



# Completion Report

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**PUBLIC**

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## People's Republic of China: Industry Green Growth Indicators and Innovative Mechanisms for Guangdong Province

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## TECHNICAL ASSISTANCE COMPLETION REPORT

<b>TA Number, Country, and Name:</b> TA 9649-PRC: Industry Green Growth Indicators and Innovative Mechanisms for Guangdong Province		<b>Amount Approved:</b> \$300,000.00	
		<b>Revised Amount:</b> Not applicable	
<b>Executing Agencies:</b> <sup>1</sup> Department of Industry and Information Technology of Guangdong Province (GDII), Guangdong Provincial Finance Department (GPFD)	<b>Source of Funding:</b> Technical Assistance Special Fund (TASF—other sources)	<b>Amount Undisbursed:</b> \$82,965.08	<b>Amount Used:</b> \$217,034.92
<b>TA Approval Date:</b> 20 November 2018	<b>TA Signing Date:</b> 14 December 2018	<b>TA Completion Date</b>	
		<b>Original Date:</b> 30 June 2020	<b>Latest Revised Date:</b> 31 December 2021
		<b>Financial Closing Date:</b> 12 April 2022	<b>Number of Extensions:</b> 2
		<b>TA Arrangement:</b> Not applicable	
<b>TA Type:</b> Knowledge and support TA	<b>Nature of Activity:</b> Capacity development, policy advice, research and development		

### Description

Environmental degradation is a serious issue for the People's Republic of China (PRC). Guangdong Province, which took a lead role at the time of the economic opening, also took a very active role in resolving environmental issues. As guided by the central government, Guangdong established policies to achieve an environmentally friendly society and promote green growth. However, it still relies heavily on a high-input, high-consumption, and high-emission development model. Industries consume more than 60% of the total energy in Guangdong. Small and medium-sized enterprises support Guangdong's manufacturing industry, but most are in the lower hierarchy of industrial supply chains that still largely depend on traditional labor, energy, and resource-intensive production methods. The provincial government agencies issued various policies and measures to promote the green growth of industries, but these are fragmented and do not provide practical guidance for enterprises, industrial parks, or cities on how to adopt and implement environmental improvement measures.

To solve the problem of fragmented policy guidance and the difficulty of putting it into practice, GDII and GPFD (executing agencies) and Guangdong Energy Conservation Center (GDECC [implementing agency]) requested technical assistance (TA) from the Asian Development Bank (ADB) to conduct research on a usable indicator system to evaluate green growth opportunities for enterprises, industrial parks, and cities; and propose innovative ways for Guangdong to promote green growth, such as an evaluation and assessment mechanism and green financing mechanisms. The initial project design was to cover broad aspects of green indicators for benchmarking the environmental performance of prefecture-level cities and industries. During the inception meeting, the executing agencies specified that they expect two sets of indicators—one to serve as selection/eligibility criteria for industries with potential green financing, and the other to serve as decision-making criteria for GPFD on fiscal transfer or ecological compensation within Guangdong Province. The TA's objectives were to develop (i) industry green growth indicators by sector for prefecture-level decision-making, (ii) fiscal transfer and eco-compensation for green growth, and (iii) a financing mechanism linking industry green growth indicators and project pipeline.

### Expected Impact, Outcome, and Outputs

The expected impacts were (i) energy consumption per unit of Guangdong's major manufacturing products reduced, and (ii) circular economy of more than 100 economic parks in the province improved. The expected outcome was the comprehensive indicator and evaluation framework on green growth in Guangdong established. The TA had three outputs: (i) good practices and lessons on industry green growth and evaluation system studied and documented, (ii) indicators to comprehensively evaluate Guangdong industries' green growth developed, and (iii) financial system and mechanism to promote green development and design of innovative financing projects prepared.

<sup>1</sup> Due to organization reform of Guangdong Province, the name of one original executing agency (Guangdong Economic and Information Commission) was updated to Department of Industry and Information Technology of Guangdong Province as approved in the minor change in implementation arrangement memorandum dated 26 June 2020.

