring and Evaluation System, it carried out pilot case studies in Suzhou, Chengdu, and Harbin. It provided feedbacks to the national level study and also serves as the M&E tool for the Project. 2. Workshops and training programs were held jointly with GIZ in pilot cities disseminating study outcomes and promoting the proposed system to other cities
Research on Guidelines for Urban Intelligent Public Transport System Construction and Application. (GEF) • The study defines the framework of urban intelligent public transport system comprising intelligent dispatching module, transit signal priority module, information service module, dedicated bus lane management module, decision support module as well as the role played by public and private sector.	The study provides both theoretical guidelines and practical action plans for the development of urban intelligent public transport system. The study outputs have been adopted by MOT as references for compiling three technical guidelines for an urban intelligent public transport system, published in Dec. 2015: 1. *Technical Requirements on ITS Applications Installed on Bus Fleet (城市公共汽电车车载智能服务终端)* 2. *Technical Standards on the Data Communication Protocol of Data-Bus-Interface on Bus Fleet. (城市公共汽电车车载智能服务终端数据总线接口通信规范)* 3. *Technical Requirements on the data communication Protocol Between the ITS Applications Installed on Bus Fleet and the Dispatching Center (城市公共汽电车车载智能服务终端数与调度中心间数据通信协议)*
Study on Connection Standards between Highways and Urban Roads (GEF) It provided a technical solution to on the physical and operational integration as well as providing coordination mechanism in planning, technical and service standard harmonization	The research findings and recommendations have been adopted by MOT to establish the technical standards of developing the interface between highway and urban streets to alleviate traffic congestion. This study was added by the first restructuring and was completed in June 2018 to respond to the emerging conflict in managing the interface between highway and urban streets in terms of traffic congestion and safety issues. It is also a key intervention area defined by the ***'13th Five Year Plan of the Modern Comprehensive Transport Development'.*** The study is foreseen to have longer term contributions to the FYP.
New Energy Bus Operation Evaluation Framework Study	The report developed an evaluation framework for new energy bus operation performances, which is useful for the MoT as the administration body for the bus service to assess the efficiency, performances and define

The output is a comprehensive diagnostic report on the new energy bus development in China, which drew valuable experiences and lessons for the world regarding the bus energy transition.	associated subsidy policy. This study was added by the first restructuring to respond to the emerging needs in managing new energy bus. Developing new energy bus system, a key intervention area defined by the ***'13th Five Year Plan of the Modern Comprehensive Transport Development'.*** The study is foreseen to have longer term contributions to the FYP.
Study on the Transport Development Strategy under the Circumstance of New Urbanization (2018-2035). (GEF) The study looks into the development trend of the new type of urbanization in China and forecast the demand and requirements it brings to transportation.	This study was added by the first restructuring responding to the evolving urbanization trend in terms of city cluster development, large city (mega city, metropolitan area, and large cities), medium size city, and town & country development. As it was completed right before the project closing, based on interview with national PMO in May 2019, the recommendations have been adopted in two regions' strategy development plan. As developing the transport system for new urbanization is also a key intervention area defined by the ***'13th Five Year Plan of the Modern Comprehensive Transport Development'***. It is highly likely the recommendations will be adopted by the line ministry and put into large scale implementation in the near future.

Component B- Pilot City Suzhou

Outputs	Impact and Outcome
Suzhou- Public Transport Development	
TA: Assessment of Bus Rapid Transit (BRT) lanes, and planning/design for two dedicated BRT Lanes (GEF) Procurement of 50 buses to operate on them, and associated traffic management, sidewalk and stop improvements (CF)	• **High quality BRT lanes in operation:** 2 BRT lanes (rapid 5 and rapid 7) selected from the study were put into operation using additional fund outside the Project. The public embraced the new routes with widespread media coverage. To further explore the social benefit of this work, the additional TA for Detailed Planning of Another 2 BRT Lines has been carried out. The 3rd lane (funded outside the Project) starts the operation before the project closing. In total, based on the study and leveraging additional fund outside the Project, Suzhou delivered 87 km BRT lanes and 8 new BRT routes, with a daily passenger volume of 50000. It specifically services the area uncovered by the metro network. • **Substantial improvements in city-wide bus network:** based on the studies' recommendations and leveraging additional fund outside the Project, Suzhou added 112 new bus routes and optimized 218 bus routes. At the end of the project, by leveraging additional fund outside the Project, Suzhou provided 387 bus routes with a daily passenger volume of 1.5 million.
Additional TA for Detailed Planning of Another 2 Bus Rapid Transit Lines in 2017 (CF)	

TA: The implementation plan of urban arterial bus route network in Suzhou City (CF) TA: Study on integration of urban rail and conventional bus in Suzhou City (CF) Procurement of 280 Clean Energy Buses (CF)	• **Coordinated and integrated urban railway network and bus network:** based on the study recommendations and leveraging additional fund outside the Project, 87 bus routes were adjusted and optimized to complement the newly opened urban rail. Suzhou provided 100% bus service coverage around urban rail stations. A daily volume of 0.2 million passengers transferred between urban rail and bus services. • **Operating the 280 CNG buses reduced energy consumption and pollution and built up the operation experience for future expansion**: early adoption of the large clean energy bus fleet provided know-how and built up the confidence for Suzhou. By leveraging additional fund outside the Project, till the end of the project, 80% of Suzhou's bus fleet was powered by new energy sources (840 CNG buses, 1642 hybrid buses, 790 E-buses) and the historical city area is fully covered by clean energy buses.
Suzhou-Travel Demand Management	
TA: Suzhou TOD Study (CF)	• **Cross-sectoral local strategies were developed to integrate land use and transport planning:** The output of the TOD study contributed to 1) the refinement of the existing "Suzhou Urban Plan"; and 2) "Suzhou Urban Comprehensive Transport System Plan" led by the Suzhou Planning Bureau.
TA: Suzhou TDM study and parking system planning, including the implementation of advisory services for parkand ride (P+R) policy (CF) TA: Formulation and pilot implementation of a differential parking policy, including the procurement of charging equipment. (GEF) Procurement of Charging Equipment for Pilot Implementation of Differentiated Parking Policy (GEF) Development of congestion pricing scheme in the historical city area of Suzhou, including analysis of implementation	• **TDM strategy were developed and adopted by Suzhou:** The studies developed strategies for public transport development, non-motorized transport (NMT) development, parking management including P+R and differentiated parking policy, and vehicle guidance in the old town area, and provided detailed plans for the configuration of parking slots. • **Promoted modal shift and reduced congestion through P+R:** Guided by the strategy and parking plan, 24 P+R parking lots with 10916 spaces were added (by leveraging additional fund outside the Project) in the outskirt of the city to encourage the commuters to transfer from private car to urban rail- the daily usage number is more than 60000. • **Differentiated parking policy has been developed, adopted and implemented in Suzhou generating substantial congestion reduction results:** The recommended parking fee structure (55 different fee level differentiated by region, vehicle type, and time) have been presented and adopted by relevant authorities. 6000 parking spaces are designated to comply with a differentiated parking fee structure (3 times of the targets). the After implementation, the number of cars entering the city center area has been significantly reduced, the parking slots daily turnaround increased from 2.22 to 2.59 times. The recommendations on the parking fee collection options were adopted and 230 sets of hand-held mobile fee collection equipment were put in operation to support the implementation and information sharing with the end user. • **The government endorsed the findings of the congestion pricing policy study which will be used in decision making in the future.** Options of congestion pricing were explored with potential impacts on congestion and carbon reduction in Suzhou. The study shows that with the recommended scheme of congestion pricing, the traffic of Suzhou center area will be reduced by 25 % in 2030 compared to the BAU scenario. The study outputs have been

conditions and the study of supporting policies. (GEF)	presented and discussed with relevant authorities in Suzhou. Once adopted, it could be expected to bring about a considerable shift from private cars to public transport, thus contribute to congestion alleviation.
Suzhou-ITS integrated with PTD, TDM and M&E beyond the project	
Construction of Suzhou's information service system for transit riders and transport agencies, including system design and procurement of on-board devices. • TA: Comprehensive Public Transport Information Service System (GEF) • Procurement of Bus On-board Device (GEF) • Procurement of Bus Ridership Data Acquisition Equipment (GEF) • TA: Traffic Demand Analysis based on IC card data (CF)	**In summary outcomes of this component include:** a) increased punctuation of bus operation -93% on-time dispatching rate; b) better matched the bus supply and demand in a real-time manner (congestion rate inside buses reduced to 67.3% during peak hours); c) dramatically improved dispatching efficiency (78% reduction in terms of cost) by using ITS based dispatching system; d) more thana million travelers benefited from enhanced travel information through the mobile app. The outcome also benefited from the additional funding mobilized by the city outside the Project. • **The management capacity and efficiency of transport agencies and bus companies have been largely enhanced by advanced ITS which integrated with PTD, TDM.** Built upon the TA, procurement of ITS system and equipment and leveraging additional fund outside the Project, Suzhou established 1) the advanced traffic control center; 2) public transport dispatch center; 3) operation management platform; 4) a travel information platform for citizens. • **New e-card based ticketing system and onboard information display not only improved the ticketing efficiency and user satisfaction, but also enhanced management capacity and the efficiency of the bus company.** 4400 sets of bus POS machines, 3000 sets of routing display screens, and 300 sets of POS data collection boxes have been delivered under the Project funded by the GEF grant and Counterpart Fund. The onboard display screens indicate the bus routing and the real-time bus stop information for the passengers. The new bus POS machines have strengthened the data transmission speed and reliability. It realized the connection between IC card data and GPS data, which will provide the basis for data analysis of ridership demand at stations. The 350 sets of equipment are used to collect the Origin-Destination (OD) data of bus passengers and will provide data support for transit network optimization. All of the above in return, optimized the bus dispatching efficiency. • **Suzhou citizens can access the real-time public transport information service system** via mobile APP (Su Zhou Xing, "Travel in Suzhou", with almost one million downloads) or the Wechat official account (with 190 thousand followers). The algorithm developed under the project produces optimized travel solutions which is shared with the citizens through the APP. There are 120, 000 daily real-time travel information inquiries were sent to the system by travelers.
Development of an urban transport M&E system, including technical assistance on urban transport evaluation and performance indicators and	**Built upon the systems, the traffic police and other transport agencies are able to use real-time traffic information including emergency cases (accident and incident) to better perform the traffic management tasks.** It also largely enhanced the enforcement capacity of traffic police on regulating the right of way of bus priority lanes- 30,000 tickets were issued to private cars which illegally occupied the dedicated bus lanes- which in return ensured the bus operation speed at 21 km/hour during peak hours in the central area of Suzhou.

provision of traffic data collection equipment. • TA: Traffic Performance Evaluation Indicator System (CF) • Procurement of Operation Monitoring System for Urban Transport (CF)	• The Traffic Police have invested US$4.71 million (funded by the Project) in equipment for traffic monitoring and detection. In totally 272 sets of monitoring equipment and 18 sets of flow measurement device have been procured, reaching 100.35% of the commitment. All the devices procured have been installed and connected with the traffic control center of the traffic police. Currently, all the devices are in good operation, and provide the data support for traffic management. • The system monitors road condition and conducts big-data analysis from a variety of sources, including that from private sector companies like Baidu Map and Gaode Map. A Transport Performance Index (TPI) was developed to indicate real-time traffic condition for regions and roads. The traffic police are now able to extract data outcomes for assistance decision making. Guidance based on the system suggestions are published through VMS boards and "Suzhou Traffic Police", the mobile APP that currently has more than one million users.
Equipment for Carbon Emission Monitoring of Transport in Suzhou (CF) TA: Carbon emission data collection and workshops (GEF)	• GHG emission and ozone level were monitored and disseminated to public monthly. Three devices were deployed to collect and analyze carbon emission data (two devices detecting GHG emission, and one set of ozone detecting and analysis system) • Suzhou PMO completed the data collection and analysis of urban transport carbon emission four consecutive years from 2014 to 2017 for the project.

