



## 1. Project Data

<b>Project ID</b> P126611	<b>Project Name</b> Liaoning Coastal Economic Zone Project	
<b>Country</b> China	<b>Practice Area(Lead)</b> Urban, Resilience and Land	
<b>L/C/TF Number(s)</b> IBRD-82360	<b>Closing Date (Original)</b> 30-Sep-2018	<b>Total Project Cost (USD)</b> 140,547,609.55
<b>Bank Approval Date</b> 20-Mar-2013	<b>Closing Date (Actual)</b> 30-Sep-2019	
	<b>IBRD/IDA (USD)</b>	<b>Grants (USD)</b>
Original Commitment	150,000,000.00	0.00
Revised Commitment	140,547,609.55	0.00
Actual	140,547,609.55	0.00

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## 2. Project Objectives and Components

### a. Objectives

According to the Financing Agreement (FA, p. 5) and the Project Appraisal Document (PAD, paragraph 17) the Project Development Objective (PDO) was "to improve the efficiency of urban transport and address water scarcity issues in selected cities in Liaoning Province."

This PDO was revised during the 2016 restructuring (see below) "to improve transport connectivity and reclaim wastewater in selected cities in Liaoning Province."



This review has parsed the original PDO into:

- to improve the efficiency of urban transport in selected cities in Liaoning Province
- to address water scarcity issues in selected cities in Liaoning Province

The revised PDO has been parsed into:

- to improve the transport connectivity in selected cities in Liaoning Province
- to reclaim wastewater in selected cities in Liaoning Province

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

Yes

**Did the Board approve the revised objectives/key associated outcome targets?**

Yes

**Date of Board Approval**

19-May-2016

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

Yes

**d. Components**

**1. Improving Urban Transport Systems** (US\$107.8 million at appraisal, revised to US\$117.1 million at restructuring, US\$109 million actual). The project was to finance new roads and rehabilitate existing urban roads with designs for traffic management, traffic calming features, and facilities that promoted cleaner alternative transport modes, such as bicycling and walking. All road designs were to include underground urban utilities, traffic signs and management systems, landscaping, street furniture, and other ancillary facilities, and acquisition of road maintenance equipment. In addition, this component was to finance buses and improve bus depots of the Panjin Public Transport Company. Originally, these roads were in Chaoyang, Donggang, Kuandian, and Lingyuan. This project was designed to foster an integrated approach to public transport planning, combining infrastructure investments with traffic management improvements, better public transport services, and integrating transport in land use planning. This component was revised after the 2016 restructuring and dropped the activities related to improving transport systems in the Longcheng district in the city of Chaoyang.

**2. Improving Urban Wastewater Treatment and Reclamation** (US\$40.6 million at appraisal, revised to US\$31.2 million at restructuring, US\$29.9 million actual). This component would construct new wastewater plants in Lingyuan City, rehabilitate existing wastewater plants, construct new networks and separate sewage and drainage networks in Suizhong county, and replace groundwater with water reclamation supply systems. Water related subprojects in Lingyuan and Suizhong were designed to provide good examples of integrated investments to address critical water pollution and scarcity issues. The subproject in Suizhong was intended to address the water pollution and poor drainage due to encroachment of existing canals,



siltation, and reduced hydraulic flows. This component was reduced after the 2016 restructuring, with discontinued activities in Suizhong, which reduced the allocation for this component.

**3. Project Management and Capacity Building** (US\$1.65 million at appraisal, US\$1.64 million actual). This component was to finance project management and supervision such as training in procurement, financial management, and contract supervision. In addition, to build the capacity of the local staff and officials involved in delivering water and urban transport services in participating cities, technical assistance would aid in preparing the following plans: (i) urban transport investment and management plans promoting public transport, pedestrian, bicycles, and traffic safety; (ii) comprehensive capital investment and asset management plans ensuring the sustainability of project investments; (iii) environmental management plans (EMPs); and (iv) resettlement action plans (RAPs). This component did not include the financing of project monitoring and evaluation (M&E) activities. The implementing entity, the Liaoning Provincial Management Office (LPMO) managed other World Bank projects and had existing procedures (PAD, paragraph 38).

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

**Project Cost:** The total project cost reached US\$150 million and disbursed US\$140.5 million.

**Financing:** The International Bank for Reconstruction and Development (IBRD) financed this investment project. There were no co-financiers.

**Borrower Contribution:** The government committed US\$189.5 million, revised to US\$75.7 million and disbursed US\$75.7 million. The reduced amount was due to two cities withdrawing from participation, reducing the needed counterpart financing (see Restructuring below).

**Dates:** The project was approved on March 20, 2013 and was made effective on July 22, 2013. The Mid Term Review (MTR) was conducted on February 27, 2017. The original closing date was on September 30, 2018 but was extended by 12 more months to end on September 30, 2019. There were two restructurings, one each of levels 1 and 2:

- On May 19, 2016, a level 1 restructuring to amend the PDOs, introduce changes to the results framework as a result, adjust the components and its allocation, reallocate among the disbursement categories in the financing plan, and amend the implementation schedule.
- On Sep 27, 2018, a level 2 restructuring to reduce from 15 to 5 the intermediate outcome target indicator for the number of industries connected to reclaimed wastewater in the results framework, extend the loan closing date, and amend the implementation schedule as a result of the extension.