## Implementation Arrangements

GDII and GPFD were joint executing agencies, which provided guidance and support to the stakeholders. GDECC was the implementing agency and worked closely with consultants and coordinated with stakeholders. The government provided counterpart support as planned, including staff time, access to data and information, and interpretation and translation services. ADB administered the TA and initially engaged five individual consultants (two international, three national) mobilized in June and July 2019. However, one consultant (national green finance expert) requested to terminate her contract in July 2019 due to personal reasons. Two additional individual consultants (one international, one national) were engaged in 2021. The consulting inputs were as follows: international—(i) team leader/industry green growth specialist (92 working days), (ii) industrial chain and circular economy expert (60 working days), and (iii) green finance specialist (10 working days); and national—(iv) deputy team leader/industrial chain and circular economy expert (110 working days); (v) fiscal policy expert (88 working days), and (vi) green finance expert (50.5 working days). Two resource persons were engaged to support the industrial park survey (national, 15 working days) and green finance discussions (international, 2 working days).

The TA's original implementation period was from December 2018 to June 2020. ADB approved two extensions: (i) from 30 June 2020 to 30 June 2021, to allow sufficient time to carry-out the workshops; and (ii) from 30 June 2021 to 31 December 2021, to finalize the TA report and provide technical support to the executing and implementing agencies to prepare a draft project proposal for innovative green financing. The 1.5 years delay did not cause any cost overruns.

## Conduct of Activities

There was a startup delay because ADB needed to reconfirm required consultants' qualifications with the executing and implementing agencies and extend or readvertise the consultant selection recruitment notice to seek more expressions of interest in order to select from a sufficient number of qualified applications during the recruitment process. Following the inception workshop in June 2019 in Guangzhou, Guangdong Province, the consultant team reviewed the (i) PRC's and overseas industry green indicators; (ii) green practices of industrial parks in the PRC; and (iii) green practices of Guangdong's industry development, eco-industrial parks, and use of green indicators. After a review of Guangdong's most pressing industry green issues, the executing and implementing agencies requested to shift the focus of the TA to industrial parks and mid-stream petrochemical industry. In 2019, Guangdong had about 11,853 industrial parks of various types. Given the limited scope and resources for the project, the consultant team distributed questionnaires and surveyed 40 industrial parks in 10 prefecture-level cities in the Pearl River Delta, east and northwest of the province, in the third quarter of 2019. The survey focused on understanding the development of low-carbon and green measures in the process of energy supply, production, transmission, and use in industrial parks; green measures in the process of wastewater, waste gas, waste residue generation, utilization, and disposal; status of recycling measures; and energy and environmental management challenges. With the assistance of GDECC, the consultants conducted field visits and detailed interviews in four selected industrial parks in Guangdong in October 2019: (i) Zhuhai Economic and Technological Development Zone, (ii) Huizhou Daya Bay Economic and Technological Development Zone, (iii) Zhanjiang Economic and Technological Development Zone, and (iv) Huizhou Zhongkai High-Tech Industrial Development Zone. They also conducted field consultations in July and September 2019 in Guangdong to understand the eco-transfer and eco-compensation situation in the province. The consultant team completed reports on (i) review of best practices of domestic and international eco-industrial parks, (ii) industrial park survey results and evaluation, and (iii) Guangdong eco-transfer system review and submitted them to the executing and implementing agencies. The green growth catalogue, planned as a guideline for desired green industrial development activities, was not prepared because of shift in TA focus to cover only industrial parks and specific petrochemical industry.

The executing and implementing agencies requested ADB to cancel the international study visits during the TA inception meeting due to domestic internal decisions. Instead, international lessons learned were identified through desk research and were consolidated in a case study report in English and Chinese containing lessons from industrial parks in Germany, Japan, the Republic of Korea, and Singapore. The TA also introduced European Union's relevant industrial indicators, such as green procurement, certification, labeling, and other international eco-industrial park approaches. The executing and implementing agencies participated in the (i) Lending Modalities and Innovation Workshop organized by ADB in Beijing in November 2019, and (ii) study visits to Shandong Province and Beijing to learn experience from ADB-financed Shandong Green Development Fund Project in December 2019.<sup>2</sup> The counterpart fund financed these domestic trips. TA activities slowed during 2020 due to the coronavirus disease (COVID-19) pandemic. Because of travel restrictions during 2020–2021, no domestic study visits were carried out. Instead, online workshops and consultation meetings were conducted in June and November 2020 and June and December 2021.

