



**GLOBAL ENVIRONMENT FACILITY**  
INVESTING IN OUR PLANET

**Naoko Ishii**  
CEO and Chairperson

August 22, 2018

Dear Council Member:

The World Bank as the Implementing Agency for the project entitled: ***China: Achieving Efficient and Green Freight Transport Development***, has submitted the attached proposed project document for CEO endorsement prior to final Agency approval of the project document in accordance with the World Bank procedures.

The Secretariat has reviewed the project document. It is consistent with the project concept approved by the Council in May 2017 and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by the World Bank satisfactorily details how Council's comments and those of the STAP have been addressed.

We have today posted the proposed project document on the GEF website at [www.TheGEF.org](http://www.TheGEF.org) for your information. We would welcome any comments you may wish to provide by September 19, 2018 before I endorse the project. You may send your comments to [gcoordination@TheGEF.org](mailto:gcoordination@TheGEF.org).

If you do not have access to the Web, you may request the local field office of the World Bank to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

Naoko Ishii  
Chief Executive Officer and Chairperson

Attachment: Project Document  
Copy to: Country Operational Focal Point, GEF Agencies, STAP, Trustee



**GEF-6 WORLD BANK APPRAISAL STAGE: GEF DATA SHEET  
REQUEST FOR CEO ENDORSEMENT**

**PROJECT TYPE: Full-sized Project  
TYPE OF TRUST FUND: GEF Trust Fund**

For more information about GEF, visit [TheGEF.org](http://TheGEF.org)

**PROJECT INFORMATION**

Project Title: China: Achieving Efficient and Green Freight Transport Development			
Country(ies):	The People's Republic of China	GEF Project ID: <sup>1</sup>	9682
GEF Agency(ies):	WB (select) (select)	GEF Agency Project ID:	P159883
Other Executing Partner(s):		Submission Date:	July 30, 2018
GEF Focal Area (s):	Climate Change	Project Duration(Months)	60
Integrated Approach Pilot	IAP-Cities <input type="checkbox"/> IAP-Commodities <input type="checkbox"/> IAP-Food Security <input type="checkbox"/>		
Name of Parent Program	[if applicable]	Agency Fee (\$):	783,379

**A. FOCAL AREA STRATEGY FRAMEWORK AND OTHER PROGRAM STRATEGIES<sup>2</sup>**

Focal Area Objectives/Programs	Focal Area Outcomes	Trust Fund	GEF Project Financing (\$)	Cofinancing (\$)
(select) CCM-1 Program 1 (select)	Accelerated adoption of innovative technologies and management practices for GHG emission reduction and carbon sequestration; Policy, planning and regulatory frameworks foster accelerated low GHG development and emissions mitigation	GEF TF	8,246,095	155,420,000
(select) (select) (select)		(select)		
(select) (select) (select)		(select)		
(select) (select) (select)		(select)		
(select) (select) (select)		(select)		
(select) (select) (select)		(select)		
(select) (select) (select)		(select)		
(select) (select) (select)		(select)		
<b>Total project costs</b>			8,246,095	155,420,000

**B. PROJECT FRAMEWORK**

Project Objective:						
Project Component	Grant Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing (\$)	Confirmed Cofinancing (\$)
1. National TA and Policy Development	TA	a. Policy, planning and regulatory framework for green multimodal freight and urban distribution better informed; b. Institutional	a. National policy, strategy and guideline for multimodal freight transportation system; b. National policy and guideline for urban freight distribution;	GEF TF	3,150,000	1,700,000

<sup>1</sup> Project ID number will be assigned by GEFSEC.

<sup>2</sup> When completing Table A, refer to the excerpts on [GEF 6 Results Frameworks for GETE, LDCF and SCCF](#) and [CBIT Programming Directions](#).

		capacity for freight planning and policy development enhanced.	c. MAC analytical tool for freight transport emission reduction; d. National freight flow model.			
2. Subnational TA and Pilot Projects	Inv	a. Innovative technologies and management practices for green freight development adopted in pilot projects; b. GHG emission reduced	a. Pilot demonstration of highway-waterway multimodal freight transport in Yantai; b. Pilot demonstration of multimodal freight information system in Xiamen; c. Pilot demonstration of urban freight distribution in Weifang; d. Pilot demonstration of integrated urban-rural distribution in Guangdong.	GEF TF	3,050,000	150,000,000
3. Capacity Building and Monitoring and Evaluation	TA	Institutional capacity for freight planning and policy development enhanced.	Workshops, trainings and dissemination activities to enhance the capacity of government officials and logistics practitioners	GEF TF	1,691,000	520,000
	(select)			(select)		
	(select)			(select)		
	(select)			(select)		
Subtotal					7,891,000	152,220,000
				Project management Cost (PMC) <sup>3</sup>	GEF TF	355,095
				<b>Total GEF Project Financing</b>		<b>8246095</b>
						<b>155420000</b>

If Multi-Trust Fund project: PMC in this table should be the total and enter trust fund PMC breakdown here ( )

### C. SOURCES OF CONFIRMED COFINANCING FOR THE PROJECT BY SOURCE AND BY NAME (\$)

Please include letters confirming [cofinancing](#) for the project with this form

Sources of Co-financing	Name of Co-financier (source)	Type of Cofinancing	Cofinancing Amount (\$)
Recipient Government	Ministry of Transport; Provincial Departments of Transport	In-kind	5,420,000
GEF Agency	World Bank	Loan	150,000,000
(select)		(select)	
(select)		(select)	
(select)		(select)	
(select)		(select)	
(select)		(select)	
(select)		(select)	

<sup>3</sup> PMC should be charged proportionately to focal areas based on focal area project grant amount in Table D below.

(select)		(select)	
<b>Total Co-financing</b>			155,420,000

**D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY<sup>1</sup>**

GEF Agency	Trust Fund	Country Name/Global	Focal Area	Programming of Funds	(in \$)		
					GEF Project Financing (a)	Agency Fee (b) <sup>2</sup>	Total (c)=a+b
WB	GEF TF	The People's Republic of China	Climate Change	(select as applicable)	8,246,095	783,379	9,029,474
(select)	(select)		(Select)	(select as applicable)			0
(select)	(select)		(Select)	(select as applicable)			0
(select)	(select)		(Select)	(select as applicable)			0
(select)	(select)		(Select)	(select as applicable)			0
(select)	(select)		(Select)	(select as applicable)			0
(select)	(select)		(Select)	(select as applicable)			0
(select)	(select)		(Select)	(select as applicable)			0
(select)	(select)		(Select)	(select as applicable)			0
<b>Total Grant Resources</b>					8,246,095	783,379	9,029,474

<sup>1</sup> In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table.

<sup>2</sup> Refer to the [Fee Policy for GEF Partner Agencies](#)

**E. DOES THE PROJECT INCLUDE A “NON-GRANT” INSTRUMENT? No**

(If [non-grant instruments](#) are used, provide in Annex B an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF/CBIT Trust Fund).

## F. PROJECT'S TARGET CONTRIBUTIONS TO GLOBAL ENVIRONMENTAL BENEFITS<sup>4</sup>

Provide the expected project targets as appropriate.

Corporate Results	Replenishment Targets	Project Targets
1. Maintain globally significant biodiversity and the ecosystem goods and services that it provides to society	Improved management of landscapes and seascapes covering 300 million hectares	<i>hectares</i>
2. Sustainable land management in production systems (agriculture, rangelands, and forest landscapes)	120 million hectares under sustainable land management	<i>hectares</i>
3. Promotion of collective management of transboundary water systems and implementation of the full range of policy, legal, and institutional reforms and investments contributing to sustainable use and maintenance of ecosystem services	Water-food-ecosystems security and conjunctive management of surface and groundwater in at least 10 freshwater basins;	<i>Number of freshwater basins</i>
	20% of globally over-exploited fisheries (by volume) moved to more sustainable levels	<i>Percent of fisheries, by volume</i> ■
4. Support to transformational shifts towards a low-emission and resilient development path	750 million tons of CO <sub>2e</sub> mitigated (include both direct and indirect)	<i>Metric tons</i> <i>15.6 million</i>
5. Increase in phase-out, disposal and reduction of releases of POPs, ODS, mercury and other chemicals of global concern	Disposal of 80,000 tons of POPs (PCB, obsolete pesticides)	<i>Metric tons</i>
	Reduction of 1000 tons of Mercury	<i>Metric tons</i>
	Phase-out of 303.44 tons of ODP (HCFC)	<i>ODP tons</i>
6. Enhance capacity of countries to implement MEAs (multilateral environmental agreements) and mainstream into national and sub-national policy, planning financial and legal frameworks	Development and sectoral planning frameworks integrate measurable targets drawn from the MEAs in at least 10 countries	<i>Number of countries</i>
	Functional environmental information systems are established to support decision-making in at least 10 countries	<i>Number of countries</i>

<sup>4</sup> Update the applicable indicators provided at PIF stage. Progress in programming against these targets for the projects per the *Corporate Results Framework* in the [GEF-6 Programming Directions](#), will be aggregated and reported during mid-term and at the conclusion of the replenishment period. There is no need to complete this table for climate adaptation projects financed solely through LDCF, SCCF and/or CBIT.

**ANNEX A: PROJECT PREPARATION GRANT (PPG) REPORTING<sup>5</sup>**

PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES FINANCING STATUS IN THE TABLE BELOW:

PPG Grant Approved at PIF:			
<i>Project Preparation Activities Implemented</i>	<i>GEF/LDCF/SCCF/CBIT Amount (\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent To date</i>	<i>Amount Committed</i>
<b>Total</b>	0	0	0

**ANNEX B: CALENDAR OF EXPECTED REFLOWS** (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF/CBIT Trust Fund or to your Agency (and/or revolving fund that will be set up)

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<sup>5</sup> If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities; and report to Trustee on the closing of PPG in the quarterly report to Trustee.

**CEO ENDORSEMENT STAGE  
DRAFT PROJECT PAPER**

ON A

PROPOSED GRANT

IN THE AMOUNT OF US \$8,246,095

TO THE

PEOPLES REPUBLIC OF CHINA

FOR THE

CHINA: GEF EFFICIENT AND GREEN FREIGHT TRANSPORT PROJECT

August 13, 2018

World Bank GEF Coordination Program

## ABBREVIATIONS AND ACRONYMS

BAU	Business-As-Usual	IPF	Investment Project Financing
BRI	The Belt and Road Initiative	IRI	Intermediate Results Indicators
CATS	China Academy of Transportation Science	ITS	Intelligent Transport System
CCM	Climate Change Mitigation	IWT	Inland Water Transport
CO2	Carbon Dioxide	LCS	Least Cost Selection
CPS	Country Partnership Strategy	LOGINK	National Public Information Platform for Transportation and Logistics
CQS	Selection Based on Consultants' Qualifications	M&E	Monitoring and Evaluation
CRI	Corporate Results Indicators	MAC	Marginal Abatement Cost
CTN	China Transport News	MOF	Ministry of Finance
DA	Designated Account	MOT	Ministry of Transport
DC	Direct Contracting	NCB	National Competitive Bidding
DLI	Disbursement Linked Indicators	NPMO	National Project Management Office
DS	Direct Selection	OECD	Organization for Economic Co-operation and Development
EA	Executing Agency	PDO	Project Development Objective
ESMF	Environment Safeguard Management Framework	PIU	Project Implementing Unit
EU	European Union	PMO	Project Management Office
FB	Finance Bureau	PP	Procurement Plan
FBS	Fixed Budget Selection	PPSD	Project Procurement Strategy for Development
FM	Financial Management	PQA	Professional Qualification Authority
FMM	Financial Management Manual	PSG	Project Steering Group
GA	Grant Agreement	QCBS	Quality and Cost Based Selection
GDP	Gross Domestic Product	RIOH	Research Institute of Highway
GEF	Global Environmental Facility	RMB	Renminbi
GHG	Greenhouse Gas	SOE	Statement of Expenditure
GPS	Global Position System	SORT	Systematic Operations Risk-rating Tool
GRM	Grievance Redress Mechanism	TA	Technical Assistant
GRS	Grievance Redress Service	TOR	Terms of Reference



IBRD	International Bank for Reconstruction and Development	TPRI	Transport Planning and Research Institute
IC	Individual Consultant	TransFORM	Transport Transformation and Innovation Platform
ICB	International Competitive Bidding	WA	Withdrawal Application
ICT	Information and Communication Technology	WTRI	Waterborne Transport Research Institute
IDA	International Development Association	YREB	Yangtze River Economic Belt
INDC	Intended Nationally Determined Contribution		

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## DATASHEET

### BASIC INFORMATION

Country(ies)	Project Name	
China	China: GEF Efficient and Green Freight Transport Project	
Project ID	Financing Instrument	Environmental Assessment Category
P159883	Investment Project Financing	B-Partial Assessment

GEF Focal Area

Climate change

### Proposed Development Objective(s)

The development objective of the project is to inform green freight transport, enhance institutional capacity for planning and policy development, and pilot innovations for carbon emission reduction in selected provinces.

### Components

Component Name	Cost (US\$, millions)
1. National Level TA and Policy Development	4.85
2. Subnational Level TA and Pilot Projects	3.05
3. Capacity Building, Monitoring and Evaluation, and Project Management	5.77

### Organizations

Borrower: PEOPLE'S REPUBLIC OF CHINA  
Implementing Agency: Ministry of Transport

### PROJECT FINANCING DATA (US\$, Millions)

## SUMMARY

<b>Total Project Cost</b>	13.67
<b>Total Financing</b>	13.67
<b>of which IBRD/IDA</b>	0.00
<b>Financing Gap</b>	0.00

## DETAILS

### Non-World Bank Group Financing

Counterpart Funding	5.42
Borrower	5.42
Trust Funds	8.25
Global Environment Facility (GEF)	8.25

## I. STRATEGIC CONTEXT

### A. Country Context

1. China's rapid economic growth over the last three decades has been accompanied by equally rapid growth in energy consumption and greenhouse gas (GHG) emissions. According to the International Energy Agency (IEA)<sup>1</sup> and Energy Data Year Book<sup>2</sup>, China's total energy consumption grew from 1246 Mtoe<sup>3</sup> in 2002 to 3105 Mtoe in 2017, at an annual growth rate of 6.3 percent. China's total Carbon Dioxide (CO<sub>2</sub>) emissions also grew from 3540 Mt<sup>4</sup> in 2002 to 9297 Mt in 2017, at an annual growth rate of 6.6 percent.