### **3. Relevance of Objectives**

#### **Rationale**

The PDOs of the Liaoning Coastal Economic Zone Urban Infrastructure and Environmental Management Project were relevant to the five main areas of engagement under China's 13th Five Year Plan (FYP, 2016-



2020). The PDOs were substantially relevant to (i) innovation, (ii) coordinated development, (iii) green growth, (iv) openness, and (v) inclusive growth,

The PDOs were also relevant to the World Bank Group's Country Partnership Framework (CPF) for FYs 2020-2025 for China. The three main areas of engagement were: (i) advancing market and fiscal reforms, (ii) promoting greener growth, and (iii) sharing the benefits of growth. The project addressed the CPF's theme to promote greener growth by enhancing urban environmental services in the participating cities; promoting low-carbon urban transport; and demonstrating measures to reduce pollution. The innovative designs adopted in transport infrastructure promoted the use of public transport and non-motorized transport. In water supply reclaimed wastewater was used in place of groundwater extraction (ICR, footnote 13). Relevance to sharing the benefits of growth was evident in the project's support to enhanced services and opportunities in the secondary cities in Liaoning as well as in promoting access and transport connectivity in less developed areas of the province.

There was clear alignment between the PDOs and the country and World Bank strategies, but the objectives were formulated to a level of ambition that did not adequately reflect a potential solution to a development problem. For example, "reclaiming wastewater" was not outcome focused. The formulation did not help understand the development results of the project - e.g., how the outcomes would positively affect community livelihoods, employment, or economic productivity. These may be longer term targets but identifying and tracking them was an important aspect of a successful development operation (see Section 8, Bank Performance, and Section 9, Monitoring and Evaluation below).

## Rating

Substantial

## 4. Achievement of Objectives (Efficacy)

### OBJECTIVE 1

#### Objective

to improve the efficiency of urban transport in selected cities in Liaoning Province

#### Rationale

The following were the inputs and activities: (i) rehabilitation and construction of new roads in Chaoyang, Donggang, Kuandian, and Lingyuan; and (ii) acquisition of buses, piloting public transport bus routes, improving bus depots, and procuring road maintenance equipment. These activities would lead to outputs such as improved roads, maintained bus depots, increase in the number of passengers per year who would use selected routes of the Panjin Public Transport Co. These outputs were expected to lead to outcomes such as increased use of non-motorized transport, increased density of passengers using public transport, increased lending to transport efficiency and improved access between lagging urban areas to more progressive ones in Liaoning Province. These outcomes would in turn lead to greener growth and more inclusive development. The underlying assumptions were sufficient capacity to implement project investments, consistent support from the national and local governments, and availability of counterpart



financing. Direct attribution of outcomes to the project inputs were established for the pilot public transport subprojects through improved services of the Panjin Public Transport Co. The rest of the project outcomes were not direct measures of transport efficiency but together with other factors such as overall bus density, frequency, ticketing system, and energy efficiency of services, they contributed to making transport services more efficient (ICR, paragraph 27).

#### **OUTPUTS:**

- At closing, 50.7 km of new and rehabilitated streets with improved public transport and non motorized transport in Chaoyang, Donggang, Kuandian, and Lingyuan were achieved (original target 52 km, target almost achieved).
- At closing, the number of passengers increased to 62,122 passengers per year on selected bus routes in Panjin (original target 15,000, target exceeded).
- At closing, there was a 15 percent Increase in annual road maintenance budget in participating cities (original target 8 percent, exceeding target).
- At closing, 2 Revised local traffic management plans and capital investments plans were revised (original target 3, target almost achieved).

#### **OUTCOMES:**

- At closing, 99 percent of people walking and biking were satisfied with the new and improved facilities on selected roads in Chaoyang, Donggang, Kuandian and Lingyuan (target 70 percent, target exceeded).
- At closing, 98 percent of riders were satisfied with public transport services on selected routes in Panjin (target 60 percent, target exceeded).
- According to the ICR, these key outcome indicators did not directly measure efficiency (ICR, paragraph 27).

**Rating**  
Modest

### **OBJECTIVE 1 REVISION 1**

#### **Revised Objective**

to improve transport connectivity in selected cities in Liaoning Province

#### **Revised Rationale**

**Theory of Change:** The Longcheng district in the city of Chaoyang and the city of Suizhong dropped out of the project in 2016 because of changing investment priorities of its new leaders. In addition, the Chinese economy had slowed down, and new budget law amendments that became effective in August 2014 limited the city's funding source for the required counterpart financing (ICR paragraph 21 and footnote 10). The indicators of efficiency in transport investments were also deemed inappropriate and the PDO itself misstated. As a result, the following activities and inputs were undertaken: (i) rehabilitation or construction of roads, and (ii) implementing a pilot public transport system, construction of bus depots, and purchase of road maintenance equipment. These inputs were to lead to outputs such as new and rehabilitated streets in



Donggang, Kuandian, and Lingyan, reduced travel times, increased road densities, increased number of passengers per year in selected Panjin bus routes, and increased use of non-motorized transport (walking and biking). These outputs were expected to lead to outcomes such as optimized bus services, improved regional connectivity, and the establishment of local networks. This was then expected to foster, green growth and inclusive development in Liaoning Province. The underlying assumptions under the original objective remained the same.

