

Policy, Regulation and Financing Cooling Options in Guangzhou

Guangzhou Municipal Planning and Natural Resources Bureau
April, 2023



The current relevant cooling control requirements in Guangzhou

Control requirements for nature and cool spaces

- **Eco-environmental conservation red lines (ECRLs):**

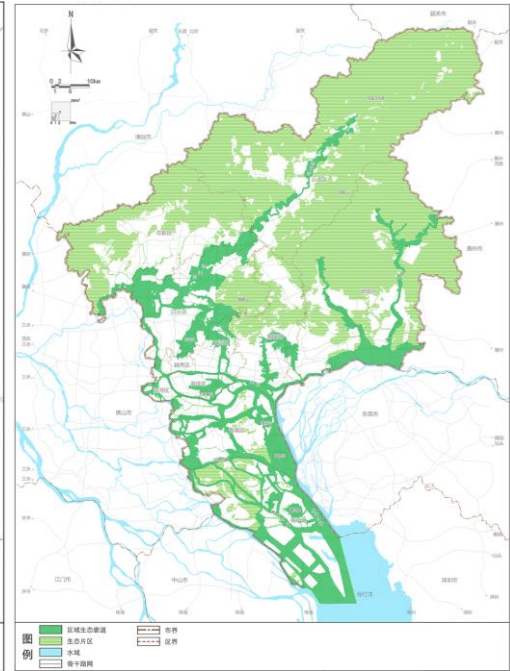
- Only limited human activities that do not cause ecological damage are allowed;
- Core area: human activities are prohibited;
- Non-core area: production and construction are prohibited.

- **Ecological Corridors:**

- Width control: regional level(500-1000m)-district level(100-200m)-community level(30-50m);
- Land use: limit residential, commercial and industrial development, allow small-scale and low-density public facilities ;
- Density control: FAR, Height, Greening Ratio, etc.



Eco-environmental conservation red lines



Ecological corridor networks

Legislating control requirements for open space and building width in local laws and regulations

第三十八条 一般建筑物的面宽，应当符合下列规定：

(一) 低、多层建筑的最大连续面宽不得大于100米。

(二) 高层建筑塔楼单体面宽不得大于80米，且各单体累加面宽不得大于对应用地红线面宽的2/3。

位于珠江两岸一线等城市重要景观控制地区或者具有城市标志性意义、影响城市生态景观的建筑物面宽，城乡规划主管部门应当组织进行城市设计研究，经公示并报规划委员会审议后，根据审议结果确定；除文化、体育等城市级大型公共服务设施外，低、多层建筑或者高层建筑裙楼最大连续面宽不得大于80米，高层建筑塔楼最大连续面宽不大于60米。

对建筑面宽有特殊要求的其他建设工程，城乡规划主管部门可以组织进行城市设计研究或者专家评审，其建筑面宽根据研究或者评审结果确定。

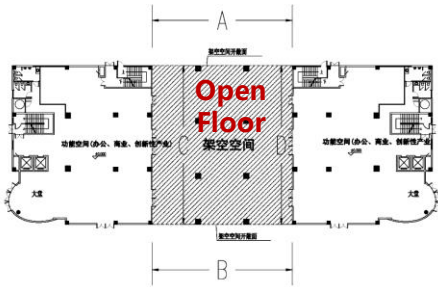
- The maximum continuous face width of low-rise buildings shall not exceed 100m;
- The face width of high-rise building tower shall not exceed 80m, and the cumulative face width shall not exceed 2/3 width of the plot.
- The continuous width of the podium shall not exceed 80m.

FAR Exemption for public open space in buildings

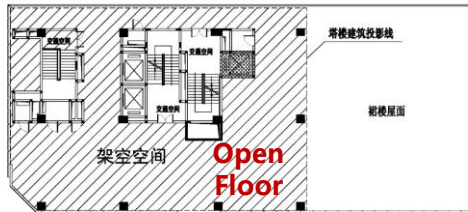
- **FAR Exemption:**

- Example: the public open space (open floor) of residential, office and commercial buildings located on the ground floor is not calculated in the FAR;

- **Requirements for the open floor (examples):**



The cumulative length of the open faces should not be less than 40% of the perimeter of the open floor, that is, $A+B \geq (A+B+C+D) * 40\%$;



The open floor located between the podium building and the tower should be open except for the necessary equipment and facility space.