Based on the documented case studies and survey results, the consultant team conducted further analysis and drafted recommendations to apply industry green indicators to Guangdong's industrial parks. They recommended headline industry green indicators for industrial parks and enterprise-level indicators. A draft comprehensive report, including

<sup>2</sup> ADB. [People's Republic of China: Shandong Green Development Fund Project](#).

policy recommendations for Guangdong's Fourteenth Five-Year Plan to encourage industrial park-level and enterprise-level industry green growth through green indicators and financing mechanisms such as green fund and eco-transfer, was prepared and shared with the executing agencies by the fourth quarter of 2020. Guangdong's local expert reviewed and provided comments on the draft report. Further, the executing and implementing agencies and the consulting team worked together to complete (i) a long list of potential green financing projects in Guangdong and screened them by applying the proposed headline green indicators; and (ii) a draft proposal of an investment project to transform Guangdong's green infrastructure and promote carbon neutrality, which can serve as basis for future ADB loans or other financial institutions' green investments. Policy recommendations, long list of projects, and the draft proposal were submitted to the executing and implementing agencies as part of the TA final report.

#### Technical Assistance Assessment Ratings

Criterion	Assessment	Rating
Relevance	The government requested the TA and was included in ADB's country operations business plan for the PRC, 2018–2020. <sup>3</sup> The TA design and results chain were appropriate with potential risks identified. The TA proposed an innovative green growth mechanism that links with green indicators for Guangdong's industries, which has significant demonstration value. The TA's objective of promoting green growth and energy efficiency of the industries aligned well with the PRC's and Guangdong Province's thirteenth five-year plans and ADB's country partnership strategy for the PRC, 2016–2020. <sup>4</sup> During the TA implementation in 2020, the PRC pledged to ensure carbon peaking before 2030 and carbon neutrality before 2060 following the Paris Agreement. The TA, therefore, became more relevant to the PRC as it supported Guangdong to contribute to the national target by conserving energy and reducing its carbon emissions, including leveraging multiple green financing sources to achieve its low-carbon targets. The TA remains highly relevant under ADB's country partnership strategy for the PRC, 2021–2025, especially its strategic priority on environmentally sustainable development, by building the capacity of Guangdong to choose low-carbon solutions and innovative financing mechanisms to promote environmental protection. <sup>5</sup> Based on TA findings, a proposal for an innovative and transformative financing mechanism for potential ADB loan was drafted for the executing and implementing agencies.	Highly relevant
Effectiveness	Key output indicators were achieved and delivered in response to the government's needs. The TA provided the executing agencies with a potential funding application for an estimated \$300 million project for financing by green financial institutions, including ADB. A comprehensive report—containing case studies, survey results, green growth evaluation indicators, and suggestions for innovative and green financing mechanisms—was prepared and submitted to the government in English and Chinese. However, there has been no indication that GDII (formerly Guangdong Economic and Information Commission [footnote 1]) adopted the evaluation guidelines and frameworks for green growth. Based on TA findings, GDECC is preparing standards on energy consumption standards which are targeted for consideration in 2022.	Less than effective
Efficiency	The TA delivered the activities and outputs within the budget. About 72.3% of TA funds were utilized and there were no financial reporting and procurement issues encountered. Traveling within the PRC became difficult since 2020 due to lockdowns and restrictions imposed to control the COVID-19 pandemic, which resulted in TA budget savings. With fewer study visits, it was challenging to comprehensively learn experiences and best practices on industry green growth and evaluation system; in lieu of study visits, desk research was conducted to compile lessons learned. The TA completion date was extended by 18 months because of startup difficulties (see Conduct of Activities section) and slowdown of activities due to COVID-19 pandemic.	Efficient

<sup>3</sup> ADB. 2018. [Country Operations Business Plan: People's Republic of China, 2018–2020](#). Manila.

<sup>4</sup> Government of the PRC, State Council. 2015. *National Economy and Social Development Thirteenth Five-Year Plan, 2016–2020*. Beijing; People's Government of Guangdong Province. 2016. *Guangdong Provincial Ecological Civilization Construction Thirteenth Five-Year Plan*. Guangzhou; and ADB. 2016. [Country Partnership Strategy: People's Republic of China, 2016–2020—Transforming Partnership: People's Republic of China and Asian Development Bank](#). Manila.