#### **OUTPUTS:**

- 50.70 km of new and rehabilitated streets with improved public transport and non-motorized transport in Donggang, Kuandian and Lingyuan (original target 52 km, revised target 31.68 km, target exceeded)
- 13.65 km of non-rural roads were constructed (original target 10.55 km, target exceeded)
- 37.05 km of non-rural roads were rehabilitated (original target 21.13 km, target exceeded)
- The number of passengers increased to 62,122 passengers per year on selected bus routes in Panjin (original target 5,100, target exceeded). The ICR cautioned against the reliability of the data submitted by the Provincial Project Management Office (ICR, Annex 1, p.38). However, footnote 18 acknowledged that the target was likely exceeded even if the final numbers were flawed.
- There was a 15 percent increase in the annual road maintenance budgets of the participating cities (original target 8 percent, revised target 15 percent, target achieved)
- 575 staff training days in traffic management planning, asset management planning, and project operations (target 340, target exceeded)
- 2 Revised local traffic management plans and capital investment plans and a database for all four cities will be used in the future.

#### **Donggang City**

- 1,466 m long x 45 m wide Zhanqian Avenue, segregated bus lanes were constructed. In addition, 790.12 m of Gaotie Avenue was upgraded. and another 4,023.27 m of the following roads were constructed: Haiguanbei Road (1,227.6 m long x 30 m wide), Hengyi Road (1,081.16 m long x 18 m wide); Henger Road (1,197.29 x 30 m long x 30m wide) was constructed; and Hengsan Road (517.22 m long x 30m wide).
- 18 road maintenance equipment were procured - one each of asphalt spreader, exaction truck, filling machine, spreader, double steel wheel vibrating roller, guardrail cleaning vehicle, and two each of high-altitude working vehicles, pipeline cleaning vehicles, sanitary suction trucks, road sweepers, road cleaning vehicles, and garbage trucks.

#### **Kuandian County**

- Rehabilitated 36 secondary access roads within the urban area (total of 21,460 m long x 4 – 21.5 m wide).
- Constructed 3 bridges (with a total of 176 m long and 9 – 12.5 m wide).
- Procured road maintenance and traffic management equipment (wheel loader, snow thrower, sprinkler, traffic signal control system, traffic signal machine and cabinet, signal machine and cabinet



foundation, vehicle signal lamp, direction indicating signal lamp, lane light bracket, cantilever signal lamp pole and foundation, camera, etc.)

#### Lingyuan City

- Constructed 7 roads (total length 5157.90 m) and the southern section of East Binhe Road (1,895.51 m), Wenyi Road (m)
- Constructed a bridge (31 m), Wuiu Bridge (135 m), and Wenyi Bridge (304.4 m)
- Rehabilitated 10 roads (total length 11871.3 m), Wuliu Da Road (956.85 m), and the northern section of East Binhe Road (2,520 m)
- Procured 24 sets of equipment for road maintenance and management.

#### Panjin City

- Constructed 2 bus maintenance depots, one at Shuangtaizi (2,4000 m<sup>2</sup>) and one at Xinglongtai (56,000 m<sup>2</sup>).
- Procured 40 new 8.5 m Liquefied Natural Gas (LNG) buses; 20 new 9.3 m LNG buses; 50 new 10.5 m LNG cum electric buses; and 30 new 12 m LNG cum electric buses.
- Replaced facilities and equipment for buses and depots.

### OUTCOMES

- There were 350,340 direct beneficiaries (no baseline reported, original target 340,000, revised target 213,200, target exceeded)
- There were 172,520 direct female beneficiaries (no baseline reported, original target 170,000, revised target 106,600, target exceeded)
- 99 percent of people walking and biking were satisfied with new and improved facilities on selected roads in Donggang, Kuandian and Lingyuan (baseline 45 percent, original target 70 percent, target exceeded).
- 98 percent increase in satisfaction by riders with public transport services on selected routes in Panjin (baseline 35 percent, original target 60 percent, target exceeded). The ICR cautioned that this increase in satisfaction may also be due to new destinations, new attractions, and improved attractiveness of the city itself (ICR, paragraph 37). According to the March 2019 satisfaction survey, 99 percent of the Panjin respondents expressed satisfaction with safe services, 91 percent with sanitation conditions, 90 percent with the facilities conditions, 88 percent with the bus services, 81 percent with the fares, 74 percent with travel speed. A few raised issues with discomfort such as crowding, bad attitudes of drivers and passengers, and traffic jams.
- Since the outcome indicators in the Results Framework measured beneficiary satisfaction and not the outcome of transport connectivity, the Project Management Office (PMO) gathered additional data to measure efficiency of connectivity such as reduced travel time, increased road density, public transport density and relation to land use.
- Regional connectivity was enhanced as reflected in the roads being connected to two China National Highways - one that runs from Beijing to Shenyang, and the other that runs from Inner Mongolia to Liaoning coastal cities.
- The connection of the improved roads to a newly constructed high speed railway station improved access to the city center and economic livelihood opportunities. Improved link between the old town



and city core, access to newly constructed residential areas, and access to industries all improved connectivity.

