

## A. Project Summary

### Project:

Planning for Green Eco-Districts in the City of Beijing:  
Carbon Accounting Standards and Tool for Statutory Zoning Plans

### Location:

City of Beijing, China

### Area Coverage:

14 Proposed Green Eco-Districts totalled 734 sq. km.

## B. From National Climate Change Policies to Local Statutory Planning: Designation of Green Eco-District Plans in City of Beijing, China

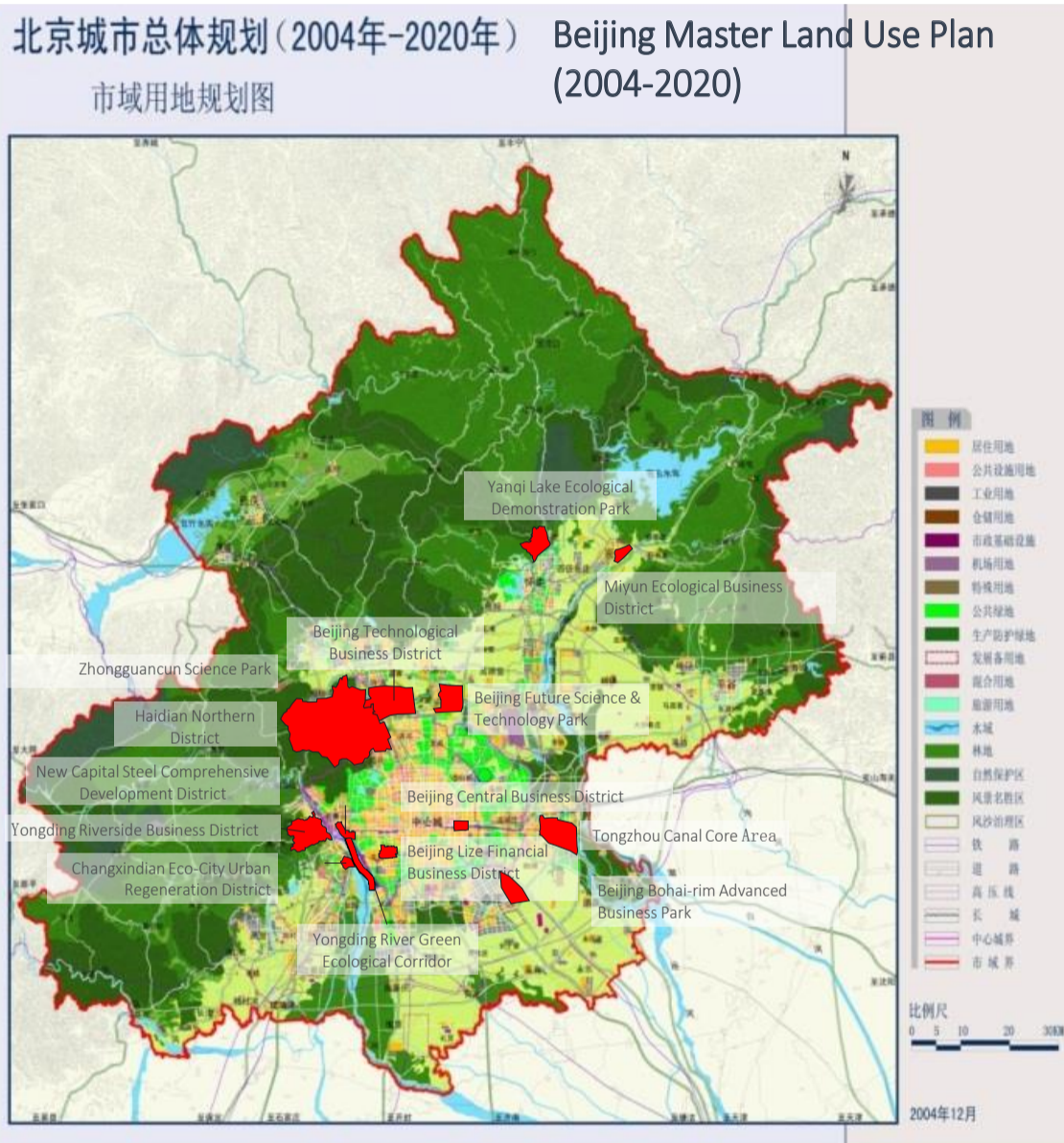


Figure 1: City of Beijing – Proposed Green Eco-Districts Locations

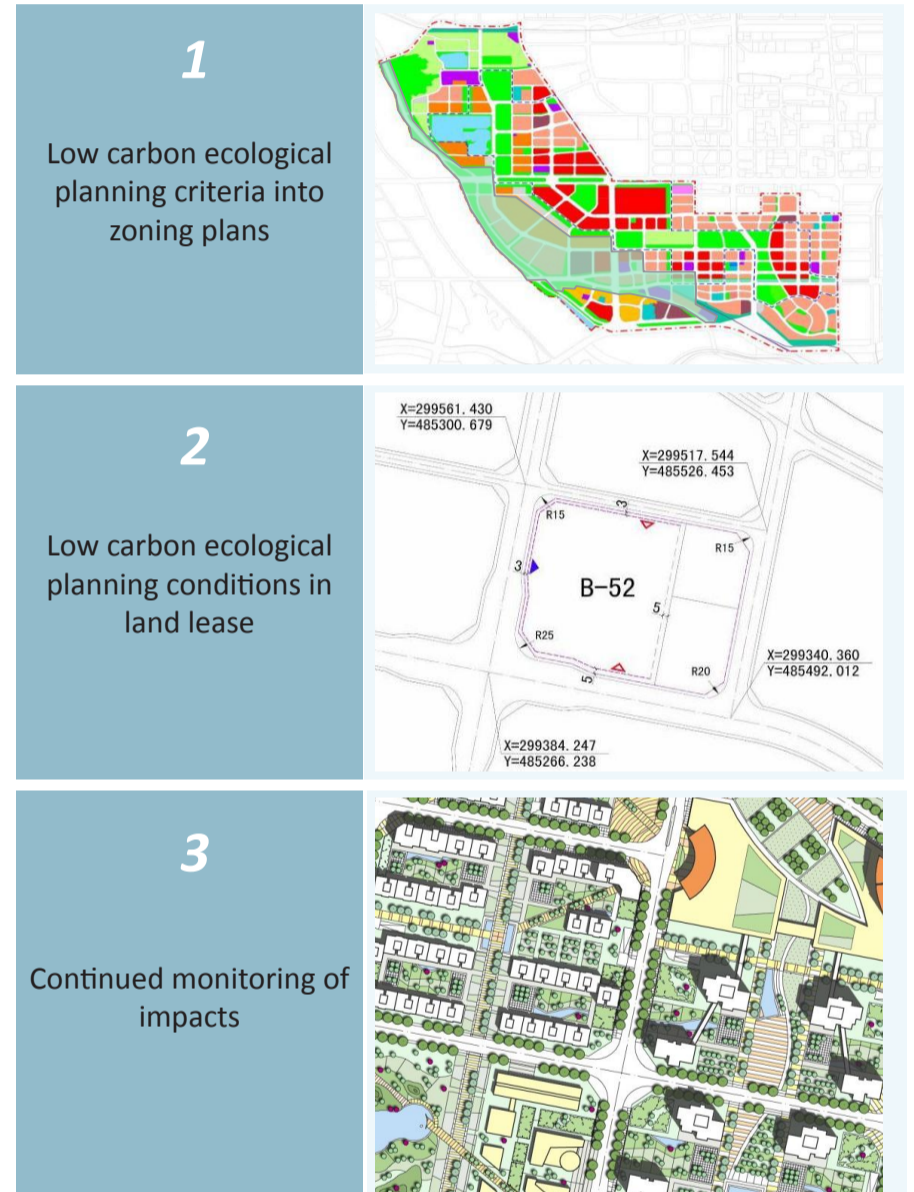


Figure 2: KPIs and the Statutory Plan Making and Design Control

The City Government of Beijing has set up a city-wide “Green Ecological Urban Development Policy Framework”. One key component is the proposed 14 new towns and urban regeneration districts as pilot “Green Eco-Districts” integrating into the city wide master plan. These new towns and urban regeneration districts all together cover more than 734 sq. km and will accommodate an estimated total population of 3.6 million. They are planned with explicit low carbon and ecological policy goals and measures.

Table 1: Green Eco-Districts in the City of Beijing

No.	Proposed Green Eco-Districts	Locations/ Municipal Districts
1	Beijing Future Science & Technology Park	Changping
2	Beijing Lize Financial Business District	Fengtai
3	Changxindian Eco-City Urban Regeneration District	Fengtai
4	Beijing Technological Business District	Changping
5	Yanqi Lake Ecological Demonstration Park	Huairou
6	Miyun Ecological Business District	Miyun
7	Haidian Northern District	Haidian
8	Yongding River Green Ecological Corridor (Fengtai)	Fengtai