2. In response, the government of China has issued a series of policies, strategies and action plans in recent years to promote energy consumption saving and carbon emission reduction. At the United Nations Climate Change Conference held in Paris in 2015, China's Intended Nationally Determined Contribution (INDC) targeted a 60 to 65 percent reduction in carbon intensity – defined as GHG emissions per unit of Gross Domestic Product (GDP) – by 2030, compared to the 2005 level. Although by 2013, approximately 28 percent reduction in carbon intensity has been achieved<sup>5</sup>, sustained efforts in all sectors are needed to achieve the ambitious INDC targets.

3. The transport sector is a major contributor of energy consumption and CO<sub>2</sub> emissions. In 2013, transport accounted for nearly 50 percent of total oil consumption and over 7 percent of CO<sub>2</sub> emissions in China. Although in recent years, CO<sub>2</sub> emission from all sectors in China has seen slight decrease, the share of emissions from the transport sector continues to increase. From 2011 to 2015, the share of transport related CO<sub>2</sub> emission increased from 6.01 percent to 7.27 percent. Its growth rate is the highest among all sectors<sup>6</sup>. Freight transport accounted for over 50 percent of the total transport CO<sub>2</sub> emissions, although freight vehicles only account for 16 percent of the total vehicles.

4. In the "New Normal" of economic development, China's annual GDP growth is gradually shifting from high-speed (10 percent on average) to medium-to-high speed (6 to 7 percent on average); and the sources of growth is transforming from export-oriented manufacturing and infrastructure investment towards innovation-driven industries and domestic consumption. China is thus relocating new industries to inland regions, and consequently, freight is diversified across space and commodities. Such relocation has led to a different freight structure and logistics pattern which pose a challenge to the existing freight transport system and logistics services. Therefore, the efficiency of freight movements will become increasingly critical in supporting the sustained economic growth and in lowering China's carbon footprint and meeting its global commitments to reduce GHG emissions, especially in the context of the new economic growth model.

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<sup>1</sup> <http://www.iea.org/statistics/>

<sup>2</sup> <http://yearbook.enerdata.net/>

<sup>3</sup> Mtoe: Million tons of oil equivalent

<sup>4</sup> Mt: Million tons

<sup>5</sup> China's Policies and Actions on Climate Change (2014), the National Development and Reform Commission, November 2014

<sup>6</sup> Shan et al. (2017) "China CO<sub>2</sub> emission accounts 1997-2015. *Scientific Data*"

## B. Sectoral and Institutional Context

5. **China's economy is one of the most freight intensive economies in the world.** In 2016, total freight volume in China was 43 billion tons and 18 trillion ton-kilometers. Compared to the United States, China's total freight volume is approximately 2.5 times in tonnage terms and 2 times in tonnage-kilometer terms. It is expected that China's freight volume will continue to grow at an annual rate of 7 to 8 percent during the 13th Five-Year Plan period. Freight transport intensity, measured in ton-kilometer per GDP, is gradually decreasing in China. This is a result of the optimization of China's economic structure, i.e., the Service Industry growing faster than the Primary and Secondary Industries. In 2015, China's freight transport intensity was 1.7 ton-kilometer/US\$, a 35 percent decrease compared to 2006. Nonetheless, it is still substantially higher than the US (0.48 ton-kilometer/US\$) and the European Union (0.19 ton-kilometer/US\$)<sup>7</sup>.

6. **Intermodal freight transportation is underdeveloped.** Over the past decades, China has developed a large transport infrastructure network consisting of over 123,500 kilometers of expressway, 121,500 kilometers of railway and 127,000 kilometers of navigable inland waterway. Nonetheless, 76 percent of the freight in China are moved by road transport, which is more carbon intensive than railway and waterway. One major impediment in China's freight transport sector is the underdeveloped intermodal transport nodes and hubs. Despite the good infrastructure network by mode, there is a missing link between the various transport modes, especially lack of efficient freight hubs to facilitate seamless intermodal transport between sea and rail, waterway and rail, and rail and road transport, etc. In addition, the transport units, equipment and operational rules and documentation varies by mode and are not standardized, making the interconnection between modes inefficient. Thirdly, there are institutional barriers between mode operators and lack of incentives for them to work across modes. Finally, information of intermodal transport is fragmented and not shared among various stakeholders such as cargo owners, freight forwarders, infrastructure operators and carriers. As a result, the transshipment cost between various modes accounts for one-third of total freight transport cost in China.

7. The government of China has recognized the key challenges and bottlenecks in intermodal freight transport. The 13th Five-Year Plan for Economic and Social Development (2016-2020) called for accelerated development in intermodal transport and construction of intermodal freight hubs. The Mid-to-Long Term Logistics Development Plan (2014-2020) issued by the State Council also emphasizes intermodal transport as one of the most critical area for logistics development in China. In response, local governments have accelerated the planning and investment of intermodal freight hubs and logistics parks. In 2015, the State Council and the Ministry of Transport (MOT) jointly launched a national intermodal pilot demonstration program, which provided policy support and financial incentives to 16 selected intermodal transport projects across the country.

8. **Emerging development corridors raised new requests for freight and logistics development.** With the adoption of new development strategies including "the Belt and Road Initiative (BRI)" and "Yangtze River Economic Belt (YREB)", China has identified a number of national and international freight and logistics corridors to support the new trade routes and industrial development locations. However, the current corridor plan are very crude, and detailed development strategies and investment plans need to be developed based on a review of the existing infrastructure, detailed survey of commodity flows along various potential freight corridors, and a better understanding of the major impediments in policies, regulations, infrastructure and operations, in order to improve

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<sup>7</sup> EU Transport in Figures: [http://ec.europa.eu/transport/facts-fundings/statistics/pocketbook-2016\\_en.htm](http://ec.europa.eu/transport/facts-fundings/statistics/pocketbook-2016_en.htm)

the efficiency and environmental sustainability of freight movement along these corridors. In particular, there is an urgent need for a national freight flow model to support data-informed policy analysis and decision making.

9. **Last mile urban distribution is inefficient.** With the expected growth in domestic consumption, urban freight demand is rapidly increasing. Last mile unit costs are usually higher than those in the intermediary stages of the freight transport sequence because of the decomposition cost and congestion. In fact, the unit cost of last-mile delivery is reported to be twice of that of long-haul transportation in China. For example, the last mile's share over total parcel delivery cost for Yuan Tong, one of the major express delivery service companies in China, can reach up to 50 percent. According to OECD's<sup>8</sup> report on Delivering the Goods: 21st Century Challenges to Urban Goods Transport, urban freight accounts for 10 to 15 percent of total traffic in developed countries, while contributing to 40 to 50 percent of traffic-related pollution in the urban area. Many Chinese cities are already suffering from the negative externalities of urbanization such as air pollution, GHG emissions and traffic congestion. While cities have taken actions to promote public transport and manage travel demand for passenger transport, relatively little has been done to facilitate the essential flows of goods in urban areas and to reduce the adverse impacts of urban freight transport.

10. In order to improve the efficiency of urban distribution, coordinated efforts from both the public and private sectors are required. Firstly, consolidation is a key to achieving sustainable urban distribution. Some urban logistics companies in China are developing offsite consolidation centers for "joint distribution", and lessons learned and supporting policies required may be summarized from these initiatives to promote its replication. Secondly, freight transport planning and management need to be integrated into the urban transport planning and traffic management process, which currently emphasizes passenger transport only. For instance, infrastructure capacity may be more efficiently used on a 24-hour basis; loading/unloading zones for goods need to be carefully planned and strictly enforced; designated delivery routes may be planned for freight distribution. Thirdly, the introduction of technological innovation can further support sustainable urban distribution. Finally, better integration of urban freight transport with long haul transport can not only improve the efficiency of urban distribution, but also facilitate urban-rural integrated distribution.

11. **Booming E-commerce has led to new logistics models in cities of all sizes.** China's already sizable online retail market is continuing to grow, driven by fast-moving consumer goods and groceries. China is now the largest eCommerce market in the world and growing. In 2017, online retail sales in China totaled 1.149 trillion, an increase of 32 percent from 869 billion in 2016<sup>9</sup>. Total parcels delivered in China is expected to more than double from 41.7 billion in 2017 to 92 billion in 2020. With increasing number of merchandise shipped in bulk to nationwide warehousing before being boxed to send to end-customers, there is expected to be rapid expansion in warehousing space at multiple layers, as well as higher demand for less-than-truckload trucking. The online retail giants Alibaba, JD and Tencent are already investing into logistics, including warehousing, trucking and last-mile delivery solutions. For example, Alibaba has slated \$16 billion for future logistics investment, both to increase its market reach and to improve the reliability and speed of delivery<sup>10</sup>. Also, the new eCommerce-led "line-haul + regional distribution center + last mile delivery" model is developing rapidly, and it will significantly impact the national line-haul and express providers, thus creating more demand for warehouse and last mile delivery services. We see new logistics evolving around speed, predictability and cost, which raise challenges to the existing transport system.

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<sup>8</sup> OECD: The Organization for Economic Co-operation and Development

<sup>9</sup> <https://www.eshopworld.com/news/2017-chinese-ecommerce-sales/>

<sup>10</sup> McKinsey Article

12. **The trucking industry have great potential to reduce CO<sub>2</sub> emissions.** Although heavy duty trucks account for 10 percent of the on-road vehicle fleet in China, they use about 50 percent of the on-road fuel because of higher per-vehicle fuel consumption. The trucking industry in China is of low concentration, and a large number of small size companies own less than 10 trucks. Low market entry threshold is also an essential problem for China. Trucks with poor facilities and illegal modifications are not closely regulated. In addition, many aged trucks are still in operation and have become the major source of air pollutants and GHG emissions. Further, there are currently over 20,000 types of freight vehicles manufactured in China and less than 20 percent of them are containerized. In China, the aggregate market share of the top five manufacturers is about 50 percent, while the top five truck manufacturers account for 91 percent of market share in the EU, 70 percent in the U.S., and 93 percent in India<sup>11</sup>. Lack of standardization of trucks in China negatively impact the efficiency of intermodal transport. Thus, more policy incentives and financial assistance are required to upgrade the existing truck fleet to larger, more efficient, and standardized trucks in order to reduce CO<sub>2</sub> emissions from freight trucks.

13. **Information and Communication Technology (ICT) could promote logistics efficiency and service quality.** New concepts such as “internet plus”, “big data”, “internet of things”, and “blockchain” are gradually being introduced into the logistics services in China by the private sector. However, most of the information are fragmented and owned by individual companies. The public sector therefore has an important role to play in creating an open platform with standardized protocols so that information may be shared among all stakeholders. In addition, once information is made available, a logistics credit system may be established for logistics companies, individuals and intermediaries. Moreover, with the massive logistics data available, data analysis could be a powerful tool to inform the public sector and support their decision making.

14. **The private sector will be closely involved in the proposed project.** Key market players have already introduced a lot of innovations to the logistics sector. For instance, many truck sourcing and service platforms have emerged (Truck Alliance, Huolala) to connect trucks and merchant stores and help both sides reduce cost and improve utilization rate. JD has established a fully automated warehouse in Shanghai and Cainiao’s Guangdong warehouse has deployed the largest number of robots in China. The express delivery (SF Holdings, ZTO, Cainiao) and e-commerce players (JD, Suning) have invested in smart locker system or smart pick-up stations, which allows customers to pick-up their parcels at communal areas as an alternative to delivery to doorsteps. While the private sector is harnessing the latest technologies, the public sector could benefit from working with the private sector, based on the massive data available, to develop policies and strategies that facilitates more efficient flow of freight and make regulations that mitigate the externalities of freight transport. Under this Global Environmental Facility (GEF) project, the national component will include consultations with the supply chain management and logistics associations as well as other logistics stakeholders from the private sector in strategy development. The local component will work with several private logistics companies to pilot innovations in intermodal transport and urban distribution.

15. **MOT proposed to pilot innovations of freight transport in selected representative projects.** MOT called for proposals nationwide for projects that: (i) feature good practices in intermodal transport and urban distribution; and (ii) demonstrate potential in GHG emission reduction. MOT has selected the pilot projects based on careful

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<sup>11</sup> The International Council on Clean Transportation. MARKET ANALYSIS AND FUEL EFFICIENCY TECHNOLOGY POTENTIAL OF HEAVY-DUTY VEHICLES IN CHINA.



evaluation of the financial and technical capacity of the implementing entities, in order to ensure the success of the pilots so that the innovations and best practices could be replicated throughout the country.

16. **Since 2011, the Bank has been engaged in improving China’s logistics and freight transport sector.** Over the years, the Bank’s engagement evolved from the initial small scale local demonstration project of energy efficiency technologies for trucks in coastal Guangdong Province<sup>12</sup>, to large scale regional consolidation and distribution center project that serves urban centers in central China<sup>13</sup>, and to multimodal integrated freight and logistics center project on the Yangtze River that supports the economic development and industrial transformation of the central western region of the YREB<sup>14</sup>. Most recently, the Bank has approved a US\$ 150 million IBRD loan to support the Hubei Inland Waterway Improvement Project (P158717), with the objective to improve inland waterway transport capacity and reliability along the Han River - a major tributary of the Yangtze River - in support of low carbon development, and specifically to facilitate increased use of inland waterways for freight transport along the YREB.

17. **The proposed GEF project will continue the Bank’s support of China’s commitment of improving freight transport efficiency and reducing carbon emission of the freight transport sector.** The proposed project will focus on improving planning and policy development of multimodal freight transport as well as piloting innovations at selected representative projects, including the Hubei Inland Waterway Improvement Project. The proposed project will include scope of detailed assessment of freight flows along YREB including Han River, and develop guidelines and standards to promote multimodal freight transport, particularly railway-waterway intermodal.