- Connectivity was measured by road density or the ratio of the total length of the road network to the overall land area.
- Road density increased by 47 percent in Donggang (from 5.32 to 7.81); by 48 percent in Kuandian (from 0.23 to 0.34); by 21 percent in Panjin (from 6.12 to 7.42) and by 58 percent in Lingyuan (from 2.39 to 3.78).
- Connectivity between cities was measured by (i) connectivity between old town and city core, (ii) improved access of newly constructed residential areas south of Lingyuan River to the city core in the north of the river, and (iii) access to logistics industries in the industrial zone east of the city.
- Travel time was reduced by 30 minutes for Panjin passengers due to optimized bus routes and improved road quality. In Lingyuan, travel time was reduced in project-supported roads by 6 minutes/km for autos, 11 minutes/km for bicycles. In Kundian, 30 minute travel time was saved due to road design (paved dirt roads).

### **Revised Rating**

Substantial

## **OBJECTIVE 2**

### **Objective**

to address water scarcity issues in selected cities in Liaoning Province

### **Rationale**

Theory of Change: Three activities were undertaken: (i) construction of new and rehabilitation of existing wastewater plants; (ii) construction of new and rehabilitation of separate sewage and drainage networks; and (iii) replacement of groundwater with water reclamation supply systems. These activities would lead to outputs such as (i) industries that would connect to reclaimed water supply systems in Lingyuan, and (ii) drainage pipes would be completed in Suizhong. These outputs would lead to outcomes such as increased use of reclaimed wastewater in industrial parks and improved urban drainage system in Suizhong. Both outcomes would address the water scarcity issues and lead to the higher level objective of greener and more inclusive growth in the cities of Liaoning. However, the PDO outcome indicators lacked explicit definition of water scarcity issues.

### **OUTPUTS:**

- At closing, 6 industries were connected to reclaimed water system in Lingyuan (original target 20, target not achieved).
- At closing, no drainage pipes were completed in Suizhong because they dropped out of the project (original target 76 km).

### **OUTCOMES:**

- At closing, Suizhong and its activities dropped out of the project, no urban area in Suizhong benefited from improved drainage system.





- There was no reported impact on water scarcity.
- At closing, 78 percent of reclaimed wastewater was used in the industrial parks in Lingyuan, (original target 60 percent, target exceeded).
- At closing, there were 350,340 project beneficiaries (target 213,200, target exceeded), of whom 49.2 percent (172,520) were female (original target 50 percent or 106,600 target almost achieved percentage wise).

**Rating**  
Modest

## OBJECTIVE 2 REVISION 1

### Revised Objective

"to reclaim wastewater in selected cities in Liaoning Province."

### Revised Rationale

**Theory of Change:** The objective was revised because the Suizhong subproject, which was supposed to demonstrate the impact on water scarcity through its drainage and water pollution control activities, were no longer part of the project. Only reusing the effluent of water treatment plans for the industries in Lingyuan city remained. The project focused on three activities: (i) construction of new and rehabilitating existing wastewater treatment plants; (ii) construction of new and rehabilitation of sewage and drainage systems; and (iii) replacing the groundwater with reclaimed water supply systems. These activities led to outputs where industries in Lingyuan were connected to reclaimed water systems, and the use of reclaimed wastewater in industrial parks increased. These outputs led to outcomes that demonstrated impact on water scarcity by reusing effluent water treatment plants for Lingyuan industries. These further contributed to greener growth in the participant cities of Liaoning Province.

### OUTPUTS:

- 40.27 km of sewage collection networks were installed (baseline 0, original target 49.9 km, target almost achieved). According to the June 3, 2020 email from the Task Team to IEG, the final outputs for the new sewerage system were below targets because some pipelines were switched for domestic funding at the government's request.
- 42.98 km of storm drainage networks were installed (baseline, original target 37.1 km, target exceeded)
- 23.76 km of reclaimed wastewater networks were installed, including a pumping station of 30,000 m<sup>3</sup>/day that connected the Waste Water Treatment Plant to the industrial park (baseline 0, original target 30.7 km, target almost achieved)
- A boosting pumping station with capacity of 30,000 m<sup>3</sup>/d was constructed to supply remote users from the network, achieving target.
- Wastewater, storm water, and reclaimed water facilities maintenance and management equipment were procured achieving target.
- 6 Industries were connected to reclaimed water system in Lingyuan (baseline 0, original target 20, revised target 5, target exceeded)



- 575 staff training days in project financed training and TA activities (baseline 60, original target 460, revised target 340, target exceeded)
- 2 local traffic management plans and capital investment plans were revised (baseline 0, original target 3, revised target 2, target achieved). The ICR noted that the PAD did not provide a clear definition for "revised plans." The ICR reported revised plans as improvements to any kind of local traffic management plans and asset management plan. The alternative would have included formal change in statutes of the plans.

**OUTCOMES:**

- 78 percent of reclaimed wastewater was used in the industrial parks (original target 60 percent, revised target 50 percent, target exceeded).
- The 6 major industrial users signed up for long term agreements to buy 20,000 cubic meter per day of reclaimed water at full cost recovery and competitive price of US\$0.36 per cubic meter or 60 percent of municipal tap water tariff for industrial users. According to the ICR, a call to an industrial user confirmed that the average use of reclaimed water in other parts of China was around 20-30 percent (ICR, footnote 27).
- Operating costs were fully recovered after 60 percent of treated municipal wastewater was reclaimed and 57 percent of that reclaimed water was sold to industries at the competitive price.