9	Yongding Riverside Business District	Mentougou
10	New Capital Steel Comprehensive Urban Development District	Shijingshan
11	Tongzhou Canal Core Area	Tongzhou
12	Beijing Central Business District Urban Regeneration	Chaoyang
13	Beijing Bohai-rim Advanced Business Park	Tongzhou
14	Zhongguancun Science Park (16 Science Parks)	Locations Throughout the City of Beijing

Table 2: Green Eco-Districts: Low Carbon and Ecological KPI in Statutory Plans

Categories		No.	Key Performance Indicators
Land Use Planning	Compact Urban Form	1	Land parcel sizes
		2	Accessibility to public facilities
		3	Percentages of mixed uses
Transportation	Road network	4	Densities of pedestrian and cycling routes
	Public Transit	5	Land parcel permeability
		6	Public transit nodes employment provision
Resources Utilization	Energy	7	Percentage of Green Buildings
		8	Renewable energy utilization rate
		9	Non-residential building energy saving standard
	Water Resources	10	Non-portable water utilization rate
Ecology, Landscape and Environment	Micro-climate	11	Rain water infiltration rate
		12	Green roof coverage
	Landscape Ecology	13	Breezeway design
		14	Landscape design for rain water retention
		15	Rain water harvest building design
		16	Accessibility to public open space
		17	Percentage of urban forest

C. Carbon Accounting Standards and Tool for Statutory Zoning Plans in Beijing

This project was tasked by the City of Beijing Planning Committee to set up a comprehensive Carbon Accounting Standards and Tool as the standardized method to measure the carbon emissions of different planning options; identification of emission sources, and the assessment of their relative impacts.