Requirements for open floor of residential, office, commercial, and innovative industries building

Source: Calculation method of FAR for planning management in Guangzhou



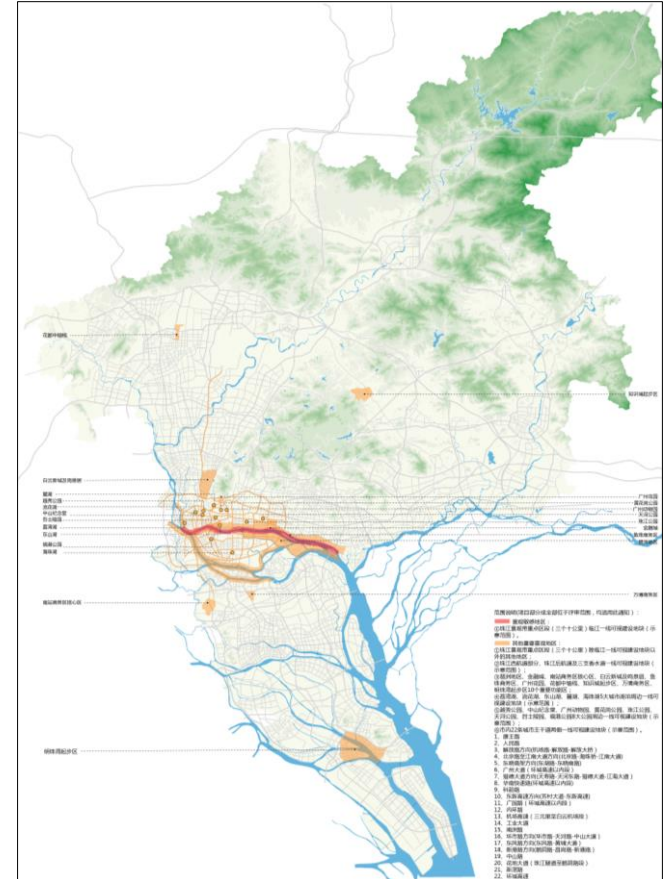
Urban design requirements for specific areas

- **Urban design requirements and proposal reviews:**

- If the project is located in the "five sides, four corridors and four areas" defined by *Overall Urban Design of Guangzhou*, the proposal needs to be reviewed by government in the landscape review meeting.

- **Specific requirements:**

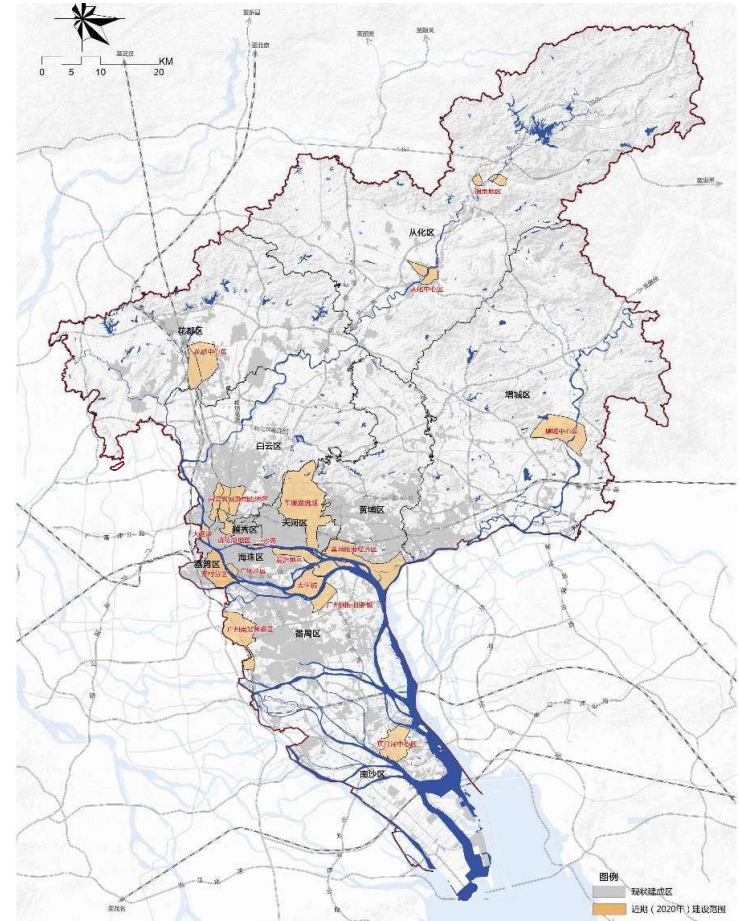
- **Public space:** encourage public open spaces in buildings(such as open floor); encourage covered linkages and sky walks between the buildings; use green spaces or rainwater wetlands in the low land as permeable areas; improve the accessibility of three-dimensional public spaces.
- **Height control:** buildings near the open spaces such natural water surfaces, green spaces, squares, and mountains should be controlled according to low-front and high-rear design features.