18. **Knowledge and experience gained from developing and implementing green freight transport policies, strategies, analytical tools, and pilot projects under the proposed GEF project will be disseminated within China and in Bank client countries through the China-World Bank Transport Transformation and Innovation Knowledge Platform (TransFORM)<sup>15</sup>.** Since 2012, TransFORM has been supporting systematic knowledge generation and sharing among practitioners and senior level decision makers within China and between China and the international community. As an established knowledge program and in its envisaged role as a major pillar of the proposed China-World Bank program for international development, TransFORM will ensure effective dissemination of the outputs, knowledge, and experience of the proposed GEF project.

### C. Relevance to Higher Level Objectives

19. The proposed project is consistent with the World Bank (the Bank) Group’s China Country Partnership Strategy (CPS) for 2013-2016. In particular, it supports Strategic Themes 1 of the CPS: Supporting Greener Growth. The project will improve the efficiency of multimodal freight transportation so that long-distance road freight will be shifted to greener transport modes such as railway and waterway. The project will also promote green urban logistics to reduce the emissions.

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<sup>12</sup> Guangdong Green Freight Demonstration Project (P119654)

<sup>13</sup> Hubei Xiaogan Logistics Infrastructure Project (P132562)

<sup>14</sup> Three Gorges Modern Logistics Center Infrastructure Project (P153473)

<sup>15</sup> TransFORM is a flagship knowledge exchange platform in China for disseminating the experiences of the Bank and its partners in the development of China’s transport sector to a broad audience in China and Bank client countries using knowledge sharing events, media outlets, and the TransFORM website (<http://www.transformcn.com/en/index.htm>).

20. The proposed project is aligned with the 13<sup>th</sup> Five-Year Plan of China on the development of modern integrated transport system for 2016-2020. Promoting multimodal freight transport and improving intermodal connectivity will optimize the freight transport structure and maximize the efficiency of overall freight transport system meanwhile reduce carbon emissions.

21. The proposed project will support the Bank's twin goals for ending extreme poverty and promoting shared prosperity. In China's transition to an economy of sustainable growth supported by high value-added industries and domestic consumption, it is shifting industrial productions as well as creating new economic sectors in the less developed inland regions, where a critical success factor for economic transformation is the availability of cost competitive logistics services. Improvements in freight and logistics in the inland regions will lower logistics costs, thus facilitate strong economic growth and healthy job creation in not only the logistics service sector but also in the industrial and associated service sectors that will, inter alia, benefit the poor and contribute to the development of these relatively less developed regions of China.

22. The proposed project is also aligned with the Climate Change Mitigation (CCM) goal of the GEF-6 program, which is to support developing countries and economies in transition to make transformational shifts towards a low-emission, resilient development path. In particular, it supports the CMM Program 1: Promote the timely development, demonstration, and financing of low-carbon technologies and mitigation options. The proposed project will support five local pilot projects to demonstrate innovative options for GHG emission mitigation in the freight transport sector, such as establishing trucking alliance to promote drop-and-pull and waterway-highway intermodal transport, using big data analytics to inform policy making and scenario testing in urban freight management, and leveraging information technology to match freight demand and supply.

## II. PROJECT DESCRIPTION

### A. Project Development Objective (PDO)

#### PDO Statement

23. The development objective of the project is to (i) improve the Government of China's institutional capacity to formulate and evaluate policies and strategies to promote green freight transport systems in China; (ii) pilot innovative carbon emission reduction measures in the freight transport sector in selected provinces, and (iii) generate lessons and experience from the project to disseminate widely within China and in the Bank client countries.

#### PDO Level Indicators

24. The achievement of the PDO will be measured through the following key performance indicators:
- i. Indicator 1: Number of analytical tools adopted by MOT for implementation in national planning and policy development;
  - ii. Indicator 2: Number of national plans adopted by MOT for implementation;

- iii. Indicator 3: Number of guidelines on improving urban freight transport issued by MOT for implementation;
- iv. Indicator 4: Net GHG emission reduced;
- v. Indicator 5: Number of international knowledge dissemination events organized.

## B. Project Components

25. The proposed project will develop policy, strategy, analytical tools and technical standards at the national level to improve the efficiency and environmental sustainability of China's freight transport sector, focusing on two priority areas, i.e., promotion of multimodal freight transportation system and optimization of urban freight distribution. The project will also pilot the key policy, strategy and analytical tools at the local levels in five selected cities and provinces. Finally, the lessons learned and implementation experience of the pilots, polices, and analytical tools will be systematically documented and disseminated within China and in other Bank client countries seeking to develop green freight transport system. Detailed cost breakdown by component is attached in **Annex 1**.

26. **Component 1: National Technical Assistance (TA) and Policy Development** (US\$3.15 million GEF grant + US\$1.7 million counterpart funding)

27. **Component 1A: Development of Policy and Strategy for Low Carbon Multimodal Freight Transportation System.** This subcomponent will develop national policies, strategy and standards aimed at improving the efficiency and environmental sustainability of multimodal freight transportation system. It will work with the research institutes affiliated with the MOT to enhance China's capacity for policy research in the freight transport sector.

- i. **Development of Structural Emission Reduction Strategy of China's Freight Transport Sector.** This proposed task aims to evaluate existing conditions of multimodal freight transport in China, identify impediments and propose solutions to promote multimodal freight transport for systematic emission reduction in the sector. The task also includes a large scope for capacity building in the development of a national freight model and its application in national and major corridor level strategic multimodal freight transport planning. Specifically, the task includes: (i) preparation of a medium-to-long term multimodal freight transport plan; (ii) development of unified technical standards supporting multimodal operation in the freight transport sector; (iii) development of a national freight model; and (iv) development of data standards for information sharing among various modes based on the existing national transport and logistics public information platform (LOGINK), which is a multimodal freight information platform.
- ii. **Development of Action Plan for Efficient and Green Freight Corridors in China.** This proposed task is to: (i) identify infrastructure and operational bottlenecks of selected national and international freight corridors that include major multimodal freight transport hubs; and (ii) propose recommendations for improvements. Outputs of the task include: (i) action plan for infrastructure connectivity improvement for the BRI freight corridors; and (ii) operation and management plan for the BRI freight corridors.
- iii. **Development of Guideline on Multimodal Freight Development for the YREB.** The proposed task includes a YREB freight flow survey that collects data such as commodity type, volume, value, transport

mode, and origins and destinations. The national multimodal freight model developed under component 1A-(a) will be used to support this analysis. The task will develop guidelines for optimizing multimodal freight transport, particularly railway-waterway intermodal transport, on the YREB.

28. **Component 1B: Development of Policy and Guideline for Green Urban Freight Distribution.** This subcomponent is to develop national policies and guidelines aimed at improving the efficiency and environmental sustainability of urban freight system, as well as interconnection between long-distance freight transport and urban freight distribution. It will work closely with the private sector to enhance China's capacity for data analytics in the freight transport sector.

i. **Development of Guideline for Green and Efficient Urban Freight Transport Development.** This proposed task is to support the issuance of national guideline and the identification of key actions for developing a green and efficient urban freight transport system. It will cover the following aspects: (i) improving traffic control and fleet management of urban freight vehicles; (ii) developing policies for the planning of multi-layer distribution network and integrating freight transport in urban transport planning; (iii) establishing a national performance monitoring and evaluation (M&E) system of urban freight transport; and (iv) promoting new energy vehicles for urban freight distribution.

ii. **Development of E-commerce Based Urban Freight Distribution Solution.** The proposed task is to develop guidelines for improving efficiency of urban freight distribution by collaborating with e-commerce companies to improve information and resource sharing. The task will analyze various delivery modes and prepare technical guidelines for standardized vehicles (including electric vehicles for last-mile delivery) and distribution system (including the introduction of joint distribution systems and self-collect parcel lockers). In addition, this task will propose possible mechanisms for logistics companies to share information and resources.

29. **Component 1C: Development of Abatement Cost Analytical Tool for Freight Transport Emission Reduction.** This subcomponent is to develop a tool to analyze the emission reduction potential and abatement cost of different physical, operational and policy interventions in the freight transport sector. In particular, it will (i) review and summarize various "avoid/shift/improve" interventions for freight transport emission reduction; (ii) develop the marginal abatement cost (MAC) curve for various interventions; and (iii) apply the MAC curve to develop the roadmap for emission reduction in key regions in China (e.g. Jing-Jin-Ji, Pearl River Delta).

30. **Component 2: Subnational TA and Pilot Projects** (US\$3.05 million GEF grant + US\$150 million counterpart funding)

31. **Component 2A: Bohai Gulf Highway-Waterway Multimodal Transport (Pilot), Yantai Municipality, Shandong Province.** The pilot project in Yantai is to promote multimodal transport of seaway and highway/railway across the Bohai Gulf, which links two major logistics corridors, i.e., Northeast Corridor and North-South Coastal Corridor. This 165km Yantai-Dalian sea ferry route could replace the 1,400km road route that circle the gulf, thus achieve carbon emission reduction. The local government is undertaking several initiatives to promote this sea ferry route, including investment in logistics hubs and facilities on both sides in Yantai and Dalian, establishment

of a trucking association for drop-and-pull, inviting experienced third-party logistics companies to run the Bohai Gulf multimodal freight business, etc.

32. The GEF project will provide TA for data analytics of intermodal transport across Bohai Gulf that (i) propose recommendations to the government on policies and incentives to attract more freight traffic to Yantai-Dalian waterway; (ii) evaluate the performance of the local logistics operators; (iii) develop solutions to improve the efficiency of freight transport across Bohai Gulf; and (iv) monitor and evaluate the carbon emission reduction from the pilot project.

33. **Component 2B: Urban Freight Joint Distribution (Pilot), Weifang Municipality, Shandong Province.** The pilot project is to promote the efficiency of urban freight distribution in Weifang through introducing international best practices such as freight consolidation, off-peak delivery, and utilization of clean energy vehicles. The project will work with the major urban freight enterprises that have urban consolidation centers on the outskirts of the city and operate more than 80 percent of the urban delivery vehicles in Weifang. The GEF project will support (i) urban freight data collection (goods, transport cost, real-time Global Position System (GPS) data, etc.) from major logistics enterprises in Weifang and installation of emission monitoring sensors on sample trucks; (ii) data analytics to provide recommendations to improve the efficiency of urban freight distribution in Weifang; and (iii) trainings to the truck drivers and campaigns to promote green urban freight distribution schemes in Weifang.

34. **Component 2C: Sea-Rail Intermodal Transport (Pilot), Xiamen Municipality, Fujian Province.** The pilot project is to promote sea-rail intermodal transport for Xiamen Port. The project will work with the Xiamen Port Administrative Company to improve the efficiency of intermodal transport operations at Xiamen Port. The GEF project will support (i) development of the multimodal transport information platform for sea-rail-road orders at Xiamen Port, including hardware procurement and software development; and (ii) TA on the optimization plan to improve the efficiency of multimodal freight operations at Xiamen Port.

35. **Component 2D: Integrated Urban-Rural Distribution (Pilot), Guangdong Province.** The pilot project is to promote urban-rural integrated distribution in Guangdong Province through application of information technology to pair urban-to-rural and rural-to-urban freight flows. The project will work with Guangzhou Huaxin Group Ltd. to demonstrate urban-rural integrated distribution in Guangzhou and Qingyuan (Guangqing). The GEF project will support: (i) development of the transport organization plan for Guangdong urban-rural integrated distribution; (ii) development of the common module for integrated urban-rural distribution and application of the module in the existing logistics platform; (iii) M&E of the Guangqing pilot project; and (iv) trainings and promotion of urban-rural integrated distribution in Guangdong.

36. **Component 2E: Integrated Development of Han River Inland Waterway (Pilot), Hubei Province.** To further promote the utilization of inland waterway on Han River, the GEF project will support (i) TA on the strategic plan for improving the integrated development of Han River inland waterway; and (ii) the purchase and installation of solar-powered navigation lights along selected pilot segments of Han River. Specifically, the TA will support activities to: (i) study the logistics service value chain, identify cost drivers, and pinpoint constraints; (ii) help the public sector to engage the private sector and identify the missing links, for example, land, ports, financing, operational inefficiency, crew training, and inter-modal integration; and (iii) propose policy recommendations on coordinated port planning, development, vessel standardization, and management of an integrated multimodal transport network, in particular the integration of IWT.

37. **Component 3: Capacity Building, Monitoring and Evaluation, and Project Management** (US\$2.05 million GEF grant + US\$3.72 million counterpart funding)

38. **Component 3A: Capacity Building.** This component will include, among others, (i) technical support, stakeholder consultations, workshops and trainings to enhance the knowledge and capacity of government authorities and logistics practitioners for multimodal freight transport and urban freight distribution; (ii) dissemination through TransFORM, the knowledge partnership platform between the World Bank and MOT, to promote the project outputs and outcomes within China and in client countries; and (iii) delivery of eco-driving training course for truck drivers.

39. **Component 3B: Monitoring and Evaluation (M&E).** This component will provide support to the national and sub-national agencies to develop the M&E methodology, collect the data and evaluate the CO<sub>2</sub> emission reduction from the sub-national pilot projects.

40. **Component 3C: Project Management.** This component will support the incremental operating costs for project management.

### C. Project Beneficiaries

41. The primary beneficiaries are: (a) businesses, including manufacturers, retailers, and service providers, that rely on freight transport for the provision of products and services; (b) individuals who purchase goods and services that are delivered by or dependent on freight transport; (c) people who suffer from traffic congestion, air pollution and high dependency on fossil fuel energy consumption; and (d) governments at both national and local levels that are responsible for the planning, management and promotion of multimodal freight transport.