<sup>5</sup> ADB. 2021. [Country Partnership Strategy: People's Republic of China, 2021–2025—Toward High-Quality, Green Development](#). Manila.

Criterion	Assessment	Rating
<b>Overall Assessment</b>	The TA's rationale and design aligned with the strategies of the PRC and ADB. The TA type was appropriate for providing indicators and policy recommendations to the government. The TA was completed without cost overruns, and it delivered a proposal of innovative and transformative financing mechanism for potential ADB assistance in response to executing agencies' requests.	Successful
<b>Sustainability</b>	By applying the indicators and mechanisms into practice, the TA team prepared a draft proposal of an investment project to promote green and low-carbon industrial development in Guangdong, and to use it as basis for potential funding application for ADB loans or other financial institution's green investments. Staff of the executing and implementing agencies gained a good understanding of linking the green indicators and potential green financing mechanism during the TA implementation. They were keen to apply for funding to put the learning into practice. However, it turned out that they needed further coordination with other provincial agencies to put forward these new ideas, especially with the provincial energy department. Inter-governmental coordination would be essential for ensuring the sustainability of the project.	Likely sustainable

### Lessons Learned and Recommendations

Implementation and/or delivery	Because the TA required specific specialization and as per government's preference, ADB recruited individual consultants rather than a consulting firm. The TA consultants demonstrated teamwork and produced consolidated deliverables. However, the challenge faced by the TA team was to ensure participation of consultants with different skills to propose a new integrated approach. Since multiple consultants need to conduct research in different areas and conclusions and results needed to be discussed and integrated, a consulting firm could have been engaged for smoother implementation and communication and to ensure consistency of the deliverables.
Management of staff and consultants	There were cases when consultants could not understand ADB requirements for payment claims and quality control of deliverables. ADB staff from user unit and Controllers Department had to spend substantial transaction costs (time and effort) to sort the administrative procedures for consultants. When selecting consultants, it is crucial to assess not only the consultants' knowledge and experience in their field of expertise but also their professional approach and attitude and whether they would cooperate with ADB and have proper understanding of internationally accepted accountability and quality requirements.
Knowledge building	The final report with policy recommendations, supporting research reports, and a draft proposal of an investment project was prepared in English and Chinese for wider dissemination to Chinese policy makers. The list of knowledge products for potential dissemination by Guangdong and ADB was prepared but was not effectively disseminated within the TA implementation period. The TA team should have allocated sufficient time between the acceptance of the final report and TA completion to generate quality knowledge products within the TA implementation period.
Stakeholder participation	ADB and consultants worked closely with the executing and implementing agencies to ensure smooth stakeholder consultation and involvement during implementation. However, when the executing and implementing agencies wanted to promote the actual investment based on the TA recommendations, new stakeholders needed to be engaged and consulted, which was beyond the TA's scope and became a challenge to move forward.
Post-TA financial resource	A draft proposal of an investment project was prepared, which was instrumental in leveraging potential new investments. Sample green projects suitable for financing with an estimated total of CNY7 billion were identified. ADB recommended that the executing and implementing agencies coordinate with other line agencies and pursue funding from ADB and other development partners' green financing projects.

### Follow-up Actions

Monitor usage of green growth indicators and implementation of green financing mechanisms proposed in this TA in investment projects and explore possible replication in the other cities and provinces in the PRC.
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## DESIGN AND MONITORING FRAMEWORK