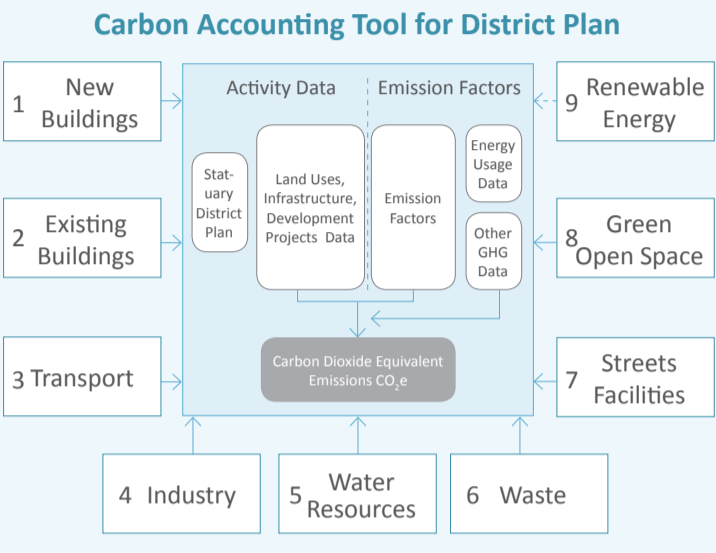


Figure 3: Carbon Accounting Standards and Tool for Beijing Green Eco-District Plans

New Buildings Carbon Emission Accounting

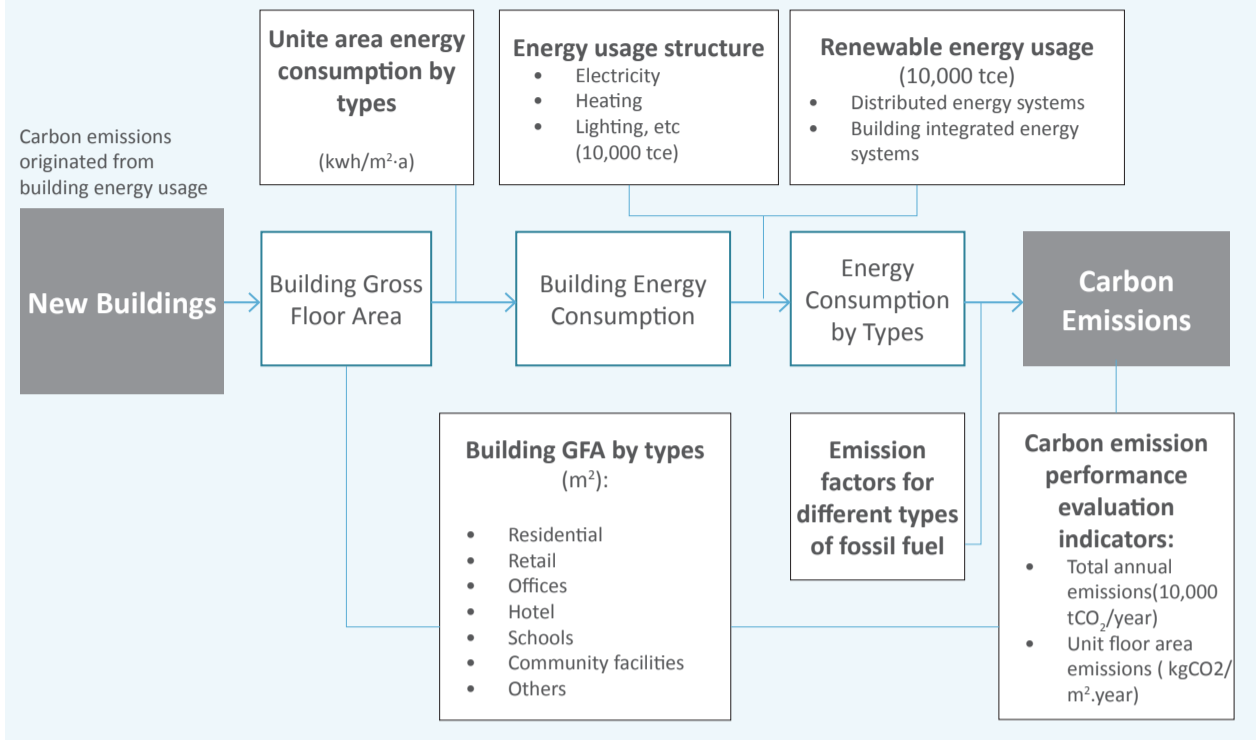


Figure 4: A Step-by-Step Calculation Guideline for Planners in the Carbon Accounting Standards (example: New Buildings)

The overall technical basis of the methodology as well as the detailed calculations in each of the modules are explained with the planners as the users.

- The basic activity data, emission factors and sources of data are presented.
- The direct and indirect emissions (Scope 1, 2 and 3 emissions) based on the planning area boundaries are explained based on the physical locations of the actual emissions.
- A system of evaluation performance indicators is set up for use to assess the emission impacts.