**Revised Rating**  
Substantial

**OVERALL EFFICACY**

**Rationale**

The efficacy of the original PDOs were modest after assessing outcomes at closing. The PDOs were revised after disbursing only US\$5.86 million of the project before the 2016 restructuring. Measuring the efficiency gains from the transport investments proved difficult because of the indicators used. It was also difficult to measure the impact on water scarcity issues because the water subproject in Suizhong was dropped in 2016. Although the remainder of the subproject focused on reusing effluent of a wastewater treatment plan for Industries in Lingyuan City.

**Overall Efficacy Rating**  
Modest

**Primary Reason**  
Insufficient evidence

**OVERALL EFFICACY REVISION 1**

**Overall Efficacy Revision 1 Rationale**

With the revised objectives introduced during the 2016 restructuring, the outcome targets were all exceeded. In addition, outcomes were directly attributed to the project. Outcomes contributed to greener growth as



evidenced by the increase in the number of industries that used reclaimed wastewater instead of extracted groundwater. Additional data provided by the LPMO included some measure of efficiency improvements in urban transport service delivery. Based on their experience with the Panjin bus project, the city issued an ordinance mandating housing developers to reserve lands for bus routes, bus stops to address access and mobility of future residents. This act supported feeder service to transit nodes near residences and reduced the cost of future land acquisition. Reclaimed water regenerated the urban landscape and increased urban biodiversity, reduced water pollution, and double access to municipal wastewater collection. However, the second revised objective was not clearly stated. The PDO did not reflect the ambition that would address the development problem (see Section 9, M&E Design, Implementation, and Utilization). In addition, the ICR acknowledged that the project did not sufficiently measure the impacts to greener growth and inclusive development of participant cities.

### Overall Efficacy Revision 1 Rating

Substantial

## 5. Efficiency

**Economic Efficiency:** At appraisal, cost benefit analysis evaluated the economic viability of the four urban road rehabilitation and/or development sub-projects in the four cities, for the public transport investments in Panjin City, and for the river channel rehabilitation and sewerage collection subproject in Suizhong County. Cost effectiveness or least-cost analysis was applied to wastewater treatment and reclamation subproject in Lingyuan City (PAD, paragraph 52). Direct and indirect economic benefits for roads were from savings in traffic operating costs, reduced fuel consumption, reduced costs from daily maintenance, repair and administrative expenditures; travel time saved for passengers using the newly built or rehabilitated roads; reduced working capital from faster transport for vehicles carrying goods; reduced losses due to car accidents; and appreciation of land values due to the convenience offered by improved roads and traffic.

At closing, for the roads subproject, economic benefits were derived from increased regional connectivity where the project financed access roads from the city center to the high speed rail station. The EIRR for the road projects ranged from 11.9 percent to 17.8 percent during appraisal, and at completion, 11.1 to 18.9 percent. The Panjin public transit system subproject was at 15.3 percent at appraisal and slightly declined to 13.9 in EIRR at closing. The Lingyuan urban road and wastewater reclamation registered and EIRR of 14.6 percent at appraisal and improved to 19.3 at closing. The overall EIRR was 14.2 percent, higher than the social discount rate and threshold of 8 percent established by the National Development and Reform Commission of China for its construction projects (ICR, footnote 31).

**Operational and Administrative Efficiency:** There was an initial delay in implementation. After four years of implementation only a third of the loan was disbursed. This was mainly due to lack of counterpart financing from the participant cities (see Section 8 Bank Performance below) and a change in investment priorities of the new leaders of Suizhong and Longchang district of Chaoyang. At that time, China was experiencing an economic slowdown, and the amended budget laws affected the ability of the cities to borrow for their counterpart funding needs. The estimated project cost of US\$339.5 million at appraisal was revised to US\$216.3 million to reflect the withdrawal of the two cities from participating in the project. This reflected an insufficient assessment of the risk in the availability of these funds at appraisal. The project was restructured by



2016 to amend the PDOs, updated the results framework, and reallocated resources among components. But even after the restructuring, the indicators reflected in the revised results framework were not sufficiently clarified (see Section 9, Monitoring and Evaluation below). As a result, the commitment for counterpart financing was reduced from US\$189.5 million to US\$75.7 million. The project was implemented over 74 months to complete, including a 12 month extension. At closing, the loan was 93 percent disbursed. According to the ICR, there was a 20 percent savings due to competitive bidding (ICR, paragraph 62).

The efficiency of the project was rated modest even with high EIRRs because of the early setbacks in operational efficiency and the ICR acknowledging that the project did not measure the impacts of the project against greener growth and inclusive development (ICR, paragraph 49). The EIRRs used below refer to the Lingyuan urban road development and wastewater reclamation component (ICR, Table 3 and Annex 3).