<b>Impacts the TA is aligned with</b> The energy consumption per unit of Guangdong's major manufacturing products reduced (Guangdong Provincial Ecological Civilization Construction Thirteenth Five-Year Plan) <sup>a</sup>  The circular economy of more than 100 economic parks in the province improved (Guangdong Provincial Ecological Civilization Construction Thirteenth Five-Year Plan) <sup>a</sup>		
Results Chain	Performance Indicators with Targets and Baselines	Achievements
<b>Outcome</b>  Comprehensive indicator and evaluation framework on green growth in Guangdong established	<b>By 2021</b>  a. Evaluation guidelines and framework adopted by Guangdong Economic and Information Commission (2018 baseline: NA)  b. Evaluation guidelines or framework is used to evaluate the green growth of 21 prefecture-level cities in Guangdong (2018 baseline: NA)	a. <b>Partially achieved.</b> Multiple green growth guidelines and indicators are currently in use. The TA focused on recommending evaluation updates, green growth indicator consolidation, and the use of green industrial indicators to promote transformational behavior. Based on TA inputs, Guangdong Energy Conservation Center is drafting energy consumption standards, targeted for consideration in 2022.  b. <b>Partially achieved.</b> After discussion with the executing and implementing agencies, the primary effort focused on green industry indicators for Guangdong's significant number of industrial parks instead of prefecture-level cities. The TA included a survey of 40 industrial parks and recommendations for focal areas and indicators for green growth. The TA team reviewed the current system of eco-transfers in Guangdong and recommended improvements and potential use in promoting the green industry. The TA team developed a project proposal and screened the potential projects with industrial parks using the proposed headline green indicators. The executing and implementing agencies plan to move forward with the projects.
<b>Outputs</b>  1. Good practices and lessons on industry green growth and evaluation system studied and documented	<b>By June 2020</b>  1a. Lessons learned from case studies during international study visits documented in three reports (2018 baseline: NA)  1b. Lessons learned from case studies during domestic study visits documented in three reports (2018 baseline: NA)  1c. Survey results documented in draft	1a. <b>Partially achieved.</b> The international study visits were canceled at the executing and implementing agencies request due to domestic internal decisions. Instead, lessons learned were identified through desk research and were consolidated in a case study report in English and Chinese containing lessons from industrial parks in Germany, Japan, the Republic of Korea, and Singapore. The TA also introduced European Union's relevant industrial indicators, such as green procurement, certification, labeling, and other international eco-industrial park approaches.  1b. <b>Achieved.</b> Domestic study visits to Shandong Province and Beijing were conducted. Traveling within the PRC became difficult since 2020 due to lockdowns and restrictions imposed to control the COVID-19 pandemic, which resulted in TA budget savings. With fewer study visits, it was challenging to comprehensively learn experiences and best practices on industry green growth and evaluation system; in lieu of study visits, desk research was conducted to compile lessons learned. These analyses were consolidated in a case study report in English and Chinese containing lessons from three domestic cases of relatively developed industrial parks in the PRC (Qingdao, Shanghai, and Suzhou).  1c. <b>Partially achieved.</b> A questionnaire survey of 40 industrial parks and detailed field interviews with four selected industrial

Results Chain	Performance Indicators with Targets and Baselines	Achievements
	Guangdong Industry Green Growth Catalogue (2018 baseline: NA)	parks were conducted. Survey and interview results were documented in a consolidated report in English and Chinese. The green growth catalogue, planned as a guideline for desired green industrial development activities, was not prepared because of shift in TA focus to cover only industrial parks and petrochemical industry.
2. Indicators to comprehensively evaluate Guangdong industries' green growth developed	<p>2a. Industry green growth evaluation indicators for Guangdong prepared (2018 baseline: NA)</p> <p>2b. Green growth of pilot enterprises, industrial parks, and cities evaluated (2018 baseline: NA)</p> <p>2c. A report on innovative green growth mechanism for Guangdong's industries prepared (2018 baseline: NA)</p>	<p>2a. <b>Achieved.</b> Industry green growth evaluation indicators, in the form of headline industrial park green industrial indicators and headline enterprise-level green industrial indicators, were prepared and presented in the TA final report.</p> <p>2b. <b>Partially achieved.</b> Evaluation was undertaken on selected industrial parks and enterprises (focusing on petrochemical industry) but not on cities. The evaluation results were presented in a consolidated survey and evaluation report in English and Chinese, as part of the TA final report.</p> <p>2c. <b>Achieved.</b> A report on innovative green growth mechanism for Guangdong's industries, which consists of eco-transfer system and its potential link with green indicators to encourage better industrial green performance, was prepared and incorporated in the TA final report.</p>
3. Financial system and mechanism to promote green development and design of innovative financing projects prepared	<p>3a. A research report on green financing mechanisms drafted (2018 baseline: NA)</p> <p>3b. A long list of green financing projects for ADB and other financial institutions prepared (2018 baseline: NA)</p>	<p>3a. <b>Achieved.</b> A report was drafted proposing a Guangdong green expansion fund for industry that potentially incorporates eco-transfer system to incentivize industrial parks or enterprises to choose transformational green investments. The TA final report included this research report on green financing mechanisms.</p> <p>3b. <b>Achieved.</b> The TA team developed a project pipeline and recommended that the government should pursue financing of end-of-grid renewable energy for industrial parks and development of the private sector circular economy approach to industrial park management. The TA also delivered a draft proposal of an investment project to assist Guangdong in submitting a loan application for future ADB financing. These were included in the TA final report.</p>