Modules	KPI for Assessment of Impacts	Units
New Building	New Building Total Emissions	tCO <sub>2</sub> /Year
	Unite GFA Emissions	kgCO <sub>2</sub> /m <sup>2</sup> •Year
Existing Building	Existing Building Total Emissions	tCO <sub>2</sub> /Year
	Unite GFA Emissions	kgCO <sub>2</sub> /m <sup>2</sup> •Year
Transport	Transport Total Emissions	tCO <sub>2</sub> /Year
	Unit Trip Distance Emissions	kgCO <sub>2</sub> /km•Year
Industry	Industry Total Emissions	tCO <sub>2</sub> /Year
	Unit Industrial Product Emissions	tCO <sub>2</sub> /10000Dollar•Year
Water Resources	Water Resource Total Emissions	tCO <sub>2</sub> /Year
	Unit Development Area Water Resources Emissions	tCO <sub>2</sub> /ha•Year
Waste	Waste Total Emissions	tCO <sub>2</sub> /Year
	Unit Development Area Waste Emissions	tCO <sub>2</sub> /ha•Year
Street Facilities	Street Facilities Total Emissions	tCO <sub>2</sub> /Year
	Unit Street Area Emissions	tCO <sub>2</sub> /ha•Year
Green Open Space	Green Open Space Carbon Sequestrations	tCO <sub>2</sub> /Year
	Unit Green Open space Area Carbon Sequestration	tCO <sub>2</sub> /ha•Year
Renewable Energy	Renewal Energy Emission Neutral Impact	tCO <sub>2</sub> /Year
	Unit Development Area Emission Neutral Impact	tCO <sub>2</sub> /ha•Year

Figure 5: Proposed Key Performance Indicators for Assessment and Comparison of Planning Options

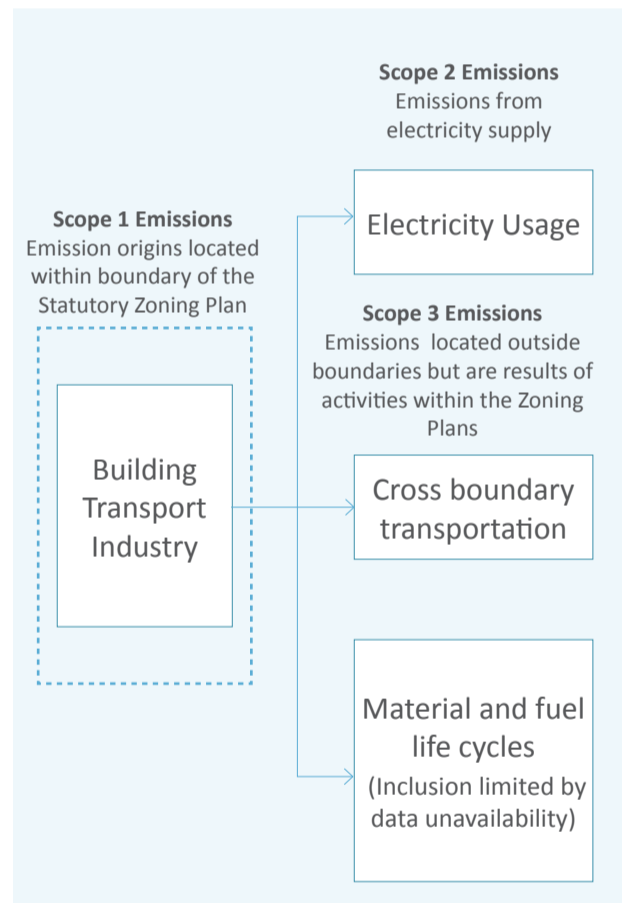


Figure 6: Emissions Boundaries: Scopes 1, 2 and 3

The accounting should not be only an one off exercise at plan making stage. It is a working tool to be undertaken at different milestones in the planning and implementation decision life-cycle: plan making, plan approval, land use right transfer, design, development control approvals and project completion stages.