## Efficiency Rating

Modest

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

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	14.60	35.70 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	19.30	40.60 <input type="checkbox"/> Not Applicable

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

## 6. Outcome

A spilt rating was applied to the project because the 2016 level 1 restructuring revised the PDO. The outcome was calculated below:

	Original	After Restructuring
Relevance of Objective	Substantial	Substantial
Efficacy		
Objective 1 – efficiency of urban transport	Modest	
Revised - to improve transport connectivity		Substantial
Objective 2 – address water scarcity	Modest	
Revised – to reclaim wastewater		Substantial
Overall Efficacy	Modest	Substantial
Efficiency	Modest	Modest
Outcome Rating	MU	MS



Outcome Value	3	4
Disbursement Value (in US\$M)	5.86	134.69
Share of disbursement to total (%)	3.9	96.1
Weighted Value of Outcome	0.117	3.844
Total Value of Outcome		3.961 or 4.0
Overall Outcome Rating		MS

**a. Outcome Rating**  
Moderately Satisfactory

**7. Risk to Development Outcome**

The following pose risks to development outcome:

- **Economic risks:** The outbreak of the Covid 19 pandemic ravaging economies worldwide beginning in 2020 poses high risks for the sustainability of the outcome of this project. The disruptions caused by responding to the pandemic will likely pose bleak economic consequences locally, nationally, and globally. The province and the country will face massive competing priorities to restart economic activities that have been disrupted by actions adopted to slowdown the spread of the pandemic. This is an unprecedented situation facing every nation around the world and not just this project.
- **Technological risks associated with unfunded future budgets for technological updates:** Panjin adopted new technologies to optimize the use of public transport. The use of big data analyzed origin to destination points, riding modalities, and bus dispatching was optimized using the platform offered by internet networks to connect passengers with bus companies. Introducing new technologies normally require budgets for regularly updating such technologies. To mitigate this risk and further support the success of the Panjin urban public transport project, the Central government granted Panjin about US\$3 million of green funds.
- **Government commitment:** Three of the four project city governments had no prior experience in implementing Bank financed project. Training and support improved their technical and managerial capacity in project management. Improved capacity and satisfaction with the interventions introduced led to improved statutory transport plans and comprehensive traffic asset management plans. These plans recognized the importance of O&M in meeting sustainability of investments. Training of staff and operators used international O&M best practices for facilities and equipment of constructed assets. Mitigating the risk of wavering commitment was signaled by the increase in annual road maintenance budgets from a baseline of 8 to 15 percent at closing. There is a risk that participating city governments may not continue to be committed to provide annual O&M budgets for these investments after closing.
- **Financial risks:** There remain risks to maintaining adequate tariffs to cover total costs including debt service by the wastewater treatment and water reclamation company. The Lingyuan Wastewater



Treatment and Water Reclamation Company demonstrated its capacity to manage the company independently and become financially self-reliant. The financial and economic benefits generated from the project convinced the Lingyuan Government to construct a second wastewater treatment plant with water reclamation and recycling infrastructures to support its industrial water demands.

## **8. Assessment of Bank Performance**

### **a. Quality-at-Entry**

The Bank team designed the project informed by lessons from previous Bank funded river basin and infrastructure operations in the province. Among the lessons learned were (i) consistency of the proposed activities with planned infrastructure networks; (ii) road designs appropriate to economic and population growth; (iii) training and technical assistance to accompany improved traffic management; (iv) ensuring the availability of counterpart funds; and (v) simplifying the institutional framework (PAD, paragraph 32). The Bank team assessed the procurement and financial management capacities of the implementing agencies and ensured that safeguard documents were developed and disclosed. The project was designed simply, with well defined components. However, a moderate shortcoming was reflected in the results framework as this lacked indicators to sufficiently measure the intended outcome (efficiency of transport services, water scarcity). Substantial risks were identified for capacity and governance and moderate risks for design, safeguards, and monitoring. To mitigate these risks, the Bank team provided experts in municipal engineering, wastewater management, economics, and safeguards compliance to assist at preparation. However, the Bank team did not assess the risks associated with the timely provision of counterpart funds, and a redirection of government priorities. There were moderate shortcomings in identification, preparation, or appraisal as evident in the acknowledged weaknesses in the indicators of the results framework, the inexperienced local staff to readily implement the project, and the differing availability of counterpart funds delayed implementation (see Quality of Supervision below).

#### **Quality-at-Entry Rating**

Moderately Satisfactory

### **b. Quality of supervision**

The Bank team focused on development impact evidenced by the 13 supervision missions over the 6 year implementation period. According to the ICR, these included site visits and support to the implementation units through high level discussions with the Liaoning Provincial Finance Department and the Liaoning Development & Reform Commission. The ICR noted that the Implementation Status and Results Reports were well documented and ratings were candid and fair. The project was delayed in the first 3 years of implementation due to: (i) lack of sufficient number and experienced staff at two local project management offices; (ii) lack of timely counterpart funds in Lingyuan City; and (iii) changes in local leadership, priorities, and policies. Participation was withdrawn, investments were dropped. The 2016 restructuring canceled the two subprojects, revised the PDOs, and amended the results framework accordingly. At this point, supervision and input processes could have been strengthened by the Bank team by (i) asking provincial



and local leaders to help resolve problems of counterpart financing, staffing problems and (ii) restructuring the project earlier than 2016 to solve emerging critical issues. In addition, the weaknesses in the results framework remained unaddressed. Project performance improved in the last two years of the project. The provincial government adopted institutional reform, assigned more experienced staff to its project management office and established better coordination between the provincial and the local implementing units. The Bank team reinforced these changes with improved and more frequent communication with the implementing agency and other stakeholders to proactively address problems such as technical design variations, land acquisition, and resettlement issues in a practical manner. With these moderate shortcomings in proactively identifying opportunities and resolving threats to achieving development outcomes, quality of supervision is rated moderately satisfactory.