Component C- Pilot City -Chengdu

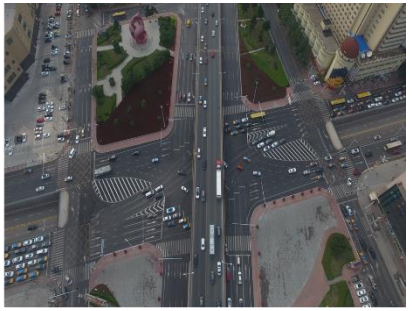
Outputs	Impact and Outcome
Chengdu- Public Transport Development Integrated with ITS	
Urban Transport Integrated Database and Comprehensive Transport Model (GEF) Public Transport Network Optimization Decision-making Aiding System (GEF) TA: Studies on Urban Public Transport Priority	**The transport policy making and investment decisions in Chengdu has been supported by the integrated database, comprehensive transport model, urban public transport priority studies and ITS.** **The integrated database and comprehensive transport model** have been collecting data to monitor the development of public transit, evaluate policy effects on urban transport improvements and provide data support for transport planning, traffic impact analysis, public transit optimization, public transit prediction, and decision making. For example, the urban rapid road network plan has been optimized by using this system and followed by investment decision.

1) Optimization of Public Transport Network in City Center and medium capacity corridors 2) Study of public transport priority at road junctions; 3) Study of Bus Stop Optimization; 4) Study on Public Transport Priority in Tianfu New Zone 5) Study on Public Transport Priority in Tianfu International Airport Procurement of Signal Controller and Communication System (CF) • The communication system transmits data among devices. The devices have been installed within 2rd ring road of Chengdu. Procurement of Video traffic counting system & Ramp control system • 476 video traffic counting devices are deployed to collect and process traffic volume information and to other basic data. 79 ramp metering system are installed along 2-nd ring road to give drivers clear guidance of the main-road congestion condition. Procurement and Installment of Electronic Signs at Bus stops (CF): 702 installed. Procurement of Simulation Software VISSIM and ARCPORT (GEF)	• In addition, an urban traffic index system was developed to monitor multi-dimensional transport performance and share daily/weekly/monthly operation report to high-level decision makers. The focus is to monitor real-time traffic congestion and exam the effectiveness of policy interventions and physical improvements. Chengdu will further develop this system to share travel information to citizen. • It is the first integrated database in Chengdu which merged the data from household survey, IC card data, GPS, highway traffic volume, mobile sources and other cross-sectoral sources from other agencies. **City-wide bus network optimization and planning updates have been supported by the TA and deployed ITS.** The major optimization and planning updates were performed for city center, medium capacity public transit corridors, Tianfu New Zone and Tianfu International Airport. It was followed up by specific investment (additional fund outside the project) from respective transport agencies and bus operators. **Bus operations have been given priorities on the road network** through improved signal priority design, junction channelization in selected areas and the systematic upgrade of the Area Traffic Control system. Using counterpart fund and additional investment outside the Project, 55 junctions have been upgraded (22.5 times of the target) to increase the operation efficiency of the main road and support bus priorities. **Services quality at bus stop have been improved by real-time bus arrival information.** Bus users are served by real-time bus arrival information at more than 700 bus stops (funded by the Project) which increased user satisfactions and punctuality of bus operations. The electronic signs at bus stops are designed to display public information such as real-time bus approaching distance, bus route changes, weather forecast, etc. **Insufficient service capacity at busy bus stops had been a bottleneck of Chengdu's public transport operations.** Through the Project, Bus stop improvements, including design and pilot implementation of accessibility zones at two busy bus stops were carried out.
Chengdu- Travel Demand Management	

TA: Development of congestion alleviation policies. (GEF) 1) Chengdu Congestion Alleviation Policies and Measures 2) Development of a parking policy and implementation of parking management measures utilizing differential pricing mechanisms. 3) Study on Congestion Charing Policy in Chengdu Downtown Area	**The congestion alleviation policies provided a comprehensive toolkit and analysis for Chengdu to reduce the congestion by leveraging global best practices and adopting local context**. It covers 8 areas:1) land use and transport integration, including TOD; 2) public transport and non-motorized transport priorities; 3) TDM including parking and HOV, low carbon zone, advanced road space pricing ;4) traffic management; 5) ITS;6) promote green commute ;7) behavior changes; 8) institutional enhancement. **14 policies and measures recommended by the TA have been implemented by Chengdu (using additional fund outside the Project) before the Project closing. It includes very complex interventions covering TDM, PMT, ITS and institutional arrangements.** 1) Established steering committee for traffic alleviation at the top level of Chengdu government and established steering committees at each district level of governments. 2) Differentiate parking policy has been implemented covering 597 km2. (12 times higher than the original targets) 3) Promoted TOD principles and invested in TOD projects: Signed MOU of implementing TOD around Chengdu's urban rails system （成都市轨道交通 TOD 项目合作协议）in 2018. The government and railway companies have issued many RFP for TOD design and implementation. 4) Issued Technical Guideline on Promoting Small blocks in urban areas (成都市 "小街区规制" 建设技术导则) in 2016. 5) Piloted HOV lane in 2017 6) Promoted and invested urban railway construction and associated interchanges. 7) Optimized the city-wide bus network and improved the services quality. 8) Optimized the bus dedicated lane networks 9) Promoted and invested in non-motorized transport system. 10) Implemented city-wide improvement of signaling control at ramps in 2014. 11) Implemented the city-wide junction channelization. 12) Two urban public transport express corridors (K3 and K11) are in operation 13) The urban traffic index system is in operation. 14) Improved the traffic management around construction sites.

Design and provision of traffic information dissemination and guidance system using real-time data. (CF) • 102 set of VMS signs are installed to display traffic performance and provide real-time traffic guidance.	**Increased the network efficiency and reduced traffic congestion** through the installed real-time traffic information message signs which provides private car users dynamic travel information guidance.

Component D- Pilot city-Harbin

Outputs	Impact and Outcome
Harbin- Public Transport Development Integrated with ITS	
Construction of a 6-km of bus priority lanes in a selected corridor including junction channelization, accessibility improvements and procurement of clean energy buses. • Construction of 6 km bus lanes system (CF) • Procurement of 300 CNG buses (CF) TA: Road Transport Channelization Research and Traffic Management Program Design (GEF) Public Transport Network Optimization and Infrastructure Improvement (GEF)	**The 6 Km dedicated bus lane (using counterpart fund) on Heping-Haping Road increases bus operation efficiency and speed.** The bus operating speed has increased from less than 12 km/hour on average to 40 km/hour for some routes operating on the lane and received positive feedback from bus drivers and passengers. **The newly procured 300 buses largely improves the riding experiences of passengers and working environment for drivers**. As Harbin suffers extremely cold weather in winter, the buses are now equipped with heating system for both passengers and drivers. **The findings of the Channelization study have been adopted by the traffic police for the channelization designs of Lesong (动力) Plaza junction in April 2017.** After reconstruction (additional funding outside the Project), the traffic capacity of the junction increased from 9000/hour to 1,2000/hour, and significantly alleviated congestion in the junction and nearby.  Before  After

• Intelligent Transport Data Center Construction and Data Integration Project (GEF) • Procurement of Harbin Intelligent Transit System Hardware (GEF) • Regular Taxi Service Management System (GEF) • Software Application Development for Harbin Intelligent Transport System-Taxi (GEF) • Procurement of Taxi Service Management Information System Hardware (GEF)	Upgrade of the existing public transport dispatch center, taxi management system and data center, including software development and hardware procurement. **The public transport dispatch center was strengthened through hardware and software upgrades.** These have built a strong foundation in terms of system structure and operational experiences for designing and implementing the later approved IPF project. **The taxi management system has been upgraded with the capability of monitoring the performance and real-time supply and demand of regular taxi and shared-mobility services.** Functions such as traffic rule violation detection, taxi remote dispatch, security of taxi terminals could be performed through the system. The taxi companies could provide timely dispatch orders to meet the peak demands. The taxi management division under the transport agency speaks highly about those system upgrades[48]. **Improved capability to regulate the shared-mobility services based on data analytics**. Most of the shared-mobility services operated in Harbin are monitored through the platform such as numbers of vehicles in operation, the permits issued to shared-mobility vehicles, the OD of the trips as well as security status of shared-mobility services. The demand and supply data from the shared-mobility services also enables the government to optimize the bus and regular taxi supply.
Harbin- Travel Demand Management	
TDM study including parking management strategy and policy and pilot implementation of parking management in selected areas. • Procurement for Bus Station Parking Management System Hardware (GEF) • Transport Impact Assessment Study (GEF)	**Bus station parking management system has been monitoring illegal street parking around major bus station.** The cameras are deployed at key transport corridors and ring roads to enforce the right of way for buses and ensure passenger safety while boarding the buses. **This Transport Impact Assessment study provided guidelines for the transport impact assessment of large developments in Harbin. Analysis of two cases**are provided for Lvshui residential area transport organization and Jiaohua old-town road network optimization. The recommendations for the residential area have been submitted to the developer. However, the institutional barriers are preventing the implementation of mandatory transport impact assessment in Harbin. It is beyond the transport agency's control where higher level government need to coordinate the implementation.

[48] It is documented in the Client ICR report and presentation. The interview with the PMO also confirmed it.

ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

Name	Role
Preparation	
Zhi Liu	Lead Infrastructure Specialist (TTL)
Kishor Uprety	Senior Counsel
Mauricio Cuellar	Senior Transprot Sepcialist
Gerald Paul Ollivier	Senior Infrastructure Specialist
Junxue Chu	Senior Finance Officer
Binyam Reja	Lead Transport Specialist (TTL)
Zhefu Liu	Senior Social Development Specialist
Arturo Ardila Gomez	Senior Urban Transprot Specialist
Ke Fang	Senior Urban Transprot Specialist
Yi Geng	Senior Financial Management Specialist
Zheng Liu	Procurement Specialist
Hooi Boon Phua	Senoir Transport Specialist
Xuan Peng	Program Assistant
Yi Yang	Urban Transprot Conulstnat
Jean Paul Velez	ET Consutlant
Gladys Frame	Traffic Management and Road Safety Consutlant
Samuel Zimmerman	Senior Urban Transprot Consutlant
Peishen Wang	Environment Consultant
Supervision/ICR	
Weimin Zhou	Task Team Leader(s)
Zheng Liu	Procurement Specialist(s)
Yi Geng	Financial Management Specialist
Zhefu Liu	Social Specialist

Peishen Wang	Social Specialist
Ruifeng Yuan	Team Member
Ning Yang	Environmental Specialist

A. STAFF TIME AND COST

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US$ (including travel and consultant costs)
Preparation		
FY12	17.565	121,687.48
FY13	6.750	62,991.24
FY14	0	126.55
Total	**24.32**	**184,805.27**
Supervision/ICR		
FY12	0	941.03
FY14	16.685	70,235.13
FY15	4.147	19,839.14
FY16	.550	39,335.45
FY17	0	23,213.84
FY18	2.975	63,757.80
FY19	.003	5,651.20
Total	**24.36**	**222,973.59**

ANNEX 3. PROJECT COST BY COMPONENT

Components	Amount at Approval (US$M)	Actual at Project Closing (US$M)	Percentage of Approval (US$M)
National Level Support	13.01	12.52	96%
Pilot Demonstration in Suzhou	46.05	52.06	113%
Pilot Demonstration in Chengdu	26.80	28.83	107%
Pilot Demonstration in Harbin	28.32	28.33	100%
Total	**114.18**	**121.74**	106%

ANNEX 4. EFFICIENCY ANALYSIS

Introduction

1. The economic analysis was not carried out at appraisal. The project supports policy and strategy formulation at the national level and tests a range of policy and technological interventions in a holistic manner at pilot city level and there is no major investment for transport infrastructure within the Project, Generally, conventional economic benefits from transport investment are resulted from reduction in travel time and vehicle operating costs. However, detailed economic analysis has not been performed for the project for three reasons. First, there is no reliable methodology to assess the economic benefits of the policy and technological interventions supported under the project. Secondly, all policy and technological interventions under the project (including procurement of buses) have proven highly cost-effective in many other countries. Thirdly, the size of project investment is relatively very small in comparison with the economic costs associated with traffic congestion.

2. The ICR assess the project's efficiency based on: cost effectiveness of the GEF Grant for CO2 emission reduction, administrative efficiency, comparing with other similar projects and ex-post cost-benefit analysis for selected interventions.

Cost Effectiveness of The GEF Grant For CO2 Emission Reduction-Direct GHG Emission Reduction and Cost-Effectiveness

3. The annual CO_2 emissions reduction is projected over a project lifecycle of 20 years to calculate the lifecycle CO_2 emissions reduction impact of the project in each city. As **Table 4** (details in ANNEX 6) indicates, the estimated lifecycle CO_2 emissions reductions over 20 years are 8.4 million ton for Suzhou, 12.5 million ton for Chengdu and 8.1 million ton for Harbin. The project's direct total emissions reduction is estimated to be 29.0 million ton, which granted GEF's US$17.6 million investment, yields an estimated cost of US$ 0.61 per ton of CO_2 reduced. The unit cost of CO_2 reduced against the total project cost of US$121.7 million is estimated US$ 4.2 per ton.

Table 4: Summary of Emissions Reduction by City

		Suzhou	Chengdu	Harbin
Annual CO_2 emissions (ton)	Baseline	2,006,175	3,171,334	2,775,974
	BAU	3,813,740	6,148,776	4,533,079
	GEF	3,393,561	5,522,531	4,130,524
	Actual	2,790,600	4,823,300	4,049,900
Annual CO_2 emissions reduction (ton) estimation (GEF-BAU)		420,178	626,246	402,555
Lifecycle CO_2 emissions reduction (ton) estimation (GEF- BAU 20 years Lifecyle)		8,403,568	12,524,913	8,051,090
Total direct project CO_2 emissions reduction impact (ton) of three cities estimation				**28,979,571**
Actual Annual CO_2 emissions reduction (ton) (Actual -BAU)		1,023,140	1,325,476	483,179
Lifecycle CO_2 emissions reduction (ton) (GEF- Actual 20 years Lifecyle)		20,462,800	26,509,520	9,663,580
Total direct project CO_2 emissions reduction impact (ton) of three cities				**56,635,900**

4. Based on the actual data collected in 2017, the direct project CO2 emissions reduction impact (ton) of three cities is 56.6 million ton. The GEF's US$17.6 million investment, yields a cost of US$ 0.31 per ton of CO_2 reduced. The unit cost of CO_2 reduced against the total project cost of US$121.7 million is US$ 2.2 per ton.

5. This is a quite conservative estimation for two reasons: 1) The pilot cities have follow-on investments outlined in the national and local policy which will be continually generate emission reduction benefits. However, the amount of funding is not tracked by the Project and the efficiency gain cannot be fully attributed to the Project; 2) As the Project has substantial nation-wide policy impact on large cities beyond the three pilot cities, the ICR only calculated the direct emission reduction from three pilot cities where data is available and excludes emission reductions from the replication effect of the project.

Cost Effectiveness of The GEF Grant For CO2 Emission Reduction-Indirect GHG Emission Reduction

6. MOT is preparing a nationwide PTM program which would include 15 pilot cities[49] in the first stage. Specific funding will be allocated to these pilot cities for public transport infrastructure development and service improvement. The policies, strategies and technical guidelines developed under the project will facilitate the successful transformation of these cities towards the PTM. In the original three pilot cities, the average lifetime CO_2 emissions reduction is 18.89 million tons per 20 years.

7. Except for Harbin which is already included in this project, 14 pilot cities under the national PTM program are taken into account for the calculation of indirect CO_2 emissions reduction. It is therefore envisaged that a total of 264.46 million tons of indirect lifetime CO_2 emission reduction would be generated from the project.

8. Therefore, if we add only small part of the in-direct GHG emission reduction, the cost-effectiveness will be further improved.

Comparing the cost-effective ratio with similar GEF projects in the transport sector [50]

Comparing similar GEF projects in the transport sector	The GEF contribution -Cost-Effective ratio: US$ per ton of CO_2
China- GEF-Large City Congestion and Carbon Reduction Project (GEF Grant US$17.6 million, US$ 121.7 million total cost)	US$0.31 (GEF), US$ 2.2 (total)
China- GEF Urban Transport Partnership Program (IEG rating MS) (GEF Grant US$17.3 million, US$ 27 million total cost)	US$4.14 (GEF)[51]
China-GEF City Cluster Eco-Transport Project (IEG rating S) (GEF Grant US$ 4.53 million, US$ 34.12 million total cost)	US$ 24.5 (GEF)[52]
China-GEF Guangdong Green Freight Demonstration Project (IEG rating MS) (GEF Grant US$ 3.7 million; US$ 13.97 million total cost)	US$ 23 (GEF)[53]
India: GEF-Sustainable Urban Transport Project (ICR rating MS) (GEF Grant US$ 10.5 million; US$ 318 million total cost)	US$ 12.9(GEF)[54]

[49] In October 2012, the MOT announced a list of 15 pilot cities enrolled in the first phase of PTM program, which included: Beijing, Shijiazhuang, Taiyuan, Dalian, Harbin, Nanjing, Jinan, Zhengzhou, Wuhan, Changsha, Shenzhen, Chongqing, Kunming, Xi'an and Urumqi.

[50] All of them are GEF project with large component on TAs and high leverage on counterpart funds in transport sector. Most of them are projects in urban transport sector. For the project which had calculated the cost-effectiveness of the GEF Grant for emission reduction, the author directly cited the numbers from the ICR and IEG review. For the project which had not calculated the cost-effectiveness, the author applied the same methodology used in this ICR for the comparison.

[51] ICR and IEG report of GEF GEF Urban Transport Partnership Program

[52] ICR and IEG report of GEF City Cluster Eco-Transport Project

[53] ICR and IEG report of GEF Guangdong Green Freight Demonstration Project. At the appraisal, it was estimated at US$ 3.5 per ton. However, at the completion, it was much higher – US$ 23 per ton.

[54] Based on author's calculation

Mexico-GEF Sustainable Transport and Air Quality (IEG rating MS) (GEF5.2 million; US$ 36.78 million total cost)	US$ 0.95 (GEF); US$84.4 (Total)[55]

9. **In summary:** despite the conservative estimation, the Project is proven to be the most cost-effective project among similar transport GEF Projects in China, India and Latin America region.

Ex-post cost-benefit analysis for selected interventions

10. The ICR selects two set of interventions from all the interventions to conduct the ex-post cost-benefit. The selection criteria for the ex-post evaluation is a strong causal link between the results and the GEF project with relevant available and verifiable data

1) The dedicated 6 km Bus lane in Harbin under Component D financed by counterpart fund. The improvements could be largely attributed to the project. The M&E data also captured the changes. The cost of the intervention (approximately 11 million USD) accounts for 8.9% of the total project
2) The entire Component B- pilot in Suzhou. As Suzhou has implemented a holistic city-wide improvement and the M&E captured a city-wide data. However, as Suzhou also has substantial investment in this area beyond the Project, we could not fully attribute the EIRR to this Project. Several sensitivity tests will be performed. The cost of Component B (46.05 million USD) accounts for 40 % of the total project cost.

11. The projects result in improved public transport services in the two cities, one covers the historical city center of Suzhou, the other one covers the dedicated bus corridor. The benefits fall into three groups:

1) User surplus: users of the services through reduced travel times, changes in travel costs and service quality in terms of reliability and punctuality
2) Operator Surplus: operators through changes in operating costs net of changes in operating revenues
3) Nonusers of the infrastructure who experience changes in congestion and accidents as a result of the changes in modes generated by the project, as well as more general effects such as any changes in GHG emission and air pollution level.