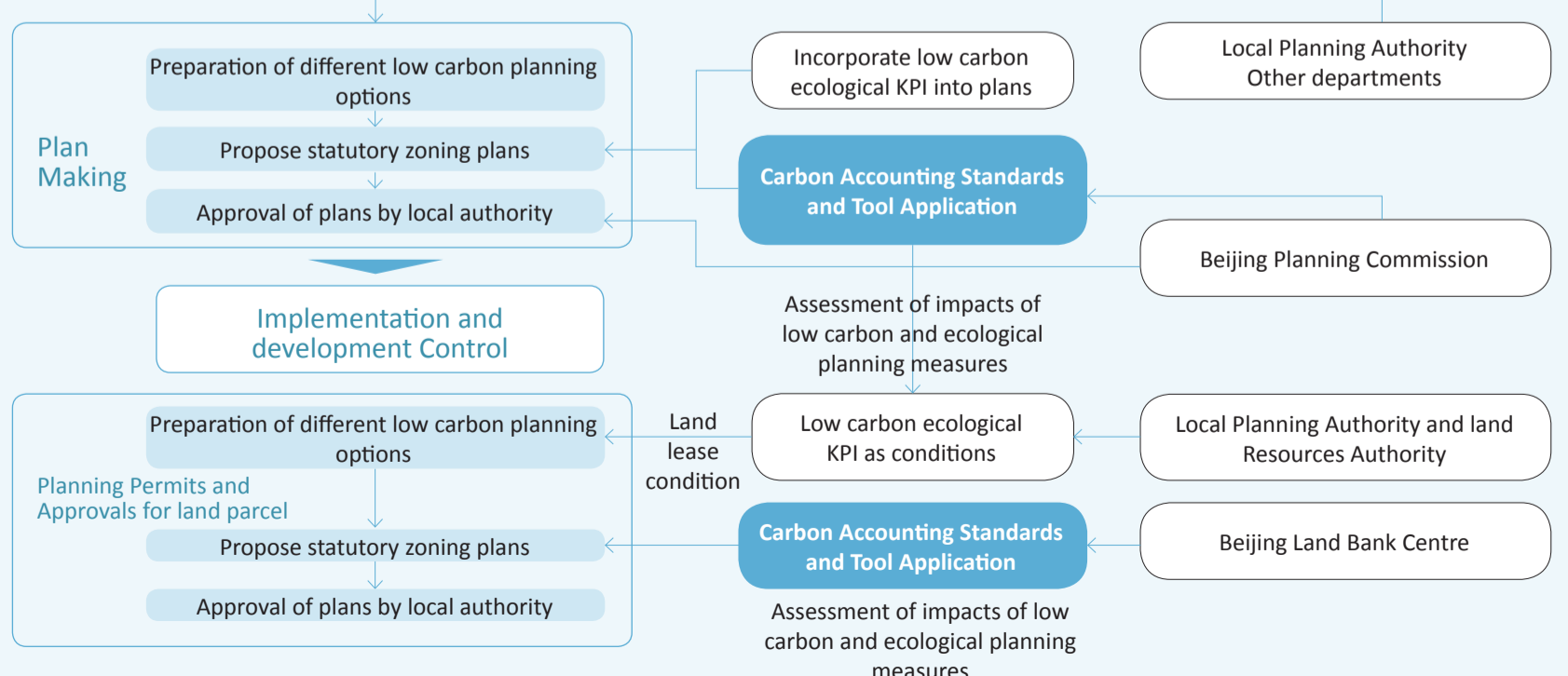


Figure 7: Carbon Accounting Standards and Tool Applications at Plan Making and Development Control processes

### D. Application: New Capital Steel Comprehensive Urban Development District

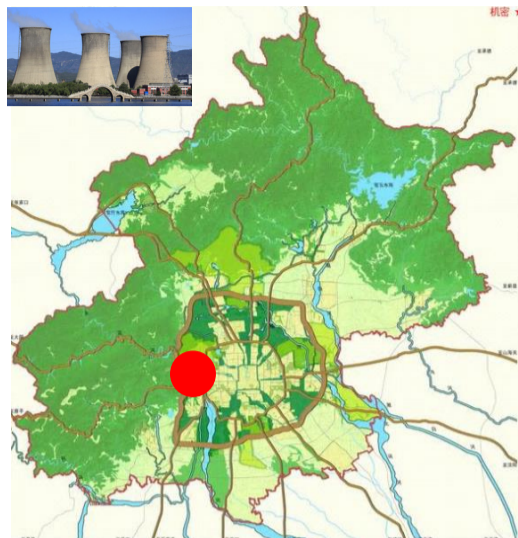


Figure 8: New Capital Steel Comprehensive Urban Development District



Figure 9: The proposed Development District

The New Capital Steel Urban Regeneration District is an urban regeneration project and one of the 245 Green Eco-Districts in the City of Beijing. It includes a vacated steel work site of 334 ha located at the western end of the Beijing city core area. The proposed statutory zoning plan will accommodate a total gross floor area of 5 million sq. m. The plan has adopted a framework of low carbon ecological KPI as implementation targets.

#### 1. Integrated Renewable and Clean Energy System

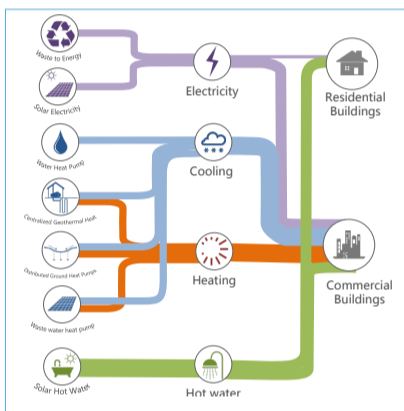
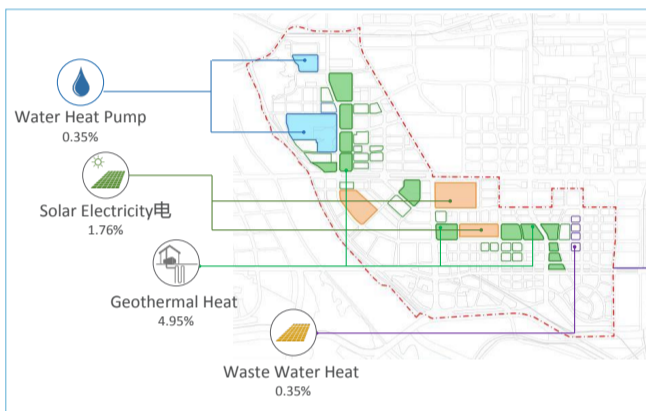
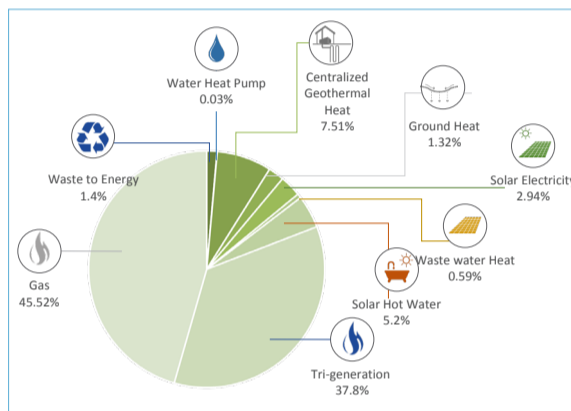