Source: Overall Urban Design of Guangzhou

Promote the sponge city in regulatory planning

- Promote the sponge city construction by adding requirements into the detailed planning and approval process, such as sponge standards of land use for infiltration, retention and detention, etc. to guide the design details:
- The outdoor ground permeability rate of residential buildings cannot be lower than **40%**;
- Sidewalks, outdoor parking lots, pedestrian streets, bicycle paths, and external courtyards of construction projects must be provided with permeable pavement, and the permeable pavement rate should not be lower than **70%**;
- In combination with the community' s green space, facilities such as grass-planted ditches, rain gardens, and other facilities should be set up according to local conditions, and the rate of sunken green space should not be less than **50%**.



Building design codes for ventilation and shading

- **Passive cooling solutions:**

- Guangzhou, which are hot in summer and warm in winter, east and west exterior windows of residential buildings must adopt building exterior shading measures.
- The open ventilation area of residential exterior windows should not be less than 10 percent of the floor area of the room or 45 percent of the area of the exterior windows. The external windows of the main function rooms in public buildings must be provided with ventilation devices.

- **Active cooling solutions :**

- When a city initiates the process of building code revision, the energy efficiency standards for active cooling appliances must be upgraded in accordance with the heightened demands for green building standards or local energy saving plans.

Sustainable urban cooling guidance in planning

- Promote sustainable development and urban cooling in urban renewal work in the stage of planning compilation and review.

在城市更新工作中大力倡导可持续发展 城市降温的规划建设指导意见

为深入践行习近平生态文明思想，全面贯彻“创新、协调、绿色、开放、共享”发展理念，响应国家碳达峰、碳中和目标，积极应对全球气候变化，结合我市城市更新工作，推动广州可持续发展城市降温“酷城”行动，提升城市气候舒适性，特制定本意见。具体如下：

一、保护利用自然开敞空间，形成“冷源”和“冷廊”

注重场地周边环境分析与衔接，充分利用周边山林、河湖等自然开敞空间形成的城市“冷源”与通风廊道，构建利于冷空气进入场地内部的布局形式。保护利用场地内的地形、河涌、水塘、植被等自然要素，避免大挖大填、清除原生植被等破坏性的建设行为；保护村落传统选址、格局、风貌以及自然和田园景观等整体空间形态与环境，充分利用旧村内的河涌、风水塘、古井塘、古树名木等要素及城市绿地空间，结合设计打造小微湿地、纳凉空间，综合形成衔接场地内外的“冷源”“冷廊”系统。

二、传承并弘扬岭南传统通风、隔热、降温智慧

传承岭南传统管城中的气候适应智慧，鼓励岭南特色的被动式通风、隔热、降温方式。鼓励运用“梳式布局”形成纵横格网结构，构建冷巷系统；演绎与发展骑楼、天井等传统建筑形式，建构具有“拔风”、遮阳、挡雨等气候适应功能的建筑过渡空间，并结合植被、水体等自然要素改善建筑环境微气候；运用“青砖石

● Checking Points:

Protect natural open space for cooling sources and corridors

Make full use of Lingnan traditional approaches for ventilation, insulation and dehumidification

Optimize detailed designs for urban cooling

Encourage open floors in buildings

Encourage 3D greening

Encourage Covered Linkages

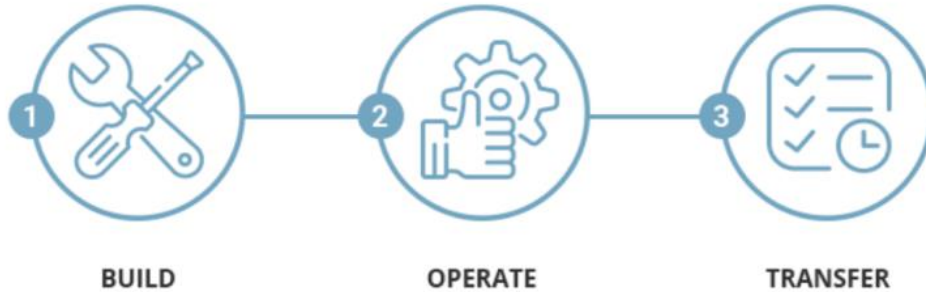
Promote Green Buildings

Promote Sponge City

Strengthen the site ventilation design and evaluation in the stage of planning compilation and review.