#### Actual Key Activities with Milestones

##### 1. Good practices and lessons on industry green growth and evaluation system studied and documented

- 1.1 Conducted questionnaire and field surveys (July–November 2019)
- 1.2 The executing and implementing agencies canceled the international study visits. The case studies and lessons from overseas industrial parks were documented through desk research (September 2020)
- 1.3 Conducted domestic study visits to Shandong Province and Beijing (December 2019). Due to COVID-19 pandemic, subsequent domestic study visits could not be conducted during 2020–2021. Case studies and lessons from domestic industrial parks were documented through desk research (September 2020)
- 1.4 Analyzed and documented the survey results of 40 industrial parks and field interview in a consolidated survey and evaluation report (April 2020). The drafting of Guangdong Industry Green Growth Catalogue was canceled.

##### 2. Indicators to comprehensively evaluate Guangdong industries' green growth developed

- 2.1 Conducted TA inception meeting to discuss the research objectives and direction (June 2019)
- 2.2 Conducted teleconferences and virtual TA meetings, especially during the COVID-19 pandemic, to discuss the research progress (July 2019–December 2021)
- 2.3 Prepared green indicators and drafted a research report (April 2020)
- 2.4 External peer reviewers sent review comments on the draft report (December 2020)
- 2.5 Submitted draft research recommendations to the executing and implementing agencies as initial input for the Guangdong's Fourteenth Five-Year Plan (April 2020); and submitted revised final TA report (November 2021)
- 2.6 Conducted TA final workshop (December 2021)

**3. Financial system and mechanism to promote green development and design of innovative financing projects prepared**

- 3.1 Drafted research report on green financing mechanisms (July 2019–April 2020)
- 3.2 Prepared a long list of green financing projects for ADB and other financial institutions (May 2021)
- 3.3 Prepared a concept note for a proposed potential green finance projects for ADB's programming discussion (May 2021) and a detailed draft project proposal (September 2021) for possible ADB loan consideration.

**Actual Inputs**

ADB: \$217,034.92

Government: \$50,000 (estimated counterpart support in the form of counterpart staff, meeting facilities, data, information, printing, coordination and arrangement activities, part of interpretation cost, domestic study visits, and other in-kind contributions)

ADB = Asian Development Bank, COVID-19 = coronavirus disease, NA = not applicable, PRC = People's Republic of China, TA = technical assistance.

<sup>a</sup> People's Government of Guangdong Province. 2016. *Guangdong Provincial Ecological Civilization Construction Thirteenth Five-Year Plan*. Guangzhou.

Source: ADB.

**TECHNICAL ASSISTANCE COST****Table A2.1: Technical Assistance Cost by Activity**  
(\$'000)

<b>Item</b>	<b>Amount</b>	
	<b>Original</b>	<b>Actual</b>
1. Consultants	210.10	207.34
2. Training, seminars, workshops, forum, and conferences	14.00	9.57
3. Study visits	45.00	0.12
4. Miscellaneous administration and support costs	10.00	0.00
5. Contingencies	20.90	0.00
<b>Total</b>	<b>300.00</b>	<b>217.03</b>

Source: Asian Development Bank.

**Table A2.2: Technical Assistance Cost by Fund**  
(\$'000)

<b>TASF-Other Sources</b>		
1.	Original	300.00
2.	Actual	217.03
3.	Unused	82.97

TASF = Technical Assistance Special Fund.

Source: Asian Development Bank.