### **Quality of Supervision Rating**

Moderately Satisfactory

### **Overall Bank Performance Rating**

Moderately Satisfactory

## **9. M&E Design, Implementation, & Utilization**

### **a. M&E Design**

The original objectives were clearly stated. The theory of change documented how the key activities and outputs were expected to lead to outcomes. Output and outcome indicators were measurable and achievable within a specific time period and were reflected in the results framework. However, the selected indicators did not encompass all expected outcomes. The outcome indicators were only expressed as beneficiary satisfaction with the improved services under the project and did not measure the efficiency of transport services or the connectivity established by the project when the PDO was revised during the 2016 restructuring (see Section 8. Bank Performance at Supervision above). In addition, indicators of the impact of the project to urban biodiversity, to improved urban planning, and reduced greenhouse gases were not in the results framework. The ICR reported these in the report footnotes. Intermediate results indicators and outputs adequately captured their contributions to project outcomes. Baselines, where relevant, and targets were available for all indicators. However, the second revised objective - to reclaim wastewater - did not clearly specify the ambition required to address the development problem. The M&E system was to be implemented by the local project management offices of the implementing agencies.

### **b. M&E Implementation**

The M&E system was implemented by the Liaoning Urban Construction and Renewal Project Office. The local project management offices of the participant cities reported on the indicators as reflected in the results framework and kept track of implementation progress, procurement, financial, and safeguards compliance. The primary outcome indicators, however, were not strengthened during implementation. Even after the May 2016 restructuring, the revised results framework suffered from the same weaknesses that featured in the original one. The Liaoning PMO provided additional data to the ICR to compensate for the weak indicators in the results framework. However, data provided were accepted with



caution on reliability (ICR, footnote 18). Beneficiary surveys were conducted with comparatively small number of sample sizes during the last two years of the project implementation (ICR, paragraph 79). There was no information regarding the continued use of the M&E functions in the participant cities after project closing.

### c. M&E Utilization

The Steering Committee and the PPMOs used the M&E data to determine the project outputs and outcomes. Results informed Lingyuan to invest in more water reclamation and recycling facilities while Panjin focused increased efforts in improving urban public transport and urban planning. Data from the M&E reports informed project restructuring, revising the objectives and updating the results framework.

Overall, the above reflected a modest quality of M&E. The results framework had design weaknesses that were not addressed during implementation. The sample size of surveys were small and some data were noted as inaccurate.

### M&E Quality Rating

Modest

## 10. Other Issues

### a. Safeguards

**Environmental Safeguards:** This project was assigned a Category B requiring a partial assessment. The following safeguards were triggered: OP 4.01 (Environmental Assessment) and OP 4.12 (Involuntary Resettlement). During project preparation, an Environmental Impact Assessment (EIA) and an Environmental Management Plan (EMP) were developed and disclosed as required. During the 2016 restructuring, two new EIAs were prepared for two new subprojects (Kundian and Lingyuan). Local authorities approved these. The project's EMP was updated and disclosed. According to the ICR, the project complied with the EMP requirements. Local and provincial levels maintained satisfactory environmental management capacity. The six annual/semi-annual Environmental Monitoring reports indicated that environmental mitigation measures and environmental monitoring were implemented during subproject construction. There were no reports of environmental non compliance or occupational, health and safety incidents in any of the subprojects.

**Social Safeguards:** The project triggered the Involuntary Resettlement policy (OP 4.12). Land acquisition and physical resettlement impacts across the participating cities/counties were anticipated. A consolidated Resettlement Action Plan (RAP) and site-specific RAPs, including land acquisition due diligence reports, were prepared for urban road improvement and wastewater treatment activities. Each city's project implementation unit established a resettlement office. All RAPs were disclosed locally on October 16, 2012 and disclosed through the Bank's InfoShop on December 14, 2012. During the 2018 restructuring, loan savings added activities in Kuandian but no RAP was required because the land for these new activities were acquired years earlier. A public consultation report was prepared for the new road rehabilitation activities in Lingyuan. The project complied with OP 4.12 as confirmed by a third-party external monitor (a Liaoning Social Academy consultant subsidiary). The project acquired a total of 760 cubic meter of





land affecting 1,843 persons or 492 households. 548 households were physically resettled and received appropriate compensation in a timely manner as confirmed by the Task Team in its June 3, 2020 email to IEG. Each project implementation unit operated a grievance redress mechanism. There were no reported appeal cases under the project. According to mission interviews, PIUs responded to questions from affected people through phone or site visit.