### D. Results Chain

42. An illustration of the results chain is included in **Annex 3**.

### E. Rationale for Bank Involvement and Role of Partners

43. **The proposed project is a continuation of the Bank's role as partner in addressing the strategic needs of China's logistics and freight transport sector development.** With the shift of its economy to domestic consumption and the relocation of the industries to inland regions, China is facing new challenges in developing freight and logistics services that are cost-effective and environmentally sustainable. As such, MOT requested the Bank's assistance in preparing national policies, strategies, guidelines, and toolkits for green freight transport development in China, and piloting selected interventions at the local level for scale-up. Building upon the Bank's ongoing activities in China's freight and logistics sector, the proposed project will take a step further to address China's strategic needs by introducing international best practices such as the development of a national freight flow modal and facilitating collaboration between the private sector, which has rich operation data, with the public

sector, which will benefit from data informed planning and policy development by working with the private sector. The Bank's cumulative experience and incremental innovations will continue contributing to the proposed project.

44. **The Bank's involvement will add additional value to China's commitment of improving freight transport efficiency and reducing carbon emission of the freight transport sector.** The national government has committed to develop green and efficient freight transport through promoting multimodal freight transport in the 13th Five Year Plan and other key policy directives in the transport sector. At national level, 85 major logistics hubs along 11 trunk logistics corridors have been identified<sup>16</sup>. Local governments have accelerated the investment in freight infrastructure and services, such as intermodal hubs, logistics parks, freight railways, inland waterway, freight distribution centers, etc. However, due to policy barriers, non-unified technical standards, and a lack of analytical tools, the capacity may not be fully utilized despite the new infrastructure being provided. The proposed project will bridge the gaps with additional values added to (i) develop policies and strategies at the national level to support the development of multimodal transport and improve the efficiency of urban freight; (ii) develop analytical tools and policy framework to support the five pilots at the local level; and (iii) build capacity to promote the national strategies and policies and disseminate the pilot experiences.

## F. Lessons Learned and Reflected in the Project Design

45. This project will leverage and build on the Bank and GEF's previous and ongoing work in areas of sustainable transport, logistics, and climate change as well as the partnership with the MOT of China. Relevant projects include but not limited to the GEF Large City Congestion and Carbon Reduction Project (P127036), the GEF Guangdong Green Freight Demonstration Project (P119654), the Three Gorges Modern Logistics Center Infrastructure Project (P153473), and the China-World Bank Transport Transformation and Innovation Knowledge Platform (TransFORM) – Phase II Project (P167123).

46. **Adopting the pilot-city mechanism in project framework design.** The GEF China Urban Transport Partnership Project and the GEF Large City Congestion and Carbon Reduction Project employed the mechanism of combining national-level TA with pilot city demonstrations. Project outcome confirmed the demonstration effect and the replication potential of successful pilot projects. In addition, it was proved that this mechanism has the advantage of facilitating knowledge dissemination, as pilot cities can share with others their knowledge and project experience through workshops and seminars hosted by the national agency. The proposed project will continue adopting this pilot-city mechanism and have five cities piloting intermodal freight transport and urban distribution.

47. **Developing multimodal freight transport to optimize the freight transport structure.** The GEF Green Freight Demonstration Project, which was implemented in Guangdong Province, primarily focused on improving the fuel efficiency of trucks (the "improve" approach). The project demonstrated that while this may reduce GHG emissions from road freight to some extent, there is an urgent need to reduce the overall freight truck mileage through "avoid" and "shift" approaches where multimodal freight transport plays an important role. The project will develop policies and guidelines to promote multimodal freight transport and incentivize mode shift to rail and waterway. Moreover, pilot demonstrations of highway-waterway and sea-rail intermodal freight transport are incorporated in the project design.

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<sup>16</sup> Action Plan on Promoting the Development of National Trunk Logistics Corridors (2016-2020), issued by MOT and other 17 ministries.

48. **Utilizing models and data analytics to inform policy development and decision-making.** The Bank has provided technical assistance to Indian and Vietnam to develop a national freight flow model, which helps better understanding of the freight flows by commodity and by mode in the country, and identification of key bottlenecks in the infrastructure network and impediments in the freight transport system. This proposed project will assist China's MOT to develop a national freight flow model and build up the capacity of MOT's research institute in data collection and freight modelling. In addition, during the preparation of the Three Gorges Modern Logistics Center Infrastructure Project, the quantitative data analytics was proved to be an effective tool for measuring efficiency of the logistics system and informing relevant decision-making. Selected datasets from both the public and private sectors of the pilot cities will be used for data analytics to improve the logistics efficiency and reduce energy consumption and carbon emissions from the pilot projects.

49. **Disseminating development experience to a global audience and creating scale-up opportunities for innovation in China and Bank client countries.** As a flagship China transport knowledge program, since 2012, TransFORM has organized more than 50 knowledge events reaching over 3,000 participants in China, launched the TransFORM web site, piloted several innovative solutions in Bank financed China transport projects, and hosted six high profile South-South knowledge exchanges. The proposed project will leverage TransFORM to make the knowledge and innovations from the proposed project more accessible and available to a global audience to maximize the global environment benefits of the proposed project.

### III. IMPLEMENTATION ARRANGEMENTS

#### A. Institutional and Implementation Arrangements

50. The project will be implemented by five executing agencies (EAs): the MOT at the national level and three provinces and one municipality at the local level, including Guangdong Province, Shandong Province (for Yantai and Weifang), Hubei Province and Xiamen Municipality.

51. **Project Steering Group (PSG).** A national PSG has been established for overseeing overall project preparation and implementation, and exercising high-level coordination among various stakeholders. The PSG is chaired by the Deputy Director General of MOT's Department of Comprehensive Planning and consisting senior officials from relevant departments of MOT, including Professional Qualification Authority, Department of Comprehensive Planning, Department of Transportation, Department of Technology, National Railway Bureau, Waterway Bureau; China Railway Corporation; as well as the Provincial Transport Departments of Guangdong, Fujian, Shandong and Hubei. The PSG will meet annually during project implementation, to discuss work progress, review annual work plan and budget plan, and to propose key changes to project implementation.



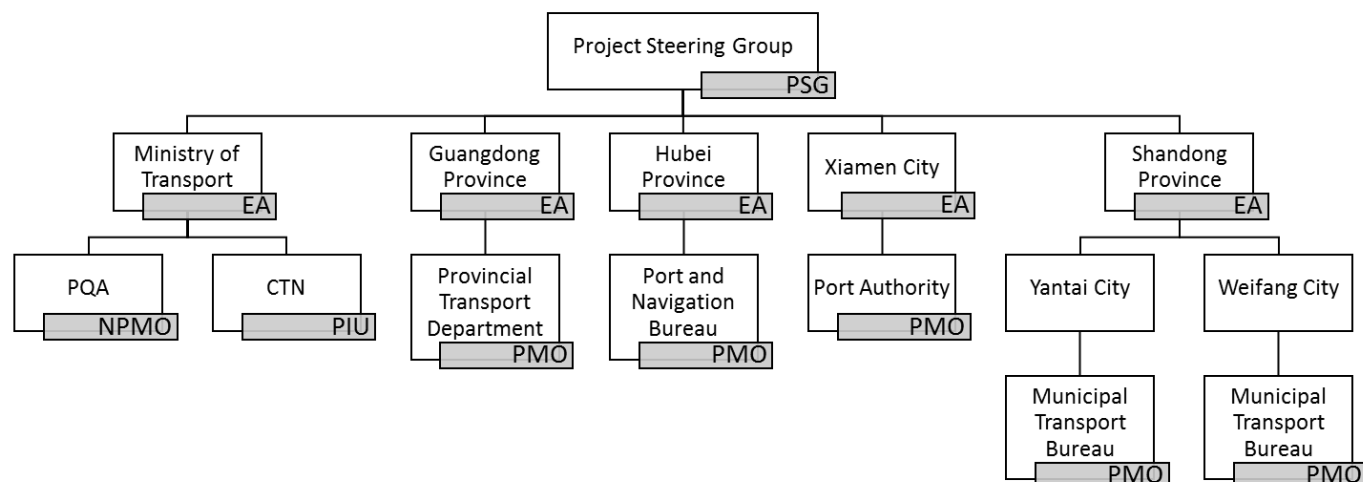


Figure 1 Framework of Institutional and Implementation Arrangements

52. **National Project Management Office (NPMO).** The NPMO is established under MOT’s Professional Qualification Authority (PQA), a public institution established under MOT, and the NPMO report directly to MOT’s Department of Comprehensive Planning. The NPMO is chaired by the Deputy Director General of PQA and consists full-time officials from PQA as well as part-time consultants hired to support project management and implementation. The NPMO will be responsible for the preparation and implementation of the national-level technical assistance and capacity building, overall project coordination, management, quality control, financial management, procurement, reporting and M&E. It will also provide guidance to the local PMOs.

53. **Project Implementing Unit (PIU).** Under the MOT, there is also one PIU, i.e., China Transport News (CTN). CTN is a state-owned newspaper organization affiliated with MOT. It includes media communication platforms including China Transport Newspaper, China Transportation News website and the Zhongjiao Media, and has been designated by MOT to maintain the TransFORM since 2014. Under this project, CTN will carry out activity (b) of Component 3A – dissemination through TransFORM. The detailed roles and responsibilities for CTN are defined through a separate Implementation Agreement between the MOT and the PIU.

54. **Local Project Management Offices (PMOs).** Five local PMOs are established under the respective transport agencies in Guangdong Province, Hubei Province, Xiamen Municipality, Yantai Municipality and Weifang Municipality (Table 1). These local PMOs will be responsible for the preparation and implementation of the respective local components in its province/city, including the technical aspects, project management, environmental and social safeguards, procurement and financial management.

Table 1 Local PMOs

Province/City	Where the local PMO is located
Guangdong	Provincial Transport Department
Hubei	Port and Navigation Bureau under Provincial Transport Department
Xiamen	Port Authority under Municipal Transport Bureau
Yantai	Municipal Transport Bureau
Weifang	Municipal Transport Bureau

55. The Planning Division of MOT's Department of Comprehensive Planning has many years of experience with the Bank projects and implemented the GEF City Cluster Eco-Transport Project and Large City Congestion and Carbon Reduction Project. However, the PQA is new to Bank projects and is unfamiliar with Bank's fiduciary and safeguards policies. Two of the local PMOs in Guangdong and Hubei have extensive experience with Bank projects; the other three local PMOs in Xiamen, Yantai and Weifang are new to Bank projects. Therefore, extensive training in procurement, financial management and safeguards has been provided to the PMOs during preparation and will need to be continued on a need basis throughout implementation.

## **B. Results Monitoring and Evaluation Arrangements**

56. The Results Framework describes the PDO-level indicators and the intermediate indicators, including the definition, baseline and target, and methodology and responsibility for data collection. Results M&E is the joint responsibility of the NPMO and the local PMOs. The pilot projects at the local level involves many enterprises, and the local PMOs are to ensure that these enterprises submit the data needed for project M&E. In addition, the project has allocated M&E budget for consultants to assist the PMOs for data collection and analysis, particularly on the indicator for CO<sub>2</sub> emission reduction. During the mid-term review, target values of all indicators will be reviewed and adjusted as needed.

## **C. Sustainability**

57. The lead executing entity of this project, the MOT, is the national agency responsible for energy and carbon reduction in the transport sector. The project concept was built on MOT's objective to achieve structural emission reduction in the freight transport sector through promotion of multimodal transport and consolidated urban distribution.

58. With the GEF and Bank support, the project will study strategies, policies and guidelines to achieve structural emission reduction. These studies will help inform the preparation and facilitate the adoption of national strategies, policies and guidelines which will be rolled out to the whole country and guide the freight transport development in China during the next few years. In addition, the project will help develop a national freight model for China and build up the technical capacity of Chinese researchers for freight modelling. It is expected that this national freight model will be maintained and updated by the Transport Planning Research Institute.

59. The local components will serve as crucial pilot demonstration for multimodal freight transport and consolidated urban distribution. The experience and lessons learned will be synthesized and disseminated through workshops and peer learning events supported under the project, as well as TransFORM, the World Bank-China transport partnership platform. Based on the experience of other GEF-funded transport projects in China, the successful pilots are likely to be replicated quickly in other Chinese provinces or cities.

## **IV. PROJECT APPRAISAL SUMMARY**

### **A. Technical, Economic and Financial Analysis (if applicable)**

60. **Technical Analysis.** Overall technical design of the proposed project focuses on creating analytical tools for the systematic planning, development, operation and management of a well-connected efficient and sustainable multimodal freight transport network at both national and local levels. The national multimodal freight transport model developed under the national component, with subsequent applications in the preparation of national and YREB corridor freight transport plans, enables a consistent approach of collecting data, assessing existing conditions, identifying impedance, and analyzing potential solutions. Additionally, the national component supports the development of an analytical tool for evaluating the emission abatement potential and cost of different physical, operational and policy interventions in the freight transport sector. Furthermore, under the subnational component, the proposed project supports public-private collaboration in undertaking big data analytics of freight transport operation data to be gleaned from various data sources including both publicly run and privately operated freight information platforms for the evaluation of freight operational performance and the proposition of public policies that promote efficient freight distributions in urban areas and integrated multimodal transport for inter-city or inter-region freight movements. Finally, the proposed project focuses on technical standardization that facilitates seamless multimodal freight transport. It supports development of unified technical standards – data, documentation, equipment - among the modes.

61. **Economic Analysis.** Following GEF guidelines, an incremental cost analysis was conducted to assess the incremental costs and global environmental benefits of the project scenario vis-à-vis business-as-usual (BAU) scenario.

62. **BAU Scenario.** The national government has prioritized the development of multimodal freight transport and improvement of urban freight in the 13th Five Year Plan and other key policy directives in the transport sector. The local governments have accelerated the investment in freight infrastructure and services, such as intermodal hubs, logistics parks, freight railways, inland waterway, freight distribution centers, etc. These directives and investments will increase the capacity for intermodal transport and urban freight distribution, and attract some freight from road to cleaner modes of transport. However, due to inefficiencies in operations and policy/standardization barriers, the capacity may not be fully utilized despite the new infrastructure being provided.

63. **Incremental Costs.** The incremental costs of this GEF project are associated with: (i) developing policies and strategies at the national level to support the development of multimodal transport and improve the efficiency of urban freight; (ii) developing analytical tools and policy framework to support the five pilots at the local level; and (iii) capacity building to promote the national strategies and policies and disseminate the pilot experiences.