Ex-post cost-benefit -The Dedicated 6 km Bus lane in Harbin

12. User Benefits for the dedicated 6 km bus lane in Harbin. This section derives the difference in costs and benefit arising from the project compared to the “without-project” or BAU case and the actual outcome of the 6 km bus lane in Harbin.

BRT length		Bus ridership during peak hours		Bus Operation Speed (Km/hour)		User Benefit per year (million USD)
BAU	With Project	BAU *	With Project	BAU *	With Project	With Project -BAU
0km	6 km	64000	94000	18	23	5.88

13. Few reasonable assumptions are made to simply the BAU and benefit estimation: 1) since only the peak hour ridership and operation speed along the corridor were monitored by the Project and the major congestion happens during the peak hours, the ICR assume that the major influence of the project is during peak hours. However, this assumption will reduce the estimated positive impact of the project; 2) In the BAU scenario all of the demand increase

[55] IEG report of GEF Mexico-GEF Sustainable Transport and Air Quality. It was estimated around US$ 4-15-5.20 at the ex-ante analysis. However, at the ex-post cost-effectiveness analysis, the result was much higher.

will be go to private car (although it is a relatively strong assumption, but the sensitivity test will treat this uncertainties) ; 3) the operating speed of car for both BAU and "with project "will be as same as the baseline data-18 km/hour; 4) the time value per hour is the average hourly salary in China- 2.4 USD per hour; 5) the major benefits of user surplus for most of the transport project is from travel time saving. Therefore, we ignore other positive benefits for this time;

14. Other main data underlying the analysis are 1) the investment was completed within 6 years, the benefits started at the 7th year, the project has 20 years life cycle; 2) the discount rate is 7%; 3) around 20 new buses (cost around 1.63 million USD) were procured for this specific 6 km lane which could operate around 8 years; 4) the operator cost will be around 2% of total capital cost based on similar BRT lane's operation experiences, mostly were spent on maintenance cost; 5) As we have compared the GHG cost-effectiveness and normally the externalities from GHG will be around less than 2-3% of the total benefits. We will not include the GHG benefit in this calculation.

15. We will calculate the EIRR and NPV for the Base case and perform sensitivity tests for the scenarios of project costs increase by 25%, user benefits reduced by 25% and operator costs increase by 50%. The results are summarized as follows:

The dedicated 6 km Bus lane in Harbin	EIRR (%)	NPV (USD million)
Base	47%	44.91
Project costs increase by 25% (to capture additional investment made outside the project)	38%	42.31
User benefits reduced by 25%	34%	30.14
Operator costs increase by 50%	46 %	44.83

16. In summary, the efficiency of the investment of the dedicated 6 km Bus lane in Harbin is very high.

Ex-post cost-benefit -The Component B- pilot in Suzhou

17. User Benefits for the Component B-pilot in Suzhou. As the nature of the project are also improve the public transport resulting in bus ridership increase and speed increase, the benefits are similar to the one described above. Another positive impact from parking police was not included here due to data availability- therefore, lower the estimated benefit. This section derives the difference in costs and benefit arising from the project compared to the "without-project" or BAU case and the actual outcome of the 6 km bus lane in Harbin.

Average trip distance[56]				Bus ridership during peak hours in historic city center		Bus Speed (Km/hour) in historic city center		User Benefit per year (million USD)
BAU		With Project		BAU	With Project	BAU	With Project	With Project -BAU
bus	car	bus	Car					
16	15	16	15	170,000	255,863	21.2	25.3	23.86

18. Few reasonable assumptions are made to simply the BAU and benefit estimation: 1) since only the peak hour ridership and operation speed along the corridor were monitored by the Project and the major congestion happens during the peak hours, the ICR assume that the major influence of the project is during peak hours. However, this assumption will largely reduce the estimated positive impact of the project- therefore, it is a very conservative estimation; 2) In the BAU scenario all of the demand increase will be go to private car; 3) the operating speed of car for both BAU

[56] From the raw data collection in the GHG annual survey under the M&E framework and PAD.

and "with project "will be as same as the baseline data-21.2 km/hour; 4) the time value per hour is the average hourly salary in China- 2.4 USD per hour; 5) the major benefits of user surplus for most of the transport project is from travel time saving. Therefore, we ignore other positive benefits for this time;

19. Other main data underlying the analysis are 1) the project has 20 years life cycle; 2) the discount rate is 7%; 3) all the new buses (330 under the project) were procured for running in the historical center area which could operate around 8 years; 4) the operator cost against the total capital cost will be higher than 2% as the city needs to spend more on infrastructure and ITS maintenance- assuming 5% (This assumption may lower the positive impact.); 5) As we have compared the GHG cost-effectiveness and normally the externalities from GHG will be around less than 2-3% of the total benefits. We will not include the GHG benefit in this calculation.

20. Given Suzhou also has substantial investment in this area beyond the Project, we will perform more sensitivity tests. We will calculate the EIRR and NPV for the Base case and perform sensitivity tests for the scenarios of project costs increase by 25% and 200%, user benefits reduced by 25% and 50%, and operator costs increase by 50% and 200%. The results are summarized as follows:

The Component B- pilot in Suzhou	EIRR (%)	NPV (USD million)
Base	26%	134.71
Project costs increase by 25% (to capture additional investment made outside the project)	23%	125.30
Project costs increase by 200% (3 times) (to capture additional investment made outside the project)	11%	59.49
User benefits reduced by 25%	22%	91.63
User benefits reduced by 50%	16%	48.55
Operator costs increase by 50%	26%	134.19
Operator costs increase by 200% (3 times)	26%	132.66

21. In summary, the efficiency of the investment of the Component B is substantial. Without include all the benefits in to this evaluation (benefits from non-peak time, parking policies, other services level improvements such as access to information and better buses, follow-on investment leveraged by local policies etc.), this conclusion stands true with various sensitivity tests. Even the project cost got tripled (for example, taking account of the investment made by Suzhou beyond the project), the project still enjoys a EIRR of 11% and NPV of US$ 59.49 million.

The administrative efficiency

22. The administrative efficiency is high, especially considering that the Project required tremendous efforts in supporting 4 PMOs and 4 PIUs in procuring 71 contracts in total. It could be further demonstrated by the following evidence:1) there is no cost overrun: all of the planned activities were completed with high quality at a lower total cost. Savings were used to perform additional activities, formally added through restructuring; 2) only 6 months extension was granted, partially due to additional time required to complete the added activities; 3) the knowledge sharing activities were highly efficient and delivered larger impacts through the integration with TransFORM; and 4) The staff time and cost spent on this project was highly efficient- the lowest ratio of staff time and cost compared to the Grant Cost or Total Project Cost at appraisal among similar transport GEF Project in China, India and Latin America. The ICR selected several similar GEF project in transport sector based on the nature of intervention and size of the project. The table below

compared the total staff cost (including travel and consultant cost) with the total cost of the Project. This Project has lowest ratio among compared projects in China, India and Mexico.

Comparing similar GEF projects in the transport sector	GEF Grant at appraisal (million)	Total Project cost (GEF+CF) at appraisal (million)	Total Staff Cost (thousands USD)	Ratio
China- GEF-Large City Congestion and Carbon Reduction Project (GEF Grant US$18.18 million)	18.18	114.18	407.7	0.36%
China- GEF Urban Transport Partnership Program (GEF Grant US$17.3 million)	21.0	27.0	608.61	2.30%
China-GEF City Cluster Eco-Transport Project (GEF Grant US$ 4.53 million)	4.8	34.12	368.33	1.08%
China-GEF Guangdong Green Freight Demonstration Project (GEF Grant US$ 3.7 million)	4.2	13.97	151.2	1.08%
India: Sustainable Urban Transport Project (GEF Grant US$ 10.5 million)	10.5	318 (IBRD+GEF+CF)	2,203.5	0.6%
Mexico-GEF Sustainable Transport and Air Quality (GEF5.2 million)	5.2	36.78	179.9	0.49%

ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS

Evaluation and Comments of Implementation Completion and Results Report for China GEF Large City Congestion and Carbon Reduction Project

GEF Large City Congestion and Carbon Reduction Project NPMO

1. On June 4, 2019, NPMO received the first draft of Implementation Completion and Results Report (the Report) for China GEF Large City Congestion and Carbon Reduction Project (the Project) issued by World Bank. According to requirements of Bank, NPMO has evaluated the Report. The report evaluated the work and project implementation of the Project during the five-year implementation period, and completed the overall evaluation of the project from four aspects: (i) Outcome; (ii) Bank Performance; (iii) M&E Quality, and (iv) Project Implementation Performance. The Project was designed to be led by the Comprehensive Department of MOT, the three pilot cities of Chengdu, Suzhou and Harbin each implemented pilot projects. Therefore, Bank conducted detailed evaluations on the implementation of the three pilot projects respectively as well.

2. The Report comprehensively sorted out the activities and achievements of the Project during the implementation period from five aspects: (i) Project Context and Development Objectives; (ii) Outcome; (iii) Key Factors that Affected Implementation and Outcome; (iv) Bank Performance, Compliance Issues and Risk to Development Outcome, and (v) Lessons and Recommendations. Numerous achievements have been assessed on the completion of various tasks and the impact on enterprises and society, especially the impact of transportation planning policies and the contribution to the low-carbon public transport sector in the Report. The Report also accurately evaluated values of applications and promotions of outcomes, and summarized experiences from various aspects including project management, capacity building, and etc. In general, the Report is comprehensive, objective, fair, targeted and clear. From the systematic point of evaluation, the Report summarizes the project completion status in the key time nodes of the target project based on analysis of procurement, implementation, M&E, financing and project management, and adopts charts and figures to intuitively and systematically reflect the overall process of project implementation, which provides valuable experience for the future project management of NPMO.

3. At the beginning and during the implementation of the Project, the good cooperation between Bank team, the Comprehensive Department of MOT and NPMO ensured the smooth implementation of the Project. During the Project implementation period, Bank team visited the Comprehensive Department of MOT for several times and visited the pilot projects to provide on-site guidance for the implementation. In daily work, Bank team also maintained close communication with NPMO and answered relevant questions raised by NPMO in a timely manner. In the process of writing this Report, Bank report writing team and NPMO conducted mission to Chengdu, Suzhou and Harbin to collect extensive information and organize seminars and interviews, aiming to learn more about the Project. During the implementation of the Project for 5 years, Bank team responded to NPMO with as many as thousands of emails, and more than 30 emails are for the Report alone, which laid good foundation for the smooth implementation of the project and the completion of the Report.