Figure 10: Integrated Renewable and Clean Energy System



Centralized Energy Facilities and Percentage of Contribution



Usage of Renewable Energy ≥19%

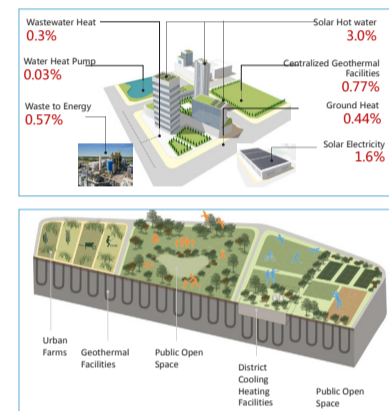


Figure 11: Innovative Use of Space: Integrated Geothermal facilities with open space and urban farming

#### 2. Industrial Heritage Conservation and Reuse



Figure 12: Use of large roof area of industrial building for solar panels



Industrial Heritage Conservation and Reuse

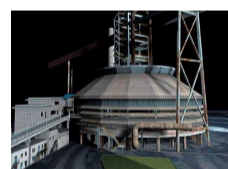
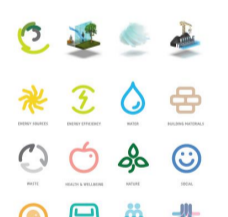