64. **Global Environmental Benefits.** The global environmental benefits of the project intervention include two types: (i) direct GHG emission reduction from the pilot projects, such as modal shift from road transport to waterway and/or railway, reduced urban distribution trips due to consolidation, reduced empty-loaded freight trips, etc.; and (ii) indirect GHG emission reduction because of policy incentives and capacity building activities that promote the replication of successful pilots.

65. Two pilot projects were selected for detailed analysis of direct GHG emission reduction: the Bohai Gulf Highway-Waterway Multimodal Transport Project in Yantai, and the Integrated Urban-Rural Distribution Project in Guangdong.

66. **Bohai Gulf Highway-Waterway Multimodal Transport Project.** In Yantai, the project intervention will attract more freight traffic to use the Yantai-Dalian seaway instead of the Bohai Gulf roadway through promoting

drop-and-pull. The ratio of trucks using drop-and-pull to cross Yantai-Dalian is expected to increase from 2.1 percent under BAU to 13 percent with the project intervention by 2023. During the project lifecycle of 2020-2030, total direct CO<sub>2</sub> emission reduction from the pilot is estimated to be 1.10 million tons.

67. **Integrated Urban-Rural Distribution Project.** In Guangdong, the project intervention will reduce empty loaded trips through facilitating the use of return trucks that distribute freight from urban to rural to replace the freight trips from rural to urban. The empty-loaded rate of trucks in Guangdong-Qingyuan pilot is expected to drop from 95 percent to 65 percent by 2023. During the project lifecycle of 2020-2030, total direct CO<sub>2</sub> emission reduction from the pilot is estimated to be 0.23 million tons.

68. The direct CO<sub>2</sub> emission reduction from these two pilots are 1.1 million tons (Yantai multimodal transport) and 0.23 million tons (Guangdong urban-rural distribution). Currently, MOT has approved 16 ongoing multimodal transport pilots; and China has more than 30 provinces that could adopt similar urban-rural distribution modality. With the issuance of national policies and guidelines to address existing impediments in multimodal transport and urban distribution, together with the capacity building and dissemination activities, it is expected that these two types of projects will have a replication effect of 10 and 20 times, respectively.

69. **Incremental Cost Analysis.** Detailed analysis are presented in the project documents. In summary, the incremental cost of the project is estimated at US\$13.67 million. Total global environmental benefits, both direct and indirect, is estimated to be 15.6 million tons. The cost-effectiveness of the GEF intervention, i.e., unit cost of CO<sub>2</sub> mitigated under the Project, is US\$0.876 per ton.

## B. Fiduciary

### (i) Financial Management

70. Financial management (FM) assessment for the proposed Project was conducted in October and November 2017, and August 2018 to determine whether the main implementing agencies, MOT's Professional Qualification Authority (PQA), China Transport News (CTN), and various PMOs and corresponding finance bureaus (FBs) for project cities and project provinces have acceptable FM and disbursement arrangements in place to adequately control, manage, account for and report on the use of project funds.

71. The NPMO has been established in MOT, and the professional PQA under MOT will take the responsibility of project FM, including grant disbursement, establishment and management of project Designated Account (DA) for the national components, etc.

72. The FM capacity assessment conducted upon all PMOs of central and province/city levels had identified the principal risk is that project staff of PQA of MOT, PMOs of Weifang, Yantai and Xiamen are new to Bank's operation which may cause inefficiency and ineffectiveness of project implementation. Mitigation measures to address the above risk are as follows: (a) the Bank will provide general and well-designed training on FM and disbursement; (b) a Financial Management Manual (FMM) has been prepared and would be followed throughout the project; (c) experienced FM consultant has been engaged to support the FM function. Overall, the residual FM risk after taking into account mitigation measures is rated as Moderate.

73. The GEF Grant Agreement (GA) will be signed between the Bank and the Ministry of Finance (MOF). Four Project Agreements will be signed between the Bank and the provinces of Shandong, Hubei, and Guangdong, and the municipality of Xiamen, respectively. In addition, the MOT will enter into implementation agreements with PQA and CTN, respectively. MOF will sign subsidiary agreements with MOT, the provincial governments of Shandong, Hubei, and Guangdong, and municipal government of Xiamen, respectively. Shandong Province will sign subsidiary agreements with Yantai Municipality and Weifang Municipality. MOT's PQA and CTN, two Provinces of Hubei and Guangdong, and three Municipalities of Xiamen, Weifang and Yantai will use the grant proceeds.

74. **Disbursement Arrangements.** Three disbursement methods are available for the project: (i) advance; (ii) reimbursement; and (iii) direct payment. The primary Bank disbursement method will be direct payment and advances to segregated US\$ DAs opened at commercial banks acceptable to the Bank. Project DAs in US\$ will be maintained as following:

*Table 2 Project Disbursement Arrangements*

<b>Components</b>	<b>Agencies Managing DA</b>	<b>Ceiling of DA</b>
MOT	MOT/ PQA under MOT	US\$500,000
Hubei	Hubei Provincial FB	US\$30,000
Guangdong	Guangdong Provincial FB	US\$75,000
Xiamen	Xiamen Municipal FB	US\$70,000
Weifang and Yantai	Shandong Provincial FB	US\$130,000

75. Withdrawal Applications (WAs) will be prepared to request Bank disbursements and to document the use of Bank financing. WAs will include supporting documents in the form of Statement of Expenditures (SOEs), to be prepared on the cash basis, as specified in the Disbursement Letter issued by the Bank.

*Table 3 Project Withdrawal Applications*

<b>Category</b>	<b>Amount of the Grant Allocated (expressed in US\$)</b>	<b>Percentage of Expenditures to be Financed (inclusive of Taxes)</b>

(1) Goods, non-consulting services, consulting services, Training and Workshops under Parts 1 of the Project	4,441,000	100%
(2) Goods, non-consulting services, consulting services, and Training and Workshops under Part 2 of the Project	3,050,000	100%
(3) Incremental Operating Costs, and Training and Workshop under Part 3 of the Project, as follows:		100%
(a) for PQA	355,095	
(b) for CTN	400,000	
<b>TOTAL AMOUNT</b>	<b>8,246,095</b>	

76. The GEF grant will be disbursed against eligible expenditures (taxes inclusive), as indicated in the table below:

77. **Disbursement Categories and Percentages.** Retroactive financing will be available for this project in the amount of US\$1 million for payments made under the project prior to the date of the GA but on or after September 30, 2017, for the implementation of goods and consultant services as well as training programs.

78. **Budgeting.** The GEF grant budget will be prepared by the NPMO and each local PMOs in accordance with implementation plan, which will be reviewed by Bank's task team. Budget variance analysis will be conducted regularly thus enabling timely corrective actions.

79. **Funds Flow.** DAs in US\$ will be set up and managed by PQA under MOT, Hubei, Shandong and Guangdong Provincial FB and Xiamen Municipal FB for their components respectively. The grant proceeds will flow from the Bank into the project DAs. Reimbursements or payments to service providers are based on funding requests (also referred to as withdrawal applications). The funding requests are supported by contractor and supplier invoices and other necessary documents processed by PQA or PMOs.

80. For Yantai and Weifang PMOs, to request Grant proceeds, the PMO will prepare a payment request with supporting documents and submit it through the respective municipal FB then to provincial FB for review. Provincial FB will transfer funds from the DA to service providers or contractors or the PMOs after approving the requests. For Xiamen, Hubei and Guangdong PMOs, to request Grant proceeds, the PMO will prepare a payment request with supporting documents and submit it to the respective municipal (Xiamen) or provincial FBs for review. Provincial or municipal FB (Xiamen) will review the requests and transfer funds from the DA to service providers or contractors or PMOs. The Bank may also make payment to contractors when the individual payment amount satisfying direct payment requirement.

81. **Accounting and Financial Reporting.** Accounting regulations issued by the International Department of MOF and currently used by all TF recipients in China will be followed to maintain project accounting records and

prepare project financial statements. The reporting format has been customized to adequately reflect project implementation and use of grant proceeds. The project accounting records and project financial statements will be prepared as follows:

- (a) Balance sheet of the project
- (b) Statement of implementation of GA
- (c) Statement of DA
- (d) Notes to the financial statements (required only for annual financial statements)

82. PQA, CTN and all the PMOs will manage, monitor and maintain project accounting records for its activities respectively. PMOs will also incorporate DA information maintained by respective FBs and CTN’s financial statement to prepare the consolidated project financial statements for national component. Shandong Provincial FB will consolidate project financial statements of Yantai and Weifang. The unaudited semi-annual project financial statements will be prepared and furnished to the Bank by PQA, Shandong Provincial FB, Guangdong PMO, Hubei PMO and Xiamen PMO, as part of the Progress Report no later than 60 days following each semester (the due dates will be August 31 and February 28).

83. The task team will monitor the accounting process, including the adequacy of the FM system and staff training, especially during the initial stage, to ensure complete and accurate financial information are provided in a timely manner.

84. **Internal Control.** The general accounting policy, procedures and regulations have been issued by MOF and will be followed by the project. Project FMM will also clearly define responsibilities, standardize payment and disbursement work. Since the GEF grand will mainly finance soft expenditures including consulting service, training/workshops and incremental operating cost, specific documentation requirement and expenditures eligibilities have been defined in FMM.

85. **Audit Arrangement.** The annual audit report of the project financial statements will be due to the Bank within 6 months after the end of each calendar year. According to the agreement reached with MOF and China National Audit Office, the audit report and audited financial statements will be made publicly available in both the Bank and official websites of the following audit offices. This requirement is stipulated in the GA. The responsible agency and timing are summarized as follows:

*Table 4 Project Audit Arrangement*

<b>Audit Reports</b>	<b>Issued by</b>	<b>Submitted by</b>	<b>Due date</b>
Project financial statements – MOT	Audit Service Center of China National Audit Office for Foreign Loan and Assistance Projects	NPMO	June 30 of each calendar year

Project financial statements – Xiamen	Xiamen Municipal Audit Office	Xiamen PMO	
Project financial statements – Hubei	Hubei Provincial Audit Office	Hubei PMO	
Project financial statements – Guangdong	Guangdong Provincial Audit Office	Guangdong PMO	
Consolidated Project financial statements for Weifang and Yantai	Shandong Provincial Audit Office	Shandong Provincial FB	

## (ii) Procurement

86. **Applicable Procurement Rules and Procedures.** Procurement for the project will be carried out in accordance with the Bank's Procurement Regulations for Investment Project Financing Borrowers, dated July 2016 and revised November 2017 as required by the provisions of the Loan Agreement. Also applicable to the project will be the Bank's Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants, dated October 2006, and thereafter revised in January 2011 and July 1, 2016. In this project, the Bank's planning and tracking system, (Systematic Tracking of Exchanges in Procurement, STEP) will be used to prepare, clear and update Procurement Plans and conduct all procurement transactions. Accordingly, all the procurement activities under the proposed project will be entered into, tracked, and monitored online through the system.

87. **Capacity Assessment.** The project involves one NPMO and 5 local PMOs – MOT as the NPMO, Yantai PMO, Weifang PMO, Xiamen PMO, Guangdong PMO and Hubei PMO. Among the NPMO and 5 local PMOs, MOT, Guangdong and Hubei PMOs have done the Bank financed projects. Yantai, Weifang and Xiamen PMOs have no experiences dealing with the Bank projects and their capacities for procurement are low.

88. **Risk Assessment.** Though MOT has done the Bank financed projects, the new staff of the NPMO have no experience dealing with the Bank financed projects, and neither do they have public procurement or project management experiences. Given the overall low capacity of national and local PMOs and the unstable perspectives of their staffing, the procurement risk is assessed as substantial. The key procurement risks include the following:

- (a) Though the NPMO and some local PMOs have the Bank project experiences, they are likely to experience a high turnover of the key staff during project implementation. The new staff will need to be trained again for the Bank's procurement procedures and policies. The NPMO has experienced one round of Project Manager turnover during the project preparation stage.



- (b) Despite having some experience with the Bank projects, there are still some gaps concerning knowledge and experience of carrying out procurement activities in accordance with the Bank's Procurement Regulations, rules and procedures.
- (c) Due to weak technical, procurement and contract management capacities, there may be delays in bid evaluation by the external experts, awarding and payment, etc. This may also cause delayed payment to the selected contract/supplier/consulting arising from delayed acceptance/assessment of the goods, non-consulting services and consulting services.

89. **Risk Mitigation Actions.** The key risk mitigation actions include the following:

- (a) The Bank has provided extensive trainings to the PMOs on the new Procurement Regulations. More in-depth trainings will be delivered to the NPMO and PMOs during project implementation on a regular basis. More hands-on support will be provided when needed.
- (b) Appropriate prior review will be executed by the Bank team to ensure project procurement to comply with the Bank's regulations. Procurement post review will be conducted annually and feedbacks for the relevant findings will be shared on time with the PMOs.
- (c) At the national level, a technical committee will be established for (i) conducting quality control of the TA Terms of Reference (TOR) and bid documents; (ii) bid evaluation; and (iii) TA output review and management. The NPMO will provide an introduction to the technical experts on the Bank's policies on the evaluation and clarifications prior to bid evaluation.

90. **Procurement Complaint Mechanism.** The complaint mechanism should be in place in the NPMO and PMOs when the project is launched.

91. **Project Procurement Strategy for Development (PPSD) and Procurement Plan (PP).** Works are not anticipated in the project. All procurement will be for goods, non-consulting and consulting services.

92. **Procurement of Goods and Non-consulting Services.** A small portion of the procurement for this project will be for goods and non-consulting services, such as green navigation channel equipment for Hubei PMO (the estimated value is U\$80k) and project achievement promotion for Yantai PMO (U\$100k). Given the small value of these procurement, open competition by approaching national markets will be applied. Request for Proposals or Request for Quotations will be adopted depending on the value of the contract to be procured. Direction Selection may be used for some non-consulting services in exceptional cases where the service provider is unique.