ANNEX 6. GEF GHG EMISSION REDUCTION CALCULATION

1) The project is structured to operate at two levels. At the national level, the project will provide technical assistance to the national government for policy, strategy and technical guideline formulation, in order to promote the development of PTM across the nation. At the local level, the project will support the development of pilot investment and technical assistance activities in Suzhou, Chengdu and Harbin, in line with the national PTM program. While the upstream policy and strategic working at the national level will be the foundation and catalyst for Chinese cities to reduce traffic congestion and GHG emissions, there is no reliable methodology to quantify potential GHG emission reduction from the national level policy interventions. Therefore, the direct impact in GHG emission reduction takes into account only the interventions in the three pilot cities. The indirect impact in GHG emission reduction is subsequently estimated, considering the replication potential encouraged by the project.

Direct GHG Emission Reduction

2) Firstly, a **baseline year estimation** of urban mobility patterns and GHG emissions were carried out for the year 2011 utilizing available information of the three cities Suzhou, Chengdu and Harbin (e.g. vehicle stock, Vehicle Kilometers Travelled / VKT, passenger volume of public transport, etc.). Based on that baseline year estimation, two different future scenarios were formulated using 2017 as the target year. The first one is a **business as usual (BAU) scenario**, which represents what would take place if the GEF interventions are not implemented – i.e., forecasting travel patterns for 2017, under the same population growth, economic growth, motorization, and the effects of transport investments that are under implementation or already planned. The BAU scenario is therefore an extrapolation of the historical trend without implementation of measures. The second one is a **GEF (intervention) scenario** in which the forecast of travel patterns for 2017 takes into account everything under the BAU scenario, in conjunction with the activities to be introduced in each city through the GEF grant. The main interventions taken into account and their related benefits are the following types:

   (i) public transport improvements (faster operating speeds, better information, better accessibility to bus stops, etc.) that would contribute to the increase of public transport ridership and a modal shift to public transport; and
   (ii) travel demand management and parking management that would limit the excessive use of private cars and help achieve a modal shift to public transport.

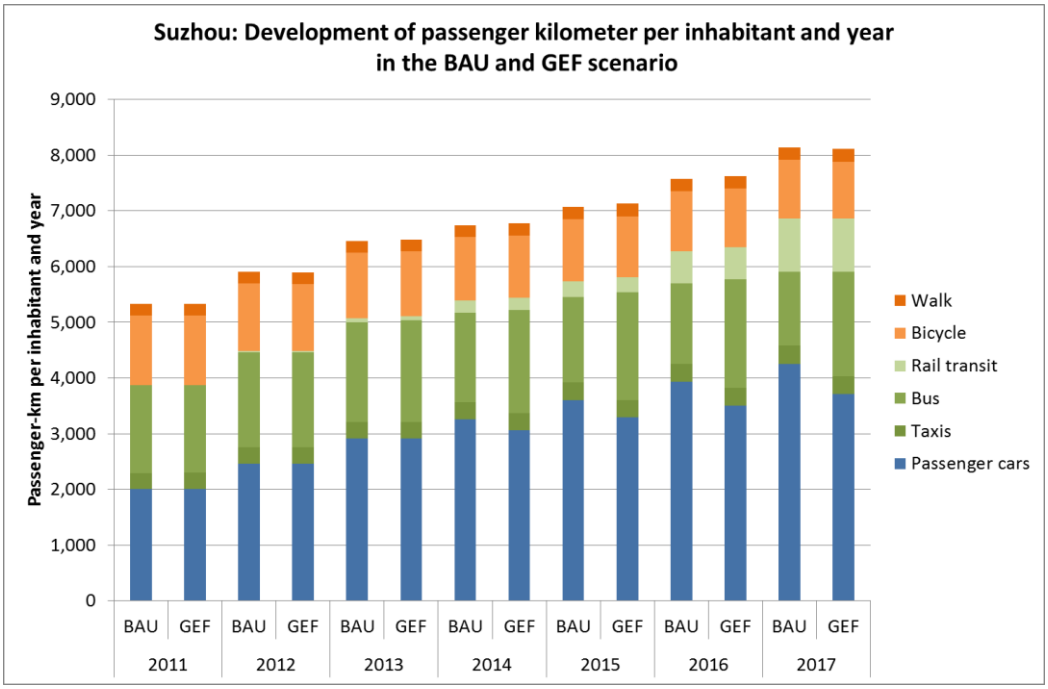
   The GHG emissions reduction will be estimated from the levels of GHG emissions associated with the modeled BAU modal shift and the observed modal shift.

   For each of the three cities, the scenarios assume an increase of the annual passenger volume per inhabitant (measured in passenger kilometers). In the scenario analyses the passenger volumes of all modes of transport (walk, bicycle, passenger cars, and public transport) within the city area are considered.[57] As Figure 6-1 shows exemplarily for Suzhou there are only slight differences between the BAU and GEF scenario in total amounts of the passenger volume per inhabitant. The differences between the scenarios are caused by modal shifts from passenger cars to public transport caused by the GEF interventions. For all cities the planed extension of the subway system was considered. The GHG emissions calculations are based on a bottom-up approach using VKT data (see below). Therefore the passenger volume was divided by the load factors to derive the annual

[57] In this context it is to consider that the increase is also caused by traffic from transport users coming from outside the cities. In this case the total passenger volume independent from the causer was divided by the inhabitants living in the urban area.

VKT for each vehicle type. For deriving consistent scenarios VKT data was aligned with the development of the vehicle fleets and the annual average kilometers driven by the vehicles. For example for Suzhou the passenger car densities increase from 11.0 cars per 100 inhabitants in 2011 to 25.0 cars per 100 inhabitants in 2017 in the BAU scenario. In the GEF scenario the increase can be reduced to 22.5 cars per 100 inhabitants in 2017.

Figure 6-1: Development of the passenger kilometer per inhabitant in Suzhou for the BAU and GEF scenario



3) The GHG emissions estimation considers only direct CO_2 emissions caused by burning fuels in the vehicles (so called tank-to-wheels emissions). Therefore, vehicles using electricity (e.g. subway cars or battery electric vehicles) have zero emissions by definition and are not considered for the CO_2 emission quantification. Therefore CO_2 emissions are only calculated for passenger cars, taxis and buses using conventional fuels (gasoline and diesel) as well as alternative fossil fuels (e.g. Compressed and Liquefied Natural Gas / CNG and LNG, Liquefied Petroleum Gas / LPG). The emission estimation for the baseline year, BAU scenario and GEF intervention scenario follow a bottom-up methodology, as described below:

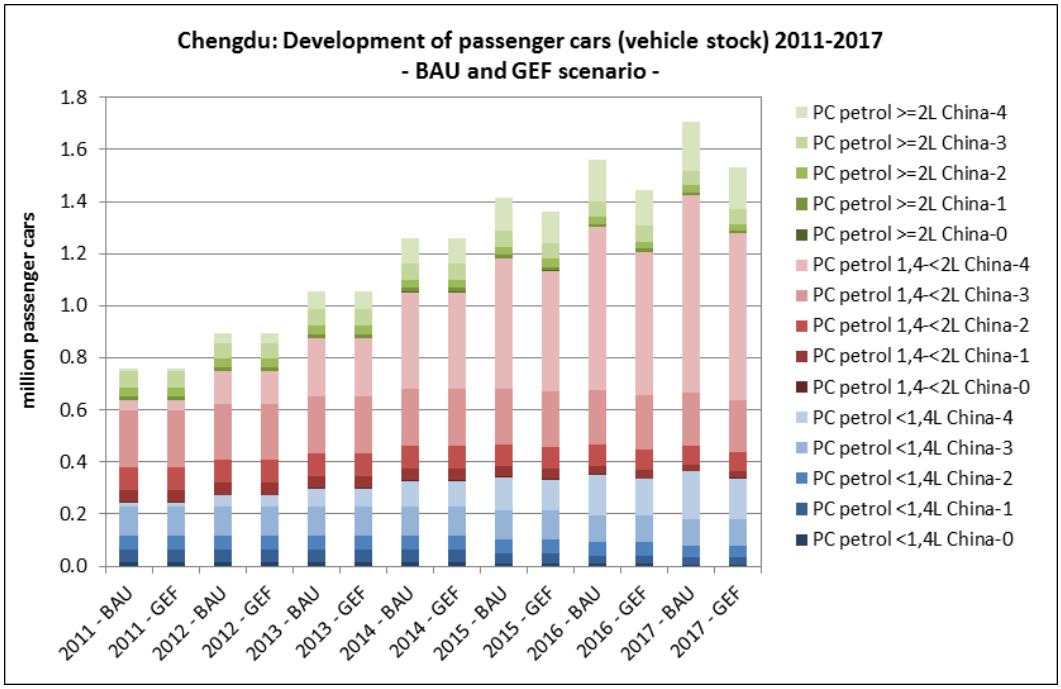
a) Calculation of energy consumption by vehicle type and fuel type:

$$\textit{Energy Consumption}_i = \textit{Vehicle Stock}_i \times \textit{Annual VKT}_i \times \textit{Fuel Efficiency}_i$$

i: per Fuel Type

Data for vehicle stock and annual kilometers are based on the passenger volumes available for each city and each scenario (see above). For buses and taxis data the fuel efficiency is based on data provided by the cities. It is assumed that the fuel efficiency after 2014 increase by 1% per year independent of the scenario. But for the GEF scenario it is assumed that the share of alternative fueled vehicles is higher than in the BAU scenario.

Figure 6-2: Development of the passenger car fleet for Chengdu 2011-2017 for the BAU and GEF scenario



For passenger cars the cities couldn't provide reliable fuel efficiency data. Therefore the Chinese version of the Handbook Emission Factors for Road Transport (HBEFA China)[58] was used. The model considers fuel consumption of the warm/hot engine as well as for cold starts. For the calculation the specific passenger car fleet compositions were considered for each city and for each scenario. The fleet composition for 2011 is based on real data provided by the cities; the future fleet compositions are results of the model using the survival probability of old cars and the assumption of the development of the vehicle fleet for each scenario (see e.g. Figure 6-2).

The fuel efficiency data calculated used for the baseline year, BAU and GEF scenario are included in Table 6-1.

Table 6-1: Development of the fuel efficiency of passenger car fleets of Suzhou, Chengdu and Harbin in the BAU and GEF scenario

Year	Fuel efficiency per 100 vehicle-km (liter gasoline/100 km)					
	Suzhou		Chengdu		Harbin	
	BAU	GEF	BAU	GEF	BAU	GEF
2011	10.54	10.54	11.71	11.71	16.05	16.05
2017	9.85	9.88	11.13	11.20	15.05	15.10

b) Calculation of CO_2 emissions by vehicle type and fuel type:
Annual Emissions $_i$ ***= Energy Consumption*** $_i$ ***× Ems. Factor*** $_i$

[58] HBEFA provides emission factors for different vehicle types and traffic situations for European countries. HBEFA China is based on HBEFA and provides China localized emission factors.

i: per Fuel Type

The CO_2 emission factors per fuel type (see Table 6-2) used for the CO_2 calculation of the base year as well as the BAU and GEF scenario refer to recommended values for China based on the *IPCC Guidelines for National Greenhouse Gas Inventories (2006)*.