Figure 13: Use of disused furnace as energy education centre for the community



Proposed Energy education centre for the community



Solar Facilities on Roof of Industrial Heritage Building

#### 3. Water Resources Management

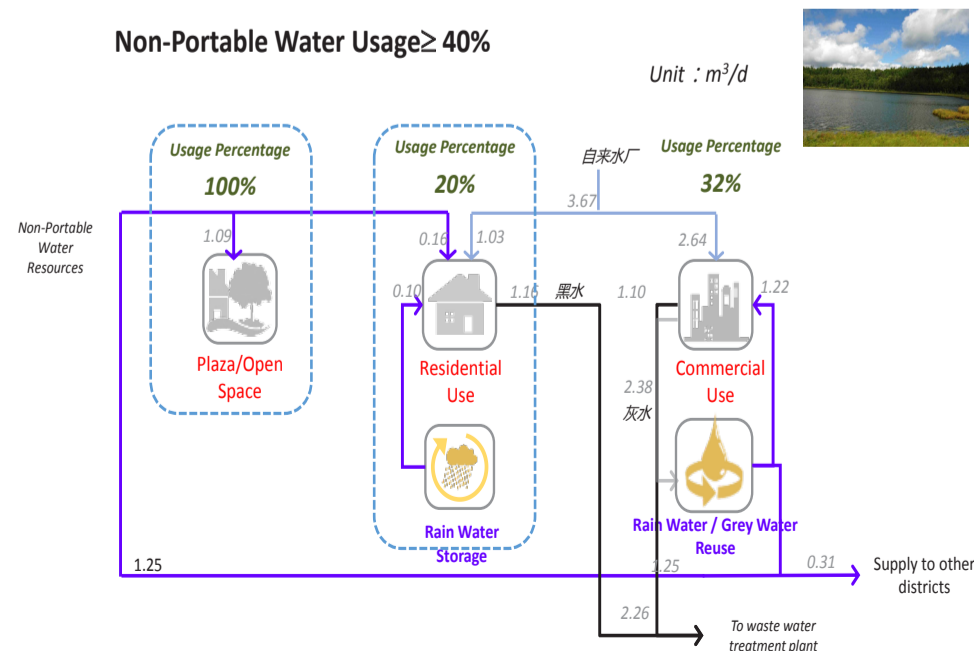


Figure 14: Non-portable Water Usage and Rain Water Harvesting

#### 4. Waste

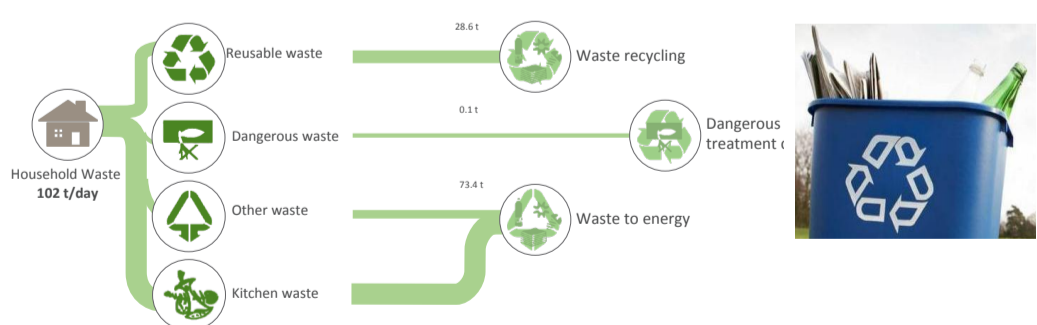


Figure 15: Waste Management

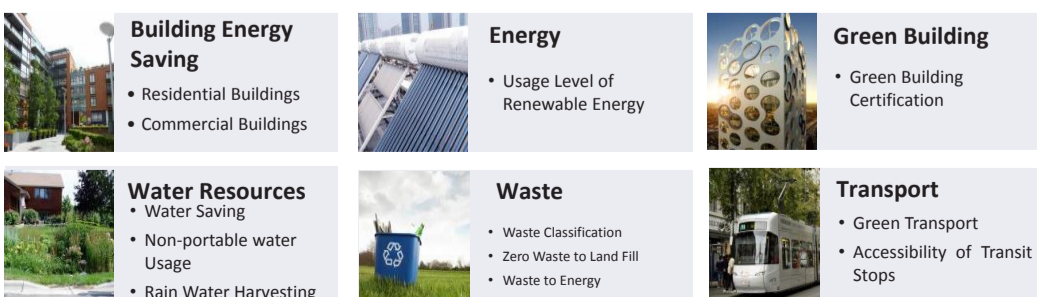


Figure 16: 13 Key Planning Criteria for Zoning Plans

### E. Carbon Accounting for New Capital Steel Comprehensive Urban Development District

The carbon accounting standards have been applied to the planning process and evaluated the emission intensity of two planning scenarios. These are the (1) Business-as-usual Scenario which represents the existing planning standards, as well as (2) the Low Carbon Scenario

Carbon Accounting Tool for District Plan

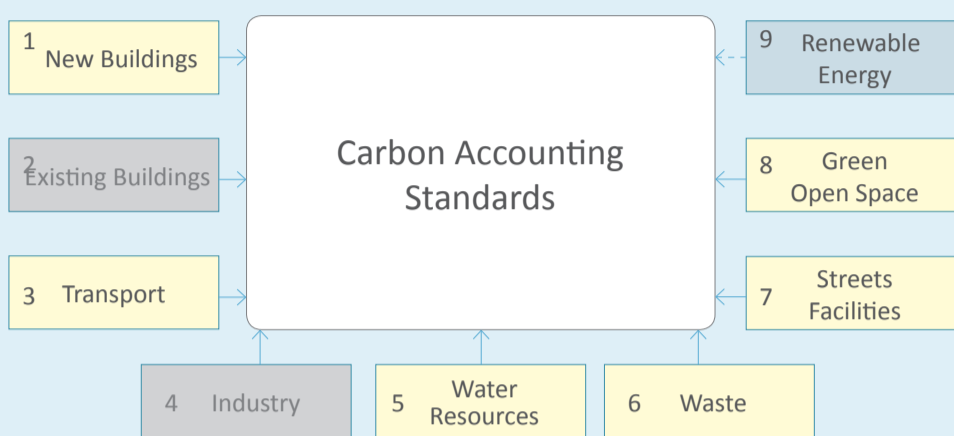


Figure 17: Carbon Accounting Standards Application for the New capital Steel District (Modules 1, 3, 5, 6, 7, 8, 9 included)

### Carbon Accounting Results

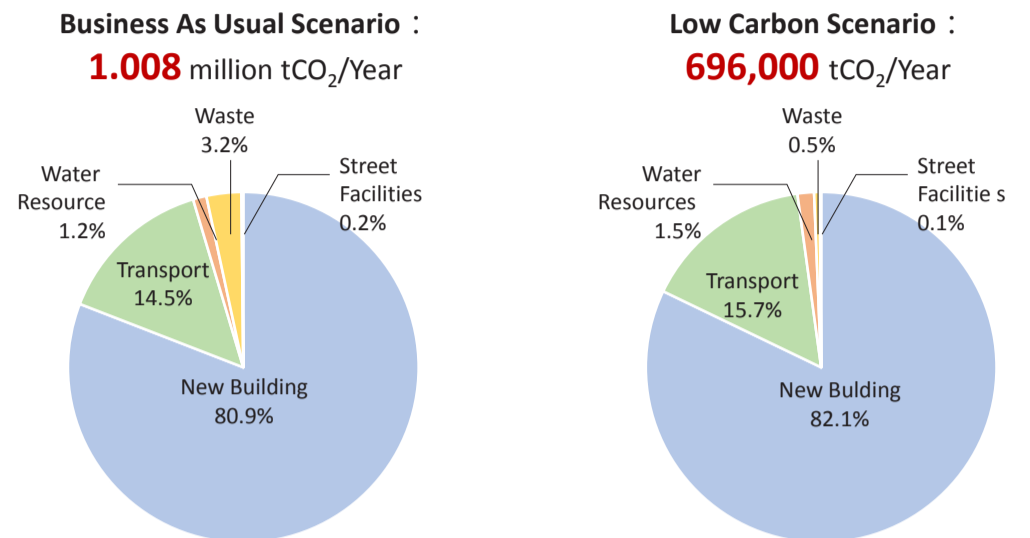


Figure 18: Impact Assessment and Results of Carbon Accounting Standards Application