93. **Procurement of Firm Consulting Services.** Most firm consulting services will be procured through Open Competition by approaching international markets. Quality and Cost Based Selection (QCBS) and Selection Based on Consultants' Qualification (CQS) will be used in most contracts. Though the selection will be conducted by approaching international markets, a fair number of local experts will be needed in the team composition considering the advantages of including local experts with respect to the local language, knowledge and expertise.

For relative small value consultant contracts, open competition by approaching national markets may be applied when there is no value to approach the international market.

94. Four affiliations of MOT, namely Transport Planning and Research Institute (TPRI), Research Institute of Highway (RIOH), China Waterborne Transport Research Institute (WTRI) and China Academy of Transportation Science (CATS), are national-level transport policy research institutions. Their participation in this GEF project is critical because: (i) these four affiliates are historically MOT’s designated policy researchers in their respective areas of expertise in the transport sector; and (ii) it is through the collaboration between these affiliations with other international research institutes during the TA activities that would achieve the PDO of enhancing China’s institutional capacity for planning and policy development. Therefore, Direct Selection (DS) may be considered in the procurement of consulting services for national-level TAs on a case-by-case basis. Justifications have been provided in the PPSD for all proposed Direction Selection contracts.

95. **Procurement of Individual Consulting Services.** Most individual consulting services will be procured through Open Competition. DS may be used in exceptional cases where the individual consultant has relevant experience and qualification of exceptional worth to the assignment or where the assignment is with a total expected duration of less than six months.

96. **PP.** The initial PP covering at least the first eighteen months of project implementation has been prepared by the national and local PMOs and was found acceptable to the Bank. The PPs will be updated, reviewed and agreed with the Bank annually, or as required, to reflect project implementation needs.

97. **Procurement and Selection Methods and Prior Review Thresholds.** The table below indicates the procurement and selection methods and prior review thresholds for goods, non-consulting services, and consulting services to be procured by each PMO under the Project based on the procurement risk assessment. Contracts not subject to prior review will be subject to post review. Procurement of works will not be expected under the Project.

*Table 5 Procurement and Selection Methods and Prior Review Thresholds*

<b>Expenditure Category</b>	<b>Contract Value (US\$)</b>	<b>Procurement Method</b>	<b>Bank Prior Review</b>
<b>Goods/IT Systems and Non-Consulting Services</b>	≥ 10 million	ICB	N/A
	>=500,000 & < 10 million	NCB Remarks: Where goods are not normally available from within China, the method of procurement will be ICB even if the contract value is less than US\$10 million	All contracts >= US\$2 million
	< 500,000	Shopping	≥ US\$200k
	N/A	DS	All DS contracts ≥ US\$2 M
<b>Consultants</b>	≥ 300,000	QCBS, QBS, LCS, FBS	Firms: All contracts ≥ US\$1M;
	< 300,000	QCBS, QBS, LCS, FBS, CQS	Firms: All DS contracts ≥ US\$1M;

	N/A	DS	IC ≥ US\$300K; DS for IC: ≥ US\$300K
	N/A	Individual Consultant	
<b>Notes:</b>	ICB: International Competitive Bidding NCB: National Competitive Bidding DS: Direct Selection QCBS: Quality- and Cost-Based Selection QBS: Quality-Based Selection LCS: Least Cost Selection FBS: Fixed Budget Selection		CQS: Selection Based on the Consultants' Qualifications IC: Individual Consultant selection procedure N/A: Not Applicable

98. **Post Review.** The Bank's procurement team and/or external auditors will conduct field visits for post review of procurement actions every 12 months. The initial post review sampling ratio will be twenty percent. This ratio will be adjusted periodically during project implementation based on performance of each PMO.

99. **Advance Procurement/Retroactive Financing.** Retroactive financing will be permitted for the project within the limits specified in the GA. The total amount of retroactive financing should not exceed 20% of the grant amount. The payments are made no more than 12 months before the expected date of signing of the legal agreement of the Bank grant. For advance procurement, payments will be made only for contract procured in accordance with applicable Bank procurement procedures.

**C. Safeguards**

**(i) Environmental Safeguards**

100. All the activities supported by GEF fund are TA activities. There is no physical civil works involved, nor the project will support any feasibility study for specific project or concrete infrastructure investment plan. As a TA focusing on green freight transport, the project studies are designed with inherent objectives of environmental protection in terms of energy saving, as well as pollution and GHG emission reduction. Meanwhile, there are potential environmental implications for these studies in terms of downstream implementation of the findings/recommendations of these studies. Therefore, the project is classified as category B as per OP4.01.

101. An Environment and Social Management Framework (ESMF) has been developed, which specifies the safeguards requirement, procedures, institutional arrangement, and implementation plans, along with the identification of the potential environmental and social implications of the project. In general, for TA activities with potential environmental and social implications, environmental and social considerations will be incorporated into the scope of work and TORs. For TA studies in which concrete downstream infrastructure projects might be recommended, a TOR for environmental impact assessment for the downstream project preparation is required to be developed as part of the TA output. The task team will provide guidance and review the TORs and TA outputs during the project implementation.

102. The ESMF has been disclosed locally and also on the Bank's website as per OP4.01.

## **(ii) Social Safeguards**

103. The TA is to finance six national-level TAs, and five local demonstration components focusing on the development of policies, strategies, analytical toolkits, and technical standards that promotes multimodal freight transportation system and urban logistics distribution. All these activities do not involve civil construction items or feasibility study, so will not directly impact the environment and society. However, given a national coverage project, the Bank policy OP4.10 will be triggered, and the TOR for each TA activity should reflect requirements in the OP 4.10. In addition, some activities, such as development of action plan for efficient and green freight corridors, may pose potential downstream social impacts, in case specific infrastructure project is recommended, physical civil works may be involved, therefore the Bank policy OP4.12 is triggered. As such, the TOR for each TA activity should reflect requirements in the OP 4.12. Considering the national and local level studies and overall plan development activities may have indirect downstream social implications if the results or recommendations of such studies are put into implementation in the future, a TOR for social assessment is required as an output of the TA. The ESMF was disclosed locally and will be disclosed in the Bank website.

104. **Social Management.** With regard to the current institutional arrangements, the national and local PMOs should strengthen their capacity building, so as to better fulfill their responsibilities. The cost of capacity building can be covered by the project grant or by the counterpart funding. Capacity building in environmental and social safeguard will include two aspects. Firstly, the PMOs will determine staffing requirements at different levels and additional staffing requirements. Secondly, the PMOs will train people engaged in environmental and social safeguard for this project.

105. **Public Consultation and Grievance Redress.** During project implementation, public consultation should be carried out in order to establish an effective grievance redress mechanism. Public consultation and the establishment of a grievance redress mechanism shall be explicitly listed in the TOR. In the research and implementation of the project components, information about the grievances and complaints of all stakeholders will be collected; and the relevant processes and results will be recorded in detail. Public opinions and advice should be taken into consideration when the relevant research is conducted, so that the outputs can reflect the results of public consultation. Public consultation and the establishment and operation of the Grievance Redress Mechanisms will be supervised regularly throughout the implementation of the project. The ESMF was disclosed on March 7, 2018.

## **(iii) Other Safeguards**

### **(iv) Grievance Redress Mechanisms**

106. Communities and individuals who believe that they are adversely affected by a World Bank supported project may submit complaints to existing project-level grievance redress mechanisms or the Bank's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the Bank's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of the Bank non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and the Bank Management has been given an opportunity to respond. For information on how to submit complaints to the Bank's corporate GRS please visit

<http://www.worldbank.org/en/projects-operations/products-and-services/grievance-redress-service>. For information on how to submit complaints to the Bank Inspection Panel, please visit [www.inspectionpanel.org](http://www.inspectionpanel.org).

## V. KEY RISKS

107. The overall risk rating of the project is Moderate. The detailed ratings are summarized in the risk table (Systematic Operations Risk-rating Tool (SORT)).

108. Technical Design of the Project. This risk is rated Moderate. The key challenges include (i) how to incorporate international best practices into the project design and apply it in the Chinese context; and (ii) how to engage the private sector and encourage innovations through the project. Several workshops were conducted during preparation to solicit ideas from the public and private sectors in order to ensure soundness of project design. This will be continued during implementation and the Bank team will work closely with international and domestic experts to ensure the quality of project outputs.

109. Institutional Capacity for Implementation and Sustainability. This risk is rated Moderated. The project requires extensive coordination between various departments under the MOT as well as collaboration between the public and private sector, which are often weak in China. The PSG is established for this purpose. The project will create a platform that brings various stakeholders in the freight sector together and this is expected to be continued after project completion.

110. Fiduciary. This risk is rated Substantial. The NPMO and three of the local PMOs are new to the Bank operations and do not have experience with Bank procurement or financial management. In addition, according to the previous experience, the staffing of GEF PMOs may change frequently which undermines the trainings provided during preparation. To mitigate the risk, the NPMO will hire experienced consultants to assist both the NPMO and the local PMOs with procurement and financial management and trainings will be provided throughout implementation on a need basis.

## VI. RESULTS FRAMEWORK AND MONITORING

### Results Framework

#### Project Development Objectives(s)

The development objective of the project is to inform green freight transport, enhance institutional capacity for planning and policy development, and pilot innovations for carbon emission reduction in selected provinces.

PDO Indicators by Objectives / Outcomes	DLI	CRI	Unit of Measure	Baseline	End Target
<b>Inform Green Freight Transport</b>					
1. Number of national plans adopted by MOT for implementation			Number	0.00	2.00
<b>Enhance Institutional Capacity for Planning and Policy Development</b>					
2. Number of analytical tools adopted by MOT for implementation in national planning and policy development			Number	0.00	2.00
3. Number of guidelines on improving urban freight transport issued by MOT for implementation			Number	0.00	1.00
<b>Pilot Innovations for Carbon Emission Reduction</b>					
Net greenhouse gas emissions		Yes	Tones/year	0.00	19,600,000.00

Intermediate Results Indicators by Components	DLI	CRI	Unit of Measure	Baseline	Intermediate Targets				End Target
					1	2	3	4	
<b>1: National TAs</b>									
MOT adopts the Action Plan for Infrastructure Connectivity Improvement for the BRI Freight Corridors			Yes/No	N					Y
MOT adopts the Guidelines for Green and Efficient Urban Freight Transport Development			Yes/No	N					Y
MOT issues the guidelines for optimizing multimodal freight transport on the YREB			Yes/No	N					Y
<b>2: Subnational TAs and Pilots</b>									
Percentage of Bohai Bay ferry traffic that is drop-and-pull			Percentage	2.10	2.10	5.00	6.50	9.00	12.00
Weifang adopts the proposal for improving urban freight transport efficiency			Yes/No	N					Y
Xiamen Port adopts the optimization plan for traffic management of Xiamen Port and associated inland dry ports			Yes/No	N					Y
Hubei Department of Transport adopts the Han River inland waterway integrated development plan			Yes/No	N					Y
Percentage of empty trucks on the return trip from rural villages to urban centers in Guangdong			Percentage	95.00	95.00	95.00	90.00	80.00	65.00
<b>3: Capacity Building</b>									
truck drivers trained at national truck driver trainings, cumulative			Number	0.00	0.00	100.00	100.00	200.00	300.00
persons trained at Guangdong integrated urban-rural distribution system trainings, cumulative			Number	0.00	0.00	100.00	100.00	200.00	300.00

- female trained at Guangdong integrated urban-rural distribution system trainings, cumulative		Number	0.00	0.00	50.00	50.00	50.00	50.00
persons trained at Weifang integrated urban distribution system trainings, cumulative		Number	0.00	0.00	100.00	100.00	200.00	300.00

### Monitoring & Evaluation Plan: PDO Indicators

<b>Indicator Name</b>	1. Number of national plans adopted by MOT for implementation
<b>Definition/Description</b>	This indicator will assess whether MOT has formally adopted the national plans developed under this project for implementation. The national plans to be developed include the medium-to-long term multimodal freight transport plan, YREB multimodal freight development plan, action plan for multimodal freight transport connectivity improvement for the BRI freight corridors, and the operation and management plan for the BRI freight corridors.
<b>Frequency</b>	One time
<b>Data Source</b>	Official document
<b>Methodology for Data Collection</b>	N/A
<b>Responsibility for Data Collection</b>	NPMO
<b>Indicator Name</b>	2. Number of analytical tools adopted by MOT for implementation in national planning and policy development
<b>Definition/Description</b>	This indicator will assess whether MOT has formally adopted the analytical tools, namely the marginal abatement cost analytical tool for freight transport emission reduction and the national freight model, for implementation in national planning and policy development.