Table 6-2: CO_2 Emission Factors per Fuel Type

Energy type	Density (ton/ m^3)	Emission factor (ton of CO_2/ton, 10,000 m^3)*
Gasoline	0.74	2.98
Diesel	0.86	3.16
CNG	——	21.84
LPG	——	3.17
LNG	0.45	3.06

Note:
*In this column, the unit of emission factor of gasoline, diesel, liquefied petroleum gas and liquefied natural gas is ton of CO_2/ton, the unit of emission factor of natural gas is ton of CO_2/10,000 m^3.

c) Calculation of total CO_2 emissions per vehicle type:

$$\textit{Annual Emissions per vehicle type} = \sum (\textit{Annual Emissions per Fuel Type})_i$$

i: per Fuel Type

The CO_2 emissions per vehicle type and therefore transport mode is the sum of the emissions per fuel type.

4) The difference in annual emissions between the two 2017 scenarios yields an **annual CO_2 emissions reduction** total for each city. **Table 6-3** below summarizes the estimated totals for annual CO_2 emissions for each project city for the two scenarios. Additionally, the table includes data for passenger volume, vehicle stock, average VKT, and energy consumption for the base year as well as for the GEF and BAU scenario. The table comprises only transport modes causing CO_2 emissions. Therefore, subway as well as non-motorized traffic (walk, bicycle) is not included.

Table 6-3: CO_2 emissions by city and by scenario

Suzhou								
2011								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	8,460	1,550	10,820	-	6,742	1,103	28,675
Avg. trip distance	km	15.84	13.63	12.10	-	4.39	1.18	-
Number of trips	million person-times	534	114	894	-	1,536	935	4,013
Mode share	%	13.31	2.83	22.28	-	38.27	23.30	100
Vehicle stock	thousand vehicles	3.66	4.00	599.00	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	68.75	165.32	12.04	-	-	-	-
Energy consumption	thousand tce	92.74	64.04	826.25	-	-	-	983.03
CO2 emissions	thousand tons of	201.1	128.8	1676.1	-	-	-	2006.18

	CO2	7	6	4				
2012								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	9,298	1,633	13,411	142	6,554	1,134	32,172
Avg. trip distance	km	15.87	13.86	12.58	3.33	4.39	1.18	-
Number of trips	million person-times	586	118	1,066	43	1,493	961	4,266
Mode share	%	13.74	2.76	24.98	1.00	35.00	22.52	100
Vehicle stock	thousand vehicles	3.83	4.30	749.88	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	72.34	162.23	11.92	-	-	-	-
2013								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	9,981	1,605	15,950	379	6,367	1,164	35,447
Avg. trip distance	km	15.89	14.09	13.07	6.67	4.39	1.18	-
Number of trips	million person-times	628	114	1,221	57	1,450	987	4,457
Mode share	%	14.09	2.56	27.39	1.28	32.54	22.14	100
Vehicle stock	thousand vehicles	4.07	4.30	900.84	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	73.07	159.43	11.80	-	-	-	-
2014 GEF								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	10,151	1,688	16,794	1,156	6,179	1,195	37,163
Avg. trip distance	km	15.92	14.32	13.55	10.00	4.39	1.18	-
Number of trips	million person-times	638	118	1,239	116	1,408	1,013	4,531
Mode share	%	14.07	2.60	27.36	2.55	31.07	22.35	100
Vehicle stock	thousand vehicles	4.30	4.71	958.07	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	70.28	153.24	11.68	-	-	-	-
2017 BAU								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	7,334	1,801	23,476	5,277	5,825	1,230	44,944
Avg. trip distance	Km3	16.00	15.00	15.00	20.00	4.39	1.18	-
Number of trips	million person-times	458	120	1,565	264	1,327	1,043	4,777
Mode share	%	9.60	2.51	32.76	5.52	27.78	21.83	100
Vehicle stock	thousand vehicles	4.03	5.51	1380.88	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	69.99	141.38	11.40	-	-	-	-
Energy consumption	thousand tce	87.54	70.34	1685.03	-	-	-	1842.91
Carbon emissions	thousand tons of CO2	255.34	140.13	3418.26	-	-	-	3813.74
2017 GEF								

		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	10,396	1,743	20,501	5276.90	5617.33	1286.21	44,820
Avg. trip distance	km	16.00	15.00	15.00	20.00	4.39	1.18	-
Number of trips	million person-times	650	116	1,367	264	1,280	1,090	4,766
Mode share	%	13.63	2.44	28.68	5.54	26.85	22.87	100
Vehicle stock	thousand vehicles	4.66	5.28	1242.79	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	71.98	141.43	11.03	-	-	-	-
Energy consumption	thousand tce	104.88	60.21	1471.82	-	-	-	1636.92
Carbon emissions	thousand tons of CO2	303.61	104.20	2985.76	-	-	-	3393.56
2017 Actual								
Carbon emissions	thousand tons of CO2	238.82	109.1	2443.3				2790.6
Chengdu								
2011								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	16,170	3,357	13,159	288	7,287	1,183	41,444
Avg. trip distance	km	9.07	8.71	8.47	7.50	6.25	1.21	-
Number of trips	million person-times	1,783	385	1,554	38	1,166	978	5,904
Mode share	%	30.20	6.53	26.31	0.65	19.75	16.56	100
Vehicle stock	thousand vehicles	7.65	12.42	760.51	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	40.07	120.51	13.31	-	-	-	-
Energy consumption	thousand tce	158.77	177.28	1288.00	-	-	-	1624.04
Carbon emissions	thousand tons of CO2	262.89	295.60	2612.85	-	-	-	3171.33
2012								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	18,255	4,258	15,161	815	6,984	1,160	46,633
Avg. trip distance	km	9.56	9.09	9.23	7.92	6.46	1.16	-
Number of trips	million person-times	1,910	468	1,643	103	1,081	1,001	6,207
Mode share	%	30.77	7.54	26.48	1.66	17.42	16.13	100
Vehicle stock	thousand vehicles	8.92	14.01	897.08	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	38.79	135.49	13.00	-	-	-	-
2013								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	19,882	4,585	17,524	2,017	6,681	1,137	51,826

Avg. trip distance	km	10.05	9.47	9.98	8.33	6.67	1.11	-
Number of trips	million person-times	1,979	484	1,756	242	1,002	1,027	6,490
Mode share	%	30.49	7.46	27.05	3.73	15.44	15.83	100
Vehicle stock	thousand vehicles	10.73	14.85	1053.13	0.32	-	-	-
Avg. annual kilometer	thousand km/vehicle	35.11	137.62	12.80	-	-	-	-
2014 GEF								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	21,077	4,484	19,645	2,485	6,378	1,114	55,183
Avg. trip distance	km	10.54	9.86	10.74	8.75	6.88	1.06	-
Number of trips	million person-times	2,001	455	1,830	284	928	1,056	6,553
Mode share	%	30.53	6.94	27.93	4.33	14.16	16.11	100
Vehicle stock	thousand vehicles	11.25	14.90	1261.53	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	40.00	135.00	11.98	-	-	-	-
2017 BAU								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	26,713	5,504	24,841	8,010	5,469	1,019	71,557
Avg. trip distance	km	12.00	10.50	13.00	10.00	7.50	0.90	-
Number of trips	million person-times	2,056	524	1,911	801	729	1,132	7,154
Mode share	%	28.74	7.33	26.71	11.20	10.19	15.83	100
Vehicle stock	thousand vehicles	13.30	18.50	1705.00	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	39.02	135.00	12.14	-	-	-	-
Energy consumption	thousand tce	340.00	300.28	2505.00	-	-	-	3145.28
Carbon emissions	thousand tons of CO2	558.33	508.77	5081.68	-	-	-	6148.78
2017 GEF								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	28,200	5,381	23,491	8,010	5,469	1,044	71,596
Avg. trip distance	km	12.00	11.00	13.00	10.00	7.50	0.90	-
Number of trips	million person-times	2,350	489	1,807	801	729	1,160	7,337
Mode share	%	32.03	6.67	24.63	10.92	9.94	15.81	100
Vehicle stock	thousand vehicles	14.10	17.77	1531.40	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	40.04	135.00	11.80	-	-	-	-
Energy	thousand tce	352.0	284.1	2200.4	-	-	-	2836.54

consumption		2	3	0				
Carbon emissions	thousand tons of CO2	577.37	481.40	4463.76	-	-	-	5522.53
2017 Actual								
Carbon emissions	thousand tons of CO2	442.2	276.4	4104.7				4823.3
Harbin								
2011								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	12,553	5,823	8,689	-	1,127	1,997	30,189
Avg. trip distance	km	11.80	12.51	12.46	-	4.51	1.45	-
Number of trips	million person-times	1,064	465	697	-	250	1,378	3,854
Mode share	%	27.60	12.08	18.09	-	6.48	35.74	100
Vehicle stock	thousand vehicles	5.04	14.44	476.22	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	85.28	113.16	12.16	-	-	-	-
Energy consumption	thousand tce	232.50	166.59	1010.87	-	-	-	1409.95
Carbon emissions	thousand tons of CO2	427.98	297.34	2050.65	-	-	-	2775.97
2012								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	13,269	6,038	9,896	-	1,128	1,867	32,198
Avg. trip distance	km	12.22	12.93	12.88	-	4.51	1.48	-
Number of trips	million person-times	1,086	467	768	-	250	1,266	3,837
Mode share	%	28.31	12.17	20.02	-	6.52	32.98	100
Vehicle stock	thousand vehicles	5.08	14.67	547.79	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	89.52	115.55	12.04	-	-	-	-
2013								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	13,986	6,285	11,041	23	1,130	1,736	34,202
Avg. trip distance	km	12.63	13.34	13.31	1.74	4.51	1.50	-
Number of trips	million person-times	1,107	471	830	13	251	1,157	3,829
Mode share	%	28.91	12.30	21.67	0.35	6.55	30.22	100
Vehicle stock	thousand vehicles	5.13	14.96	617.33	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	93.42	117.93	11.92	-	-	-	-
2014 GEF								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	14,703	6,410	12,170	187	1,132	1,605	36,207