**b. Fiduciary Compliance**

**Financial Management:** According to the ICR, the government complied with all financial management legal covenants. All audit reports, submitted on time, contained unqualified opinions and were without significant control weaknesses. In the first year, when Interim Unaudited Financial Reports (IUFs) were submitted late, these issues were quickly resolved. The subsequent IUFs were found acceptable. Delay in implementation was periodically addressed by on-the-job training and implementation support in financial management. Toward the last two years, financial management improved and disbursements accelerated (see Section 8 Assessment of Bank Performance, (b) Quality of Supervision above).

**Procurement:** Procurement was conducted using agreed procedures. The following issues occurred during implementation: (i) a Lingyuan urban transport subproject experienced delays in contract award to resolve complaints from participating bidders; (ii) untimely releases of consultants' payments contributed to delayed/incomplete output delivery; (c) some shopping contracts showed unit prices higher than prevailing market prices; (iii) in a Lingyuan works contract, a contractor provided a performance security deposit that did not meet contract conditions. A post procurement review identified how these issues were resolved: (i) after payments due the consultants were released, work resumed; (ii) the difference in unit prices were justified, documented, and accepted; and (iii) there was no need to replace the performance bank guarantee because the contracted work was completed.

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

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**d. Other**

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**11. Ratings**

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Moderately Satisfactory	There were moderate shortcomings in the project's intended progress towards its' outcomes.
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	



Quality of M&E	Modest	Modest
Quality of ICR	---	Substantial

## 12. Lessons

The operations offered five lessons and recommendations presented below that teams could consider in similar future operations:

- **Technical assistance interventions may benefit from early identification and adequate financing.** In this project, just-in-time technical assistance in transport and asset management informed the Panjin Public Transport Authority how to deliver optimal bus services. Armed with a better appreciation for O&M needs in the investment life cycle, authorities increased the cities’ annual road maintenance budgets, from 8 to 15 percent at project closing. Interventions in transport services are best served by a menu of possible technical assistance needs and accompanied by sufficient budgetary resources to carry them out to coincide with opportunistic needs.
- **Demonstrating cost effective solutions may boost local governments’ resolve to champion support for green alternatives to conventional water supply.** In this project, in Lingyuan, over 12 million cubic meter of reclaimed wastewater was sold to 6 large industries, equivalent to US\$4.3 million in revenues for the local government and savings of around US\$3.6 million in operating costs for the industries. Lingyuan decided to build a second wastewater treatment plant after the project closed. The local government experienced that using reclaimed wastewater mitigated urban water scarcity, improved efficiency in water use, reduced water pollution, minimized groundwater extraction, and improved water ecosystems. Their experience demonstrated that they could recover costs, facilitate savings for industries served by reclaimed waste water, and that together, the local government and industry could contribute to green growth. Other cities could follow their success in recycling municipal wastewater by adopting appropriate policies and enforceable regulations that allowed the government to recover their costs, generate revenues, and provide industries with savings.
- **Critical assessment of the risks associated with the availability of counterpart funds may mitigate implementation challenges.** In this project, two of the participant cities and one with a subcomponent critical to substantially achieving outcome dropped from the project because of the lack of access to counterpart funds. Critical assessment at appraisal may propose appropriate mitigating measures or identify alternative activities to replace project components that may drop to remain focused on achieving the project’s objectives.
- **Similarly sized cities may be encouraged to replicate the results of innovation in green mobility.** In this project, the innovations adopted by Panjin City transformed its public transport systems through better routes, better services, and improved infrastructure. Less polluting buses also gave the national government a model for replication by similarly sized cities. These innovations in Panjin City demonstrated how other cities could pursue greener and more inclusive growth strategies.
- **Improved surroundings may foster further improvements outside of the project.** In this project, residents of Kundian saw that paved dirt roads around their homes allowed them increased access to major thoroughfares, signaling access to more developed urban areas but also improved their immediate surroundings. Residents became more conscious of



improving the appearance of the river near the roads. Residents reportedly discontinued dumping their waste in the river after seeing these improved roads. The Environment Bureau provided trash bins along the paved roads and made more frequent waste collection. The Water Resource Bureau provided proper embankment of the river outside of the project requirements. The improved surroundings introduced by the paved dirt roads led to improving the area surrounding the river beside those dirt roads.

### 13. Assessment Recommended?

No

### 14. Comments on Quality of ICR

The ICR was concise while providing a detailed overview of the project. The report followed OPCS guidelines. The narrative provided evidence to support the ratings, particularly with respect to the revised objectives. The report was candid, discussing the shortcomings of the indicators used in the results framework, the delays in early implementation, and the caution to the quality of evidence in reported outcomes. The analysis in the report sufficiently linked outcomes to the evidence reported with plenty of anecdotal references throughout. The stories provided in Annex 7 and the photos accompanying the project in Annex 8 were helpful in demonstrating the outcomes of the project. The report was results oriented, providing story lines to support the impact of the project interventions, such as those related to the Panjin public transport services. The demonstration impact of generating revenues after recovering costs in support of using reclaimed wastewater for industries was remarkable since the local government decided to continue with this green initiative post-closing. Lessons were based on the evidence provided by the project interventions. However, the ICR did have minor shortcomings including incomplete data in various places throughout the text. In addition, there was a lack of information regarding compensation for displaced households. This meant IEG needed to ask the team for the relevant missing information.

#### a. Quality of ICR Rating

Substantial