<b>Frequency</b>	One time
<b>Data Source</b>	Official document
<b>Methodology for Data Collection</b>	N/A
<b>Responsibility for Data Collection</b>	NPMO
<b>Indicator Name</b>	3. Number of guidelines on improving urban freight transport issued by MOT for implementation
<b>Definition/Description</b>	This indicator will assess whether MOT has formally adopted the guidelines for implementation as sector guidelines. The guidelines on improving urban freight transport include guidelines for green and efficient urban freight transport development and guidelines for improving efficiency of urban freight distribution.
<b>Frequency</b>	One time
<b>Data Source</b>	Official document
<b>Methodology for Data Collection</b>	N/A
<b>Responsibility for Data Collection</b>	NPMO
<b>Indicator Name</b>	Net greenhouse gas emissions
<b>Definition/Description</b>	
<b>Frequency</b>	One Time
<b>Data Source</b>	Project statistical data and related database from local governments and selected enterprises

<b>Methodology for Data Collection</b>	The PMOs will estimate the annual carbon emission under the business as usual scenario based on the projected growth rate of population, economics, motorization, and transport investment. The PMOs will calculate the annual carbon emission under the scenario that the proposed GEF project is implemented based on the algorithms jointly developed by the PMOs and the Bank.
<b>Responsibility for Data Collection</b>	National and Local PMOs

#### Monitoring & Evaluation Plan: Intermediate Results Indicators

<b>Indicator Name</b>	MOT adopts the Action Plan for Infrastructure Connectivity Improvement for the BRI Freight Corridors
<b>Definition/Description</b>	This indicator will assess whether MOT has formally adopted the action plan for implementation
<b>Frequency</b>	One time
<b>Data Source</b>	Official document
<b>Methodology for Data Collection</b>	N/A
<b>Responsibility for Data Collection</b>	NPMO
<b>Indicator Name</b>	MOT adopts the Guidelines for Green and Efficient Urban Freight Transport Development
<b>Definition/Description</b>	This indicator will assess whether MOT has formally adopted the plan for implementation
<b>Frequency</b>	One time

<b>Data Source</b>	Official document
<b>Methodology for Data Collection</b>	N/A
<b>Responsibility for Data Collection</b>	NPMO
<b>Indicator Name</b>	MOT issues the guidelines for optimizing multimodal freight transport on the YREB
<b>Definition/Description</b>	This indicator will assess whether MOT has formally adopted and issued the guidelines for implementation
<b>Frequency</b>	One Time
<b>Data Source</b>	Official Document
<b>Methodology for Data Collection</b>	N/A
<b>Responsibility for Data Collection</b>	NPMO
<b>Indicator Name</b>	Percentage of Bohai Bay ferry traffic that is drop-and-pull
<b>Definition/Description</b>	The truck freight tonnage in drop-and-pull mode carried by ferry divided by total truck freight tonnage carried by ferry from Yantai to Dalian through Bohai Bay. This indicator measures the freight transport efficiency improvement aspect of the PDO.
<b>Frequency</b>	Annually
<b>Data Source</b>	Daily recorded data

<b>Methodology for Data Collection</b>	The PMO will record daily truck freight tonnage in roll-on-and-roll-off mode and in drop-and-pull mode carried by ferry from Yantai to Dalian through Bohai Bay. The daily recorded data will be summarized to generate semiannual reports. The annual percentage of the Bohai Bay ferry traffic that is drop-and-pull will be the sum of monthly truck freight tonnage carried in drop-and-pull mode by ferry of the previous 12 months divided by the sum of monthly freight tonnage carried by ferry fleet of the previous 12 months.
<b>Responsibility for Data Collection</b>	Yantai PMO
<b>Indicator Name</b>	Weifang adopts the proposal for improving urban freight transport efficiency
<b>Definition/Description</b>	This indicator will assess whether Weifang has formally adopted the proposal for implementation
<b>Frequency</b>	One time
<b>Data Source</b>	Official document
<b>Methodology for Data Collection</b>	N/A
<b>Responsibility for Data Collection</b>	Weifang PMO
<b>Indicator Name</b>	Xiamen Port adopts the optimization plan for traffic management of Xiamen Port and associated inland dry ports
<b>Definition/Description</b>	This indicator will assess whether Xiamen Port has formally adopted the plan for implementation
<b>Frequency</b>	One time
<b>Data Source</b>	Official document

<b>Methodology for Data Collection</b>	N/A
<b>Responsibility for Data Collection</b>	Xiamen PMO
<b>Indicator Name</b>	Hubei Department of Transport adopts the Han River inland waterway integrated development plan
<b>Definition/Description</b>	This indicator will assess whether Hubei Department of Transportation has formally adopted the plan for implementation
<b>Frequency</b>	One time
<b>Data Source</b>	Official document
<b>Methodology for Data Collection</b>	N/A
<b>Responsibility for Data Collection</b>	Hubei PMO
<b>Indicator Name</b>	Percentage of empty trucks on the return trip from rural villages to urban centers in Guangdong
<b>Definition/Description</b>	The number of empty return trips that are from rural villages (Qingyuan) to urban centers (Guangzhou) divided by the total number of return trips that are from rural villages (Qingyuan) to urban centers (Guangzhou).
<b>Frequency</b>	Annually
<b>Data Source</b>	Daily recorded data

<b>Methodology for Data Collection</b>	The PMO will record daily roundtrip information of trucks selected by proportional sampling approach including (i) origin, (ii) destination, (iii) truck type, (iii) cargo type, (iv) cargo weight, and (v) shipment distance. The daily recorded data will be summarized to generate quarter reports. The annual percentage of empty return trips will be the sum number of empty return trips within the previous 4 quarters divided by the total number of return trips within the previous 4 quarters.
<b>Responsibility for Data Collection</b>	Guangdong PMO
<b>Indicator Name</b>	truck drivers trained at national truck driver trainings, cumulative
<b>Definition/Description</b>	This indicator will monitor the number of truck drivers trained by means of training sessions and events that has been conducted as part of the capacity building in the proposed project. This indicator is calculated as the number of persons attending multiply the number of training days.
<b>Frequency</b>	Annually
<b>Data Source</b>	Statistic data
<b>Methodology for Data Collection</b>	The NPMO will organize training sessions and events and record the number of persons attended and the number of training days.
<b>Responsibility for Data Collection</b>	NPMO
<b>Indicator Name</b>	persons trained at Guangdong integrated urban-rural distribution system trainings, cumulative
<b>Definition/Description</b>	This indicator will monitor the number of persons trained by means of training sessions and events that has been conducted as part of the capacity building in the proposed project. This indicator is calculated as the number of persons attending multiply the number of training days.

<b>Frequency</b>	Annually
<b>Data Source</b>	Statistic data
<b>Methodology for Data Collection</b>	The Guangdong PMO will organize training sessions and events and record the number of persons attended and the number of training days.
<b>Responsibility for Data Collection</b>	
<b>Indicator Name</b>	- female trained at Guangdong integrated urban-rural distribution system trainings, cumulative
<b>Definition/Description</b>	
<b>Frequency</b>	
<b>Data Source</b>	
<b>Methodology for Data Collection</b>	
<b>Responsibility for Data Collection</b>	
<b>Indicator Name</b>	persons trained at Weifang integrated urban distribution system trainings, cumulative
<b>Definition/Description</b>	This indicator will monitor the number of persons trained by means of training sessions and events that has been conducted as part of the capacity building in the proposed project. This indicator is calculated as the number of persons attending multiply the number of training days.
<b>Frequency</b>	Annually
<b>Data Source</b>	Statistic Data
<b>Methodology for Data Collection</b>	The Weifang PMO will organize training sessions and events and record the number of persons attended and the number of training days.

<b>Responsibility for Data Collection</b>	Weifang PMO





**ANNEX 1: Detailed Project Costs by Component**

Component	Cost	GEF Grant	China
<b>Component 1: National Technical Assistance and Policy Development</b>	<b>4,850,000</b>	<b>3,150,000</b>	<b>1,700,000</b>
1A: Development of Policy and Strategy for Low Carbon Multimodal Freight Transportation System	3,250,000	2,250,000	1,000,000
<i>(a) Development of Structural Emission Reduction Strategy of China's Freight Transport Sector</i>	<i>1,500,000</i>	<i>1,000,000</i>	<i>500,000</i>
<i>(b) Development of Action Plan for Efficient and Green Freight Corridors in China</i>	<i>850,000</i>	<i>600,000</i>	<i>250,000</i>
<i>(c) Development of Guideline on Multimodal Freight Development for the YREB</i>	<i>900,000</i>	<i>650,000</i>	<i>250,000</i>
1B: Development of Policy and Guideline for Green Urban Freight Distribution	1,100,000	700,000	400,000
<i>(a) Development of Guideline for Green and Efficient Urban Freight Transport Development</i>	<i>500,000</i>	<i>300,000</i>	<i>200,000</i>
<i>(b) Development of E-commerce Based Urban Freight Distribution Solution</i>	<i>600,000</i>	<i>400,000</i>	<i>200,000</i>
1C: Development of Abatement Cost Analytical Tool for Freight Transport Emission Reduction	500,000	200,000	300,000
<b>Component 2: Subnational Technical Assistance and Pilot Projects</b>	<b>3,050,000</b>	<b>3,050,000</b>	<b>0</b>
2A: Bohai Gulf Highway-Waterway Multimodal Transport (Pilot), Yantai	750,000	750,000	0
<i>(a) Data Analytics of Multimodal Transport Across Bohai Gulf</i>	<i>650,000</i>	<i>650,000</i>	<i>0</i>
<i>(b) Project Management and Dissemination</i>	<i>100,000</i>	<i>100,000</i>	<i>0</i>
2B: Urban Freight Joint Distribution (Pilot), Weifang	550,000	550,000	0
<i>(a) Urban Freight and Emission Data Collection</i>	<i>160,000</i>	<i>160,000</i>	<i>0</i>
<i>(b) Data Analysis</i>	<i>290,000</i>	<i>290,000</i>	<i>0</i>



<i>(c) Training and Campaign</i>	100,000	100,000	0
2C: Sea-Rail Intermodal Transport (Pilot), Xiamen	700,000	700,000	0
<i>(a) E-Commerce Platform</i>	550,000	550,000	0
<i>(b) Optimization Plan of Intermodal Freight Operation at Xiamen Port</i>	150,000	150,000	0
2D: Integrated Urban-Rural Distribution (Pilot), Guangdong	750,000	750,000	0
<i>(a) Guang-qing Urban-Rural Integrated Distribution Pilot</i>	560,000	560,000	0
<i>(b) Capacity Building</i>	190,000	190,000	0
2E: Integrated Development of Han River Inland Waterway (Pilot), Hubei	150,300,000	300,000	0
<i>(a) Strategic Plan for Improving the Integrated Development of Han River Inland Waterway</i>	220,000	220,000	0
<i>(b) Green Navigation Channel</i>	150,080,000	80,000	0
<b>Component 3: Capacity Building, Monitoring and Evaluation, and Project Management</b>	<b>5,766,095</b>	<b>2,046,095</b>	<b>3,720,000</b>
3A: Capacity Building	1,741,000	1,441,000	300,000
<i>(a) Trainings and Workshops</i>	1,021,000	921,000	0
<i>(b) Dissemination through TransFORM</i>	500,000	400,000	200,000
<i>(c) Eco-Driving Training</i>	220,000	120,000	100,000
3B: Monitoring and Evaluation	470,000	250,000	220,000
3C: Project Management	3,555,095	355,095	3,200,000
<b>Total Project Cost</b>	<b>13,666,095</b>	<b>8,246,095</b>	<b>5,420,000</b>



### ANNEX 3: GHG Emission Reduction Calculation and Incremental Cost Analysis

1. **Economic Analysis.** Following GEF guidelines, an incremental cost analysis was conducted to assess the incremental costs and global environmental benefits of the Project scenario vis-à-vis business-as-usual (BAU) scenario.
2. **BAU Scenario.** The national government has prioritized the development of multimodal freight transport and improvement of urban freight in the 13th FYP and other key policy directives in the transport sector. The local governments have accelerated the investment in freight infrastructure and services, such as intermodal hubs, logistics parks, freight railways, inland waterway, freight distribution centers, etc. These directives and investments will increase the capacity for intermodal transport and urban freight distribution, and attract some freight from road to cleaner modes of transport. However, due to inefficiencies in operations and policy/standardization barriers, the capacity may not be fully utilized despite the new infrastructure being provided.
3. **Incremental Costs.** The incremental costs of this GEF project are associated with: (i) developing policies and strategies at the national level to support the development of multimodal transport and improve the efficiency of urban freight; (ii) developing analytical tools and policy framework to support the five pilots at the local level; and (iii) capacity building to promote the national strategies and policies and disseminate the pilot experiences.
4. **Global Environmental Benefits.** The global environmental benefits of the Project intervention include two types: (i) direct GHG emission reduction from the pilot projects, such as modal shift from road transport to waterway and/or railway, reduced urban distribution trips due to consolidation, reduced empty-loaded freight trips, etc.; and (ii) indirect GHG emission reduction because of policy incentives and capacity building activities that promote the replication of successful pilots. A more detailed incremental reasoning by component is provided in Table 1.
5. Two pilot projects were selected for detailed analysis of direct GHG emission reduction: the Bohai Bay Highway-Waterway Multimodal Transport Project in Yantai, and the Integrated Urban-Rural Distribution Project in Guangdong.
6. **Bohai Bay Highway-Waterway Multimodal Transport Project in Yantai, Shandong Province.** In this project, the emission reduction is through “shift” approach, i.e. attracting more traffic from road to sea transport. In the BAU scenario, it is assumed that the number of trucks (both in roll-on-roll-off (RoRo) and drop-and-pull (DnP) mode) is increasing at the same rate (5%) annually, which is derived from the historic seaway transport data in the past 10 years. In the GEF scenario, the number of trucks in RoRo mode remains the same as BAU, while the share of DnP is expected to level up at the targeted growth rate.

- (a) In the BAU scenario, with the most recent number of trucks by seaway in year 2016 and the normal growth rate (5%), the total number of trucks by seaway in the studied years could be estimated. With the same methodology, annual BAU ratio of DnP/total trucks is calculated as 2.1%, thus number of DnP trucks can be calculated as well.

$$\text{Total trucks by seaway (BAU)} = \text{Baseline number of trucks by seaway} \times 1.05^n$$

$$\text{Number of DnP (BAU)} = \text{Total trucks by seaway (BAU)} \times \text{BAU ratio}$$

$$\text{Number of RoRo (BAU)} = \text{Total trucks by seaway (BAU)} \times (1 - \text{BAU ratio})$$

where n denotes the number of years after the baseline year

- (b) In the GEF scenario, given the targeted ratio of DnP over total sea transport in each year – provided by the ferry operator – and the number of RoRo trucks, the number of DnP trucks can be estimated. Thus the total number of trucks by seaway can be estimated.

$$\text{Number of DnP (GEF)} = \text{Number of RoRo (BAU)} \times (\text{targeted ratio}/1 - \text{targeted ratio})$$

$$\text{Total trucks by seaway (GEF)} = \text{Number of RoRo (BAU)} + \text{Number of DnP (GEF)}$$

- (c) The impact of GEF intervention is the increase of trucks using sea transport, particularly, RoRo.

$$\text{Number of increased trucks by seaway} = \text{Total trucks by seaway (GEF)} - \text{Total trucks by seaway (BAU)}$$

- (d) The increased trucks by seaway were supposed to travel from Yantai to Dalian by road transport under the BAU scenario. The direct emission reduction resulted from the GEF intervention is thus calculated using the road transport distance and emission factor for trucks, which is 0.51 kg CO<sub>2</sub>/km<sup>18</sup>.

$$\text{Direct emission reduction} = \text{Number of increased trucks by seaway} \times \text{road transport distance} \times \text{Emission factor for trucks}$$

- (e) As more trucks are transported by seaway, number of ship trips may increase leading to additional emissions. Based on the operator's information, one freight ship can carry 300 trucks per trip. The number of ship trips per day can thus be calculated and all numbers are rounded up.

$$\text{Number of ship trips per day (BAU or GEF)} = \text{Total trucks by seaway (BAU or GEF)} / 365 / 300$$

$$\text{Increased ship trips per day} = \text{Number of ship trips per day (BAU)} - \text{Number of ship trips per day (GEF)}$$

- (f) Given the emission factor for ship fuel use is 3150 kg CO<sub>2</sub>/ton<sup>19</sup>, and the fuel use per ship per trip is 18 tons oil – provided by the ship operator – the increased CO<sub>2</sub> by ship per year can be calculated.