Avg. trip distance	km	13.05	13.76	13.73	3.48	4.51	1.53	-
Number of trips	million person-times	1,127	466	886	54	251	1,053	3,837
Mode share	%	29.37	12.15	23.10	1.40	6.55	27.43	100
Vehicle stock	thousand vehicles	5.28	14.95	687.25	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	95.33	120.31	11.81	-	-	-	-
2017 BAU								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	14,172	7,194	16,788	1,113	1,096	1,178	41,541
Avg. trip distance	km	14.30	15.00	15.00	8.70	4.50	1.60	-
Number of trips	million person-times	991	480	1,119	128	244	736	3,698
Mode share	%	26.80	12.97	30.27	3.46	6.59	19.91	100
Vehicle stock	thousand vehicles	5.38	16.31	977.35	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	91.47	127.59	11.45	-	-	-	-
Energy consumption	thousand tce	250.52	199.74	1831.50	-	-	-	2281.76
Carbon emissions	thousand tons of CO2	461.16	356.52	3715.39	-	-	-	4533.08
2017 GEF								
		Bus	Taxi	Car	Metro	Bicycle	Walk	Total
Passenger volume	million pkm	16,245	7,090	14,738	1,113	1,137	1,213	41,536
Avg. trip distance	km	14.30	15.00	15.00	8.70	4.50	1.60	-
Number of trips	million person-times	1,136	473	983	128	253	758	3,730
Mode share	%	30.46	12.67	26.34	3.43	6.77	20.32	100
Vehicle stock	thousand vehicles	5.56	15.58	884.27	-	-	-	-
Avg. annual kilometer	thousand km/vehicle	100.03	127.75	11.11	-	-	-	-
Energy consumption	thousand tce	289.71	189.50	1612.96	-	-	-	2092.17
Carbon emissions	thousand tons of CO2	524.01	334.45	3272.06	-	-	-	4130.52
Actual 2017								
Carbon emissions	thousand tons of CO2	361.8	409.7	3278.4				4049.9

5) The data collection is carried out annually through survey and reporting system monitored by the ITS system or the formal statistics. It was managed by the national PMO, PIU and supported by the pilot city.

6) The annual CO_2 emissions reduction is projected over a project lifecycle of 20 years to calculate the lifecycle CO_2 emissions reduction impact of the project in each city. As **Table 6-4** indicates, the estimated lifecycle CO_2 emissions reductions over 20 years are 8.4 million ton for Suzhou, 12.5 million ton for Chengdu and 8.1 million ton for Harbin. The project's direct total emissions reduction is estimated to be 29.0 million ton, which granted GEF's US$18.18 million investment, yields an estimated cost of US$ 0.63 per ton of CO_2

reduced. The unit cost of CO_2 reduced against the total project cost of US$114.18 million is estimated US$ 3.94 per ton.

Table 6-4: Summary of Emissions Reduction by City

		Suzhou	Chengdu	Harbin
Annual CO_2 emissions (ton)	Baseline	2,006,175	3,171,334	2,775,974
	BAU	3,813,740	6,148,776	4,533,079
	GEF	3,393,561	5,522,531	4,130,524
	Actual	2,790,600	4,823,300	4,049,900
Annual CO_2 emissions reduction (ton) estimation (GEF-BAU)		420,178	626,246	402,555
Lifecycle CO_2 emissions reduction (ton) estimation (GEF- BAU 20 years Lifecyle)		8,403,568	12,524,913	8,051,090
Total direct project CO_2 emissions reduction impact (ton) of three cities estimation				**28,979,571**
Actual Annual CO_2 emissions reduction (ton) (Actual -BAU)		1,023,140	1,325,476	483,179
Lifecycle CO_2 emissions reduction (ton) (GEF- Actual 20 years Lifecyle)		20,462,800	26,509,520	9,663,580
Total direct project CO_2 emissions reduction impact (ton) of three cities				
56,635,900				

7) Based on the actual data collected in 2017, the direct project CO2 emissions reduction impact (ton) of three cities is 56.6 million ton. The GEF's US$18.18 million investment, yields a cost of US$ 0.32 per ton of CO_2 reduced. The unit cost of CO_2 reduced against the total project cost of US$114.18 million is US$ 2.0 per ton.

Indirect GHG Emission Reduction

8) MOT is preparing a nationwide PTM program which would include 15 pilot cities[59] in the first stage. Specific funding will be allocated to these pilot cities for public transport infrastructure development and service improvement. The policies, strategies and technical guidelines developed under the project will facilitate the successful transformation of these cities towards the PTM. In the original three pilot cities, the average lifetime CO_2 emissions reduction is 18.89 million tons per 20 years. Except for Harbin which is already included in this project, 14 pilot cities under the national PTM program are taken into account for the calculation of indirect CO_2 emissions reduction. It is therefore envisaged that a total of 264.46 million tons of indirect lifetime CO_2 emission reduction would be generated from the project.

[59] In October 2012, the MOT announced a list of 15 pilot cities enrolled in the first phase of PTM program, which included: Beijing, Shijiazhuang, Taiyuan, Dalian, Harbin, Nanjing, Jinan, Zhengzhou, Wuhan, Changsha, Shenzhen, Chongqing, Kunming, Xi'an and Urumqi. The number of demonstration city further expanded during the project implementation.

ANNEX 7. Supporting Documents

Project Documents

1. Project Appraisal Document
2. Grant Agreement
3. World Bank Group's China Country Partnership Strategy Project Aide Memories
4. ISRs and AMs
5. Client's ICR reports

Key Policy Documents developed under the Project

1. 13th Five Year Plan of the Modern Comprehensive Transport Development *http://www.mot.gov.cn/zhuanti/shisanwujtysfzgh/guihuawenjian/201703/t20170301_2170528.html*
2. The Evaluation Index System for City Public Transportation Development Performance (GB/T35654-2017)
3. Comprehensive Transport Network Plan 2014-2020 For Urban Area issued by MOT and NDRC
4. 13th FYP for Urban Public Transport Development Plan issued by MOT
5. National Urban and Town System Plan, under development by MOT and the Ministry of Housing and Construction
6. Regulation of Investment Subsidy on Integrated Passenger Hub, [2015]35 Notice, issued by MOT in 2015
7. 13th FYP for Integrated Passenger Hub Development Plan issued by MOT
8. Integrated Passenger Hub Intelligent System Information Exchange Technical Specification (JT/T 1117-2017).
9. Integrated Passenger Hub Intelligent System Construction General Technical Requirements (JT/T 980-2015).
10. Urban Passenger Transport Reporting Regulation *http://zizhan.mot.gov.cn/zfxxgk/bnssj/zhghs/201710/P020171025470411279598.pdf*
11. Comprehensive Transport Planning Department's Notice number 175, 2015, MOT
12. Transport Sector Energy Consumption Statistic Reporting Regulation in 2014
13. Transport energy consumption statistic reporting regulation, MOT and Statistic Bureau *http://zizhan.mot.gov.cn/zfxxgk/bnssj/zhghs/201611/P020161223521639618349.pdf*

Key References

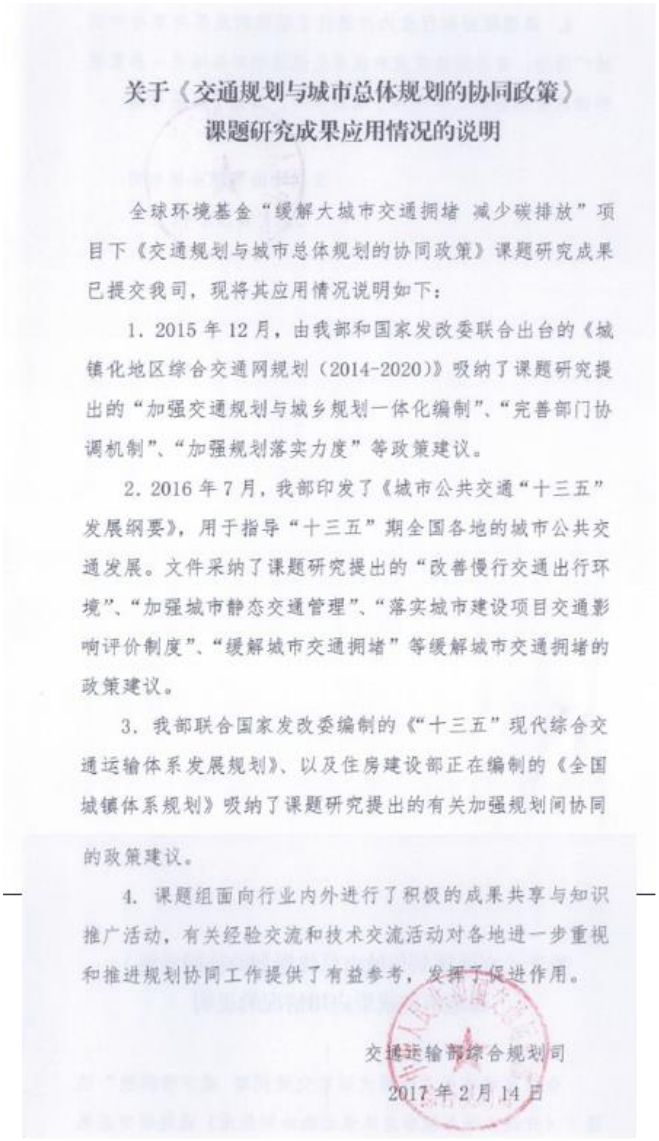
1. GoC's 12th Five-Year Plan (FYP) for Economic and Social Development
2. GoC's 13th FYP Five-Year Plan (FYP) for Economic and Social Development
3. Overview of China's Five-Year Plans in the Transport Sector, GIZ, http://www.sustainabletransport.org/wp-content/uploads/2017/12/20171201_GIZ-Chinas-Five-Year-Plans-in-the-Transport.pdf
4. Sum4All, https://sum4all.org/
5. Mobile Metropolises: Urban Transport Matters: An IEG Evaluation of the World Bank Group's Support for Urban Transport

ANNEX 8. Endorsement Letters

There are more than 20 pages of endorsement letters from national and local cities. Due to the page limits, only a list of the letters and two samples of the letter are provided here.