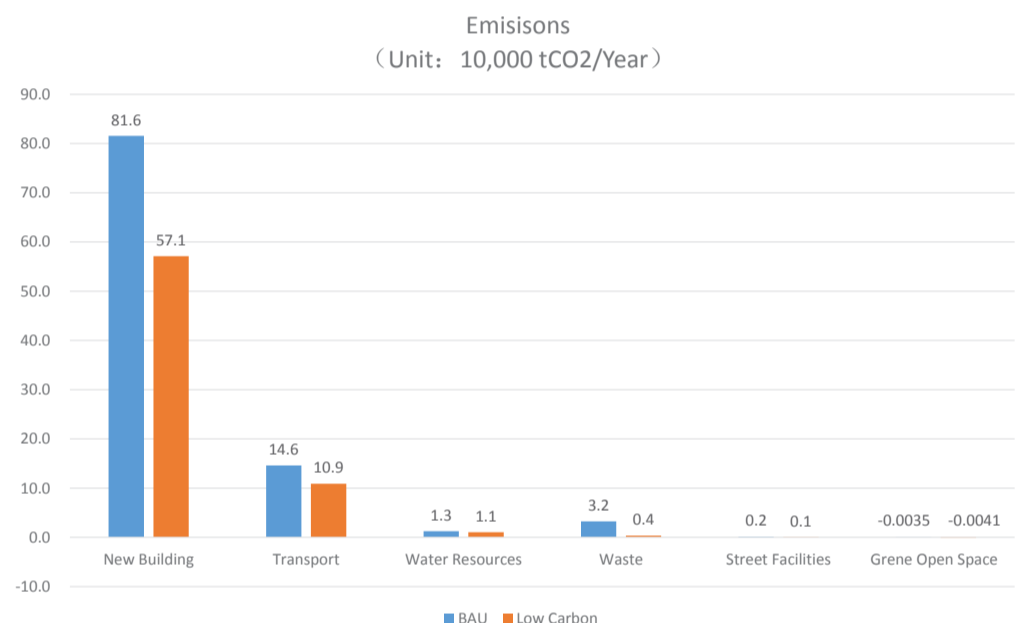
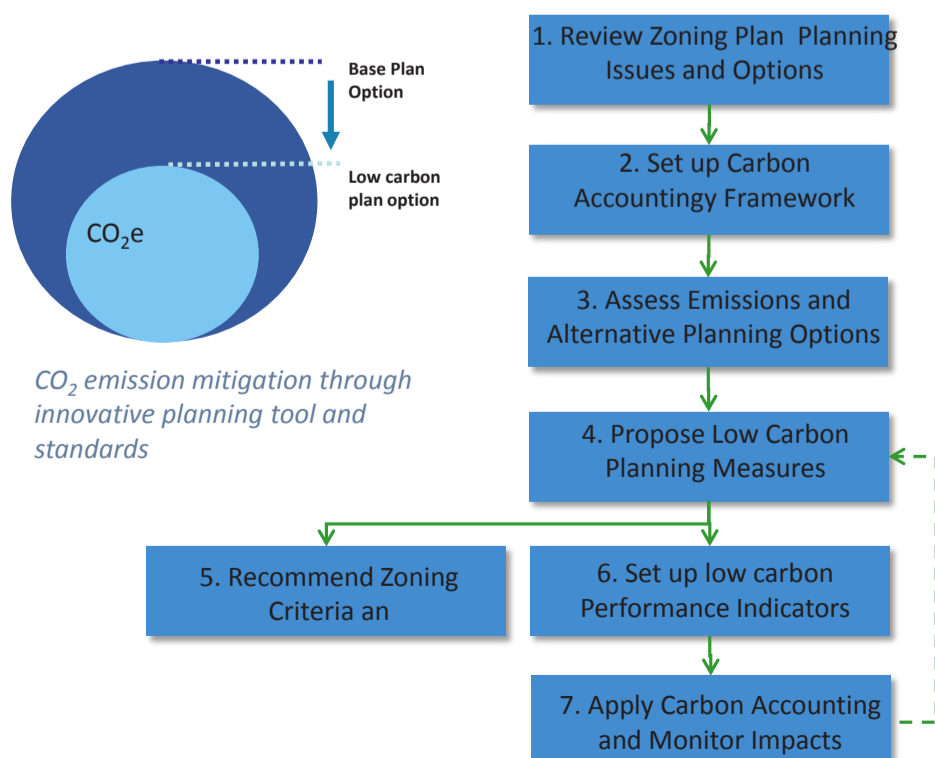


Figure 19: Impact Assessment : Comparison of BAU and Low Carbon Planning Option

### F. Summary

#### Summary: innovation and Originality

- The use of Carbon Accounting Standards and Tool for City of Beijing Green Eco-District statutory zoning plan for Chinese cities is innovative.
- The tool and the applications are the first of its kind in the local planning practices in China.
- The use of quantitative tool in development control to assess objectively the impacts of climate change measures and ecological planning criteria is pioneering.
- The standard and tool are prepared as a step-by-step guidebook for planners is practical.



This project has established a carbon accounting standards for Statutory District Zoning Plans, integrating low carbon planning and design targets, and has set out the carbon emission accounting protocol, describe the methodology, the toolbox, database, calculations and evaluation performance indicators. These are included in the Green Eco-District Plans Carbon Accounting Guidebook released in 2015 for use by local planning authorities, planning profession and the community at large.