<sup>18</sup> Research on Fuel Consumption & Carbon Emission Factor of Road Freight Trucks. China Academic Journal. 1000-3703(2015)04-0037-04

<sup>19</sup> The International Council on Clean Transport. Greenhouse Gas Emissions from Global Shipping, 2013-2015.

**Increased CO<sub>2</sub> by ship per year = Increased ship trips per day × Oil use per ship per trip × Emission factor for ships × 365**

- (g) Each year the CO<sub>2</sub> reduction is the difference between CO<sub>2</sub> emission saved from road and CO<sub>2</sub> emission increased from ship.

**Direct CO<sub>2</sub> reduction per year = Direct emission reduction from road – Increased CO<sub>2</sub> by ship per year**

**Total CO<sub>2</sub> reduction =  $\sum_1^n$  Direct CO<sub>2</sub> reduction per year, where n indicates years of GEF project**

7. The lifecycle of this pilot project is considered to be from 2020 to 2030. Based on the calculation in Table 2, the lifecycle CO<sub>2</sub> emission reduction from the Yantai pilot is estimated to be 1.10 million tons.

8. **Integrated Urban-Rural Distribution Project in Guangdong Province.** In the BAU scenario, the empty loaded rate of return trucks remains a slow decrease each year. With GEF intervention, the empty loaded rate of return trucks is expected to decrease rapidly. The direct emission reduction resulted from utilizing the return urban freight vehicles to replace the rural freight vehicles for delivering the rural products to the urban area. It is expected that 2000 urban freight vehicles will register in the information platform under the GEF scenario.

(a) Based on the information provided by the logistics operator, among the 2000 registered urban freight vehicles, 1467 vehicles are in 4.2 meter long and 533 are in 9.6 meter long. Also, trips per vehicle per month is 15 trips per month for each vehicle. Thus the loaded return trips from Qingyuan to Guangzhou can be calculated.

**Loaded return trips per month = 15 × (1 – empty loaded rate) × number of pilot urban freight vehicle**

(b) The capacity of urban freight vehicles are larger than the rural freight vehicles. It is assumed that (1) for the 4.2m-long pilot vehicle, one loaded return trip can save 4 trips for rural freight vehicles from Qingyuan to Guangzhou, and (2) for the 9.6m-long pilot vehicle, one loaded return trip can save 8 trips for rural freight vehicles from Qingyuan to Guangzhou. Taking the trip from Guangzhou back to Qingyuan into consideration, the total saved rural freight trips per month are doubled.

**Saved rural freight trips per month = 2 × (4 × Loaded return trips per month<sub>4.2m</sub> + 8 × Loaded return trips per month<sub>9.6m</sub>)**

(c) The average trip distance from Qingyuan to Guangzhou is 97km and the emission factor<sup>1</sup> for small rural freight vehicle is 0.32kg CO<sub>2</sub>/km, the direct emission reduction from saved rural freight trips can be estimated.

**Direct CO<sub>2</sub> reduction per month = Saved rural freight trips per month × emission factor × average distance**

9. The lifecycle of this pilot project is considered to be from 2020 to 2030. Based on the calculation in Table 3, the lifecycle CO<sub>2</sub> emission reduction from the GuangQing pilot is estimated to be 0.23 million tons.

10. **Incremental Cost Analysis.** The direct CO<sub>2</sub> emission reduction from these two pilots are 1.1 million tons (Yantai multimodal transport) and 0.23 million tons (Guangdong urban-rural distribution). Currently, MOT has approved 16 ongoing multimodal transport pilots; and China has more than 30 provinces that could adopt similar urban-rural distribution modality. With the issuance of national policies and guidelines to address existing impediments in multimodal transport and urban distribution, together with the capacity building and dissemination activities, it is expected that these two types of projects will have a replication effect of 10 and 20 times, respectively. Total global environmental benefits, both direct and indirect, is estimated to be 15.6 million tons. The incremental cost of the Project is estimated at US\$13.67 million. The cost-effectiveness of the GEF intervention, i.e., unit cost of CO<sub>2</sub> mitigated under the Project, is US\$0.876 per ton.

**Table 1: Incremental Reasoning by Component**

	<b>Baseline project/ BAU scenario</b>	<b>GEF intervention/ GEF scenario</b>	<b>Global environmental benefits</b>	<b>Incremental cost</b>
National TAs	<p>National policy directives to promote the development of multimodal freight transport and improve urban freight distribution</p> <ul style="list-style-type: none"> <li>- Local government accelerate the planning and investment in freight infrastructure and services</li> <li>- Some freight may be shifted to cleaner modes</li> <li>- Some urban freight trips may be consolidated and reduced</li> </ul>	<p>Policy/strategy/guideline to address impediments in policy, planning, operational, standardization, information for multimodal transport and urban freight distribution</p> <ul style="list-style-type: none"> <li>- Planning and investment informed by data and freight flow modal</li> <li>- China's freight structure optimized</li> <li>- Railway/waterway capacity fully utilized</li> <li>- More long-haul freight shifted to railway and waterway</li> <li>- Urban freight efficiency improved</li> <li>- Urban freight trips consolidated, optimized and reduced</li> </ul>	<p>Indirect GHG emission reduction, contributing to China's INDC goal</p>	\$3.15 million
Yantai pilot	<p>Investment in logistics hubs and facilities, establishment of a trucking association for drop-and-pull, experienced third-party logistics companies to run the Bohai Bay multimodal freight business</p> <ul style="list-style-type: none"> <li>- Infrastructure built</li> <li>- Some freight traffic shifted from road to seaway</li> <li>- Third-party logistics operator engaged</li> </ul>	<p>Policies and incentives to attract more freight traffic to Yantai-Dalian seaway, credibility system of logistics operators, and business plan and operational plan to improve freight efficiency</p> <ul style="list-style-type: none"> <li>- Additional freight and trucks attracted to seaway</li> <li>- More operators join the trucking association</li> <li>- Successful operations of Bohai Bay multimodal freight business</li> </ul>	<p>Direct GHG emission reduction, from attracting additional freight trucks to use drop-and-pull compared to BAU</p> <p>(lifecycle CO2</p>	\$0.75 million



			emission reduction estimated to be 1.10 million tons)	
Weifang pilot	<p>Construction of 4 urban freight consolidation centers</p> <ul style="list-style-type: none"> <li>- Freight consolidated in 4 centers being shipped to end customers</li> </ul>	<p>Data collection and analytics to provide urban distribution optimization solutions</p> <ul style="list-style-type: none"> <li>- Freight distribution in 4 centers optimized</li> <li>- Freight route optimized</li> <li>- Off-peak delivery plans</li> <li>- Introduction of clean energy vehicles</li> </ul>	Direct GHG emission reduction, from reducing freight trip distance and increasing energy efficiency of freight vehicles compared to BAU	\$0.55 million
Xiamen pilot	<p>Construction of Xiamen port railway hub</p> <ul style="list-style-type: none"> <li>- Some freight shift from road to railway</li> </ul>	<p>Development of multimodal logistics information platform and optimizing port internal traffic</p> <ul style="list-style-type: none"> <li>- Multimodal freight transport efficiency improved</li> <li>- Easier access to shipping orders</li> <li>- More freight shifted from road to railway</li> </ul>	Direct GHG emission reduction, from shifting more freight to railway compared to BAU	\$0.70 million
Guangdong pilot	<p>Construction of freight hubs and development of logistics information platform</p> <ul style="list-style-type: none"> <li>- Increased rural freight trips</li> <li>- Empty freight trucks from rural to urban</li> </ul>	<p>Pilot of urban-rural integrated distribution</p> <ul style="list-style-type: none"> <li>- Demand and supply matched between rural-to-urban freight and urban-to-rural empty return trucks</li> <li>- Rural freight consolidated</li> <li>- Return trucks replacing the individual villager's rural freight trips</li> </ul>	Direct GHG emission reduction, from avoiding rural-to-urban freight trips	\$0.75 million

			(lifecycle CO2 emission reduction estimated to be 0.23 million tons)	
Hubei pilot	<p>Construction of the Yakou navigation-hydropower complex</p> <ul style="list-style-type: none"> <li>- Increased inland waterway capacity on Han River</li> <li>- Increased freight volume by waterway</li> </ul>	<p>Strategic plan for improving the integrated development of Han River inland waterway</p> <ul style="list-style-type: none"> <li>- Improved reliability of inland waterway transport on Han River</li> <li>- Improved efficiency of multimodal transport operation</li> <li>- More freight shifted from road to inland waterway</li> </ul>	Direct GHG emission reduction, from shifting more freight to inland waterway compared to BAU	\$0.30 million
Capacity Building		<p>Workshops and trainings to promote the key policy/ strategy/guideline and disseminate the experiences gained from pilot projects</p> <ul style="list-style-type: none"> <li>- Quicker adoption of the policy/ guideline by stakeholders</li> <li>- Replication of the innovations from the pilots in other projects</li> </ul>	Indirect GHG emission reduction, from replication effects	\$2.05 million

**Table 2: Calculation for Yantai Pilot**

Annual number of trucks (*10 <sup>4</sup> )		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
BAU	Roll on n roll off	130.71	137.24	144.10	151.31	158.88	166.82	175.16	183.92	193.11	202.77	212.91
	DnP/Total ratio	2.10%	2.10%	2.10%	2.10%	2.10%	2.10%	2.10%	2.10%	2.10%	2.10%	2.10%
	Drop n pull	2.80	2.94	3.09	3.25	3.41	3.58	3.76	3.95	4.14	4.35	4.57
	Total trucks by seaway	133.51	140.19	147.20	154.56	162.28	170.40	178.92	187.86	197.26	207.12	217.48
GEF	Roll on n roll off	130.71	137.24	144.10	151.31	158.88	166.82	175.16	183.92	193.11	202.77	212.91
	DnP/Total ratio	5.28%	7.00%	10.00%	13.00%	13.00%	13.00%	13.00%	13.00%	13.00%	13.00%	13.00%
	Drop n pull	7.29	10.33	16.01	22.61	23.74	24.93	26.17	27.48	28.86	30.30	31.81
	Total trucks by seaway	137.99	147.57	160.12	173.92	182.62	191.75	201.33	211.40	221.97	233.07	244.72
Number of increased trucks by seaway		4.48	7.39	12.92	19.36	20.33	21.35	22.42	23.54	24.71	25.95	27.25
Emission factor for trucks (kg CO <sub>2</sub> /km)		0.51										
Road transport distance (km)		1400										

<b>Direct emission reduction from road (ton)</b>	32004	52737	92253	138258	145171	152430	160051	168054	176456	185279	194543
<b>Number of ship trips per day (BAU)</b>	13	13	14	15	15	16	17	18	19	19	20
<b>Number of ship trips per day (GEF)</b>	13	14	15	16	17	18	19	20	21	22	23
<b>Increased ship trips per day</b>	0	1	1	1	2	2	2	2	2	3	3
<b>Emission factor for ships (ton CO<sub>2</sub>/ton oil)</b>	3.15										
<b>Fuel use per trip for ship (ton oil)</b>	18										
<b>Increased CO<sub>2</sub> by ship per year (ton)</b>	0	20695.5	20695.5	20695.5	41391	41391	41391	41391	41391	62086.5	62086.5
<b>Direct CO<sub>2</sub> reduction per year (ton)</b>	32004	32041.5	71557.5	117562.5	103780	111039	118660	126663	135065	123192.5	132456.5
<b>Total direct CO<sub>2</sub> reduction (ton)</b>	1104021.5										

**Table 3: Calculation for Guangdong Pilot**

		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
BAU	Empty loaded rate (%)	95%	94%	93%	92%	91%	90%	89%	88%	87%	86%	85%
	Loaded return trips per month (4.2m)	1100	1320	1540	1760	1980	2201	2421	2641	2861	3081	3301
	Loaded return trips per month (9.6m)	400	480	560	640	720	800	879	959	1039	1119	1199
	Saved rural freight trips per month	15198	18238	21277	24317	27356	30396	33436	36475	39515	42554	45594
GEF	Empty loaded rate (%)	95%	90%	80%	65%	65%	65%	65%	65%	65%	65%	65%
	Loaded return trips per month (4.2m)	1100	2201	4401	7702	7702	7702	7702	7702	7702	7702	7702
	Loaded return trips per month (9.6m)	400	800	1599	2798	2798	2798	2798	2798	2798	2798	2798
	Saved rural freight trips per month	15198	30396	60792	106386	106386	106386	106386	106386	106386	106386	106386
Saved rural freight trips per month		0	12158	39515	82069	79030	75990	72950	69911	66871	63832	60792
Average distance (km)		97										
Rural freight vehicle emission factor (kg CO <sub>2</sub> /km)		0.32										

<b>Direct CO<sub>2</sub> reduction per month (ton)</b>	0	377	1227	2547	2453	2359	2264	2170	2076	1981	1887
<b>Direct CO<sub>2</sub> reduction per year (ton)</b>	0	4529	14718	30569	29437	28305	27173	26040	24908	23776	22644
<b>Total CO<sub>2</sub> reduction (ton)</b>	232099										