List of endorsement letters

1. Endorsement letter from MOT to certify the contribution of *Concept Paper for 13th Five-Year Plan of Transport Development* to national policy formation, in particular for the 13th Five Year Plan of the Modern Comprehensive Transport Development
2. Endorsement letter from MOT to certify the contribution of Study of Synergy Policies between City's Transport Planning and City's Master Plan to national policy formation
3. Endorsement letter from Suzhou to certify the contribution of Study of Synergy Policies between City's Transport Planning and City's Master Plan to local policy formation
4. Endorsement letter from Chengdu to certify the contribution of Study of Synergy Policies between City's Transport Planning and City's Master Plan to local policy formation
5. Endorsement letter from Harbin to certify the contribution of *Study of Synergy Policies between City's Transport Planning and City's Master Plan* to local policy formation
6. Endorsement letter from MOT to certify the contribution of *Integrated Passenger Hub Layout Planning and Function Optimization Guidelines* to national policy formation
7. Endorsement letter from Suzhou to certify the contribution of *Integrated Passenger Hub Layout Planning and Function Optimization Guidelines* to local policy formation and application in investment projects.
8. Endorsement letter from Chengdu to certify the contribution of *Integrated Passenger Hub Layout Planning and Function Optimization Guidelines* to local policy formation and application in investment projects.
9. Endorsement letter from Harbin to certify the contribution of *Integrated Passenger Hub Layout Planning and Function Optimization Guidelines* to local policy formation.
10. Endorsement letter from MOT to certify the contribution of *Urban Passenger Transport Statistics Database* to national policy and regulation formation
11. Endorsement letter from MOT to certify the contribution of *Guidelines for Urban Intelligent Public Transport System Construction and Application* to the formation of national policy and technical standards
12. Endorsement letter from Chengdu to certify the contribution of *Guidelines for Urban Intelligent Public Transport System Construction and Application* to the formation of local policy.
13. Endorsement letter from Harbin to certify the contribution of *Guidelines for Urban Intelligent Public Transport System Construction and Application* to the formation of local policy.
14. Endorsement letter from MOT to certify the contribution of *Guidelines for Technical Standard on Information Exchange and Service Mechanism* to the formation of national policy and technical standards
15. Endorsement letter from MOT to certify the contribution of *Urban Transport Demand Management Manual to* the decision-making process.
16. Endorsement letter from Suzhou to certify the contribution of *Urban Transport Demand Management Manual* to the decision-making process.
17. Endorsement letter from Chengdu to certify the contribution of *Urban Transport Demand Management Manual* to the decision-making process.
18. Endorsement letter from Harbin to certify the contribution of *Urban Transport Demand Management Manual* to the decision-making process.



关于《交通规划与城市总体规划的协同政策》
课题研究成果应用情况的说明

全球环境基金“缓解大城市交通拥堵 减少碳排放”项目下《交通规划与城市总体规划的协同政策》课题研究成果已提交我司，现将其应用情况说明如下：

1. 2015 年 12 月，由我部和国家发改委联合出台的《城镇化地区综合交通网规划（2014-2020）》吸纳了课题研究提出的“加强交通规划与城乡规划一体化编制”、“完善部门协调机制”、“加强规划落实力度”等政策建议。

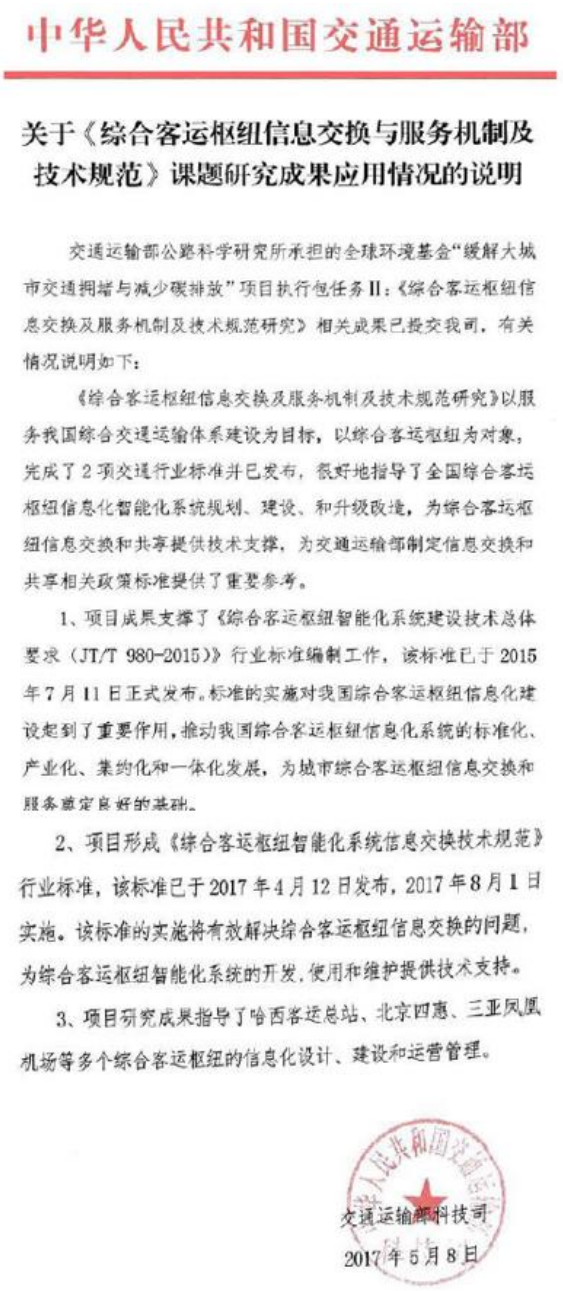
2. 2016 年 7 月，我部印发了《城市公共交通“十三五”发展纲要》，用于指导“十三五”期全国各地的城市公共交通发展。文件采纳了课题研究提出的“改善慢行交通出行环境”、“加强城市静态交通管理”、“落实城市建设项目交通影响评价制度”、“缓解城市交通拥堵”等缓解城市交通拥堵的政策建议。

3. 我部联合国家发改委编制的《“十三五”现代综合交通运输体系发展规划》、以及住房建设部正在编制的《全国城镇体系规划》吸纳了课题研究提出的有关加强规划间协同的政策建议。

4. 课题组面向行业内外进行了积极的成果共享与知识推广活动，有关经验交流和技术交流活动对各地进一步重视和推进规划协同工作提供了有益参考，发挥了促进作用。

交通运输部综合规划司
2017 年 2 月 14 日

Endorsement letter from MOT to certify the contribution of *Study of Synergy Policies between City's Transport Planning and City's Master Plan* to national policy formation



中华人民共和国交通运输部

关于《综合客运枢纽信息交换与服务机制及技术规范》课题研究成果应用情况的说明

交通运输部公路科学研究所承担的全球环境基金“缓解大城市交通拥堵与减少碳排放”项目执行包任务 II：《综合客运枢纽信息交换及服务机制及技术规范研究》相关成果已提交我司，有关情况说明如下：

《综合客运枢纽信息交换及服务机制及技术规范研究》以服务我国综合交通运输体系建设为目标，以综合客运枢纽为对象，完成了 2 项交通行业标准并已发布，很好地指导了全国综合客运枢纽信息化智能化系统规划、建设、和升级改造，为综合客运枢纽信息交换和共享提供技术支撑，为交通运输部制定信息交换和共享相关政策标准提供了重要参考。

1、项目成果支撑了《综合客运枢纽智能化系统建设技术总体要求（JT/T 980-2015）》行业标准编制工作，该标准已于 2015 年 7 月 11 日正式发布。标准的实施对我国综合客运枢纽信息化建设起到了重要作用，推动我国综合客运枢纽信息化系统的标准化、产业化、集约化和一体化发展，为城市综合客运枢纽信息交换和服务奠定良好的基础。

2、项目形成《综合客运枢纽智能化系统信息交换技术规范》行业标准，该标准已于 2017 年 4 月 12 日发布，2017 年 8 月 1 日实施。该标准的实施将有效解决综合客运枢纽信息交换的问题，为综合客运枢纽智能化系统的开发、使用和维护提供技术支持。

3、项目研究成果指导了哈西客运总站、北京四惠、三亚凤凰机场等多个综合客运枢纽的信息化设计、建设和运营管理。

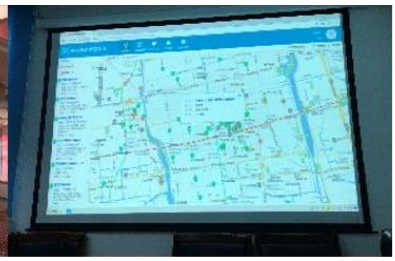
交通运输部科技司
2017 年 5 月 8 日

Endorsement letter from MOT to certify the contribution of *Guidelines for Technical Standard on Information Exchange and Service Mechanism* to the formation of national policy and technical standards

ANNEX 9. Photos of Project Achievements:

Suzhou Traffic Police Command and Service Center

Suzhou Urban Transport Comprehensive Indicator developed



Suzhou old-town parking space management monitoring platform

Hand-held devices for parking charging in Suzhou

Clean Energy Bus procured in Suzhou

Onboard POS device procured and installed in Suzhou

On-bus e-map procured and installed in Suzhou

Passenger flow counting device deployed on buses in Suzhou

Suzhou Transportation Operation Command Center (TOCC)

Electronic bus stop sign indicating the time of incoming buses in Chengdu

Chengdu-Electronic sign publishing transport guidance information

Project results demonstration workshop in Chengdu

Vissim simulation of transport network around Tianfu new airport in Chengdu

Jinsha PT interchange station, with 6-floor bus parking lot in Chengdu

Interior platform of Jinsha PT interchange station in Chengdu

Clean energy bus procured in Harbin

Bus stop parking monitoring cameras deployed around bus stops in Harbin

Fixed-asset placard indicating the device procured under World Bank project in Harbin

Taxi parking management cameras deployed, with back-end system in Harbin

Crossroad channelized at Lesong Plaza in Harbin

Servers and storage centers procured and installed in Harbin

Online-hailing taxi management and service system in Harbin

Bus-priority lane in Harbin in the winter

TransFORM website

National Workshops.

2013 Project Launch, Project Procurement and Financial Management Workshop

2014 Large City Congestion and Carbon Reduction Forum

2015 International Forum on Strategies of Energy Saving and Emission Reductions in Urban Transport Sector

2015 The 13th Five-Year-Plan Transportation Development Forum

2016 International Workshop at Public Transport Priority and Network Optimization

2017 B&R Logistics Development Workshop

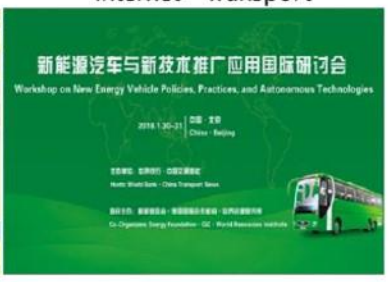
2017 Workshop on Urban Intelligent Transport and Job-Housing Development

2017 COTA—World Bank Forum

2017 “Workshop on the Promotion and Application of ” Internet+ Transport”

2017 International workshop on logistics cost assessment and performance evaluation

2017 Workshop on Xiong’ an new area sustainable transport development strategy



2018 Workshop on New Energy Vehicle Policies, Practices, and Autonomous Technologies