Explorations and practices in pilot projects

Yongqing Fang: Introduce Build-Operate-Transfer(BOT) model to support implementation of urban cooling measures in urban renovation project



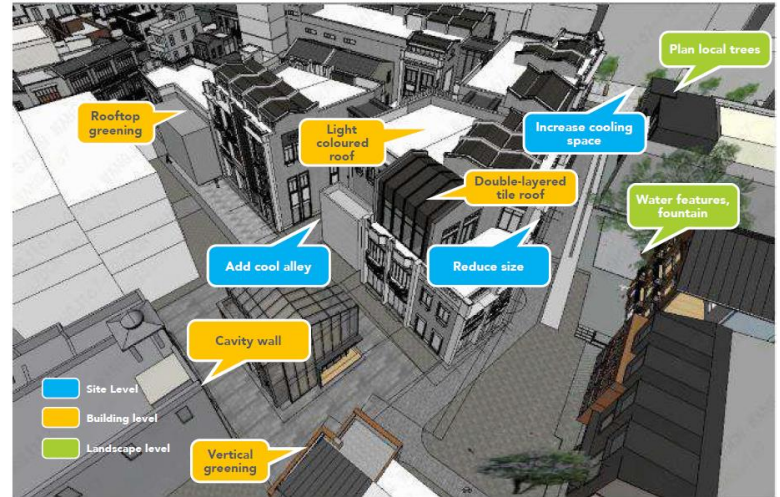
- **Vanke Group signed a 15- to 20-year lease with Guangzhou for lands in Yongqing Fang that will be returned to the government after the operation period expires.**
- Through the lease of state-owned land with historic and cultural value, the enterprise develops, operates, and maintains the land, financing the initial cost.



Yongqing Fang: Finance feasibility of urban cooling measures in urban renovation project, low-cost options but significant long-term benefits

- The 1.52 ha pilot area in Yongqing Fang, urban cooling measures will incur an engineering cost of only US\$80,000–90,000, compared to the construction cost for the entire Jixiang section of roughly 10 million dollars.
- According to relevant studies, for each US\$1.00 invested in urban nature-based cooling measures, there will be net benefits of US\$1.50–15.20, or return on investment between 50 percent and 1,420 percent (Estrada, Botzen, and Tol 2017).

Category	Measures	Size	Cost
Greening	Fixed rooftop greening	≈220m ²	Increased cost ≈50,000 dollars
	Ground-grown vertical greening along walls	≈240m ²	
	Movable rooftop greening	Total length ≈50m	
Architecture	Rooftop reflective coating	≈790m ²	Increased cost ≈35,000 dollars
	Double-layered tile roofs	≈350m ²	
	Install shading structures on the curtain walls of the east, west, and south sides as well as on the rooftop skylight.	≈320m ²	
	Install flexible windows and doors such as Tanglong doors and lattice windows.	≈20	



China-Singapore Guangzhou Knowledge City: Key improvements in the cooling design are incorporated into the regulatory plan

Control key points

Building height

Function and facade

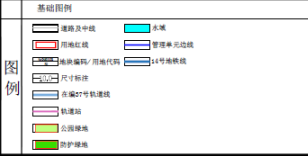
Architectural style

Building setback restriction

Detailed regulations

Height zoning, street-wall interface, arcade facade, 3D greening, vertical protection, sight corridors and public building facade

中新广州知识城环九龙湖地区城市设计深化



AG0612-1管理单元城市设计图则

指北针	比例尺		索引
	1:2000		
城市设计导则			
分类	要素		
1 建筑	1.1 建筑高度：建筑高度应符合国家现行标准，建筑高度不得超过24m，建筑高度不得超过24m，建筑高度不得超过24m。 1.2 建筑间距：建筑间距应符合国家现行标准，建筑间距应符合国家现行标准。 1.3 建筑退线：建筑退线应符合国家现行标准，建筑退线应符合国家现行标准。 1.4 建筑风貌：建筑风貌应符合国家现行标准，建筑风貌应符合国家现行标准。 1.5 建筑密度：建筑密度应符合国家现行标准，建筑密度应符合国家现行标准。 1.6 建筑容积率：建筑容积率应符合国家现行标准，建筑容积率应符合国家现行标准。		
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备注：
 1. 本图例中，建筑高度是指建筑的最高点，建筑高度是指建筑的最高点，建筑高度是指建筑的最高点。
 2. 本图例中，建筑间距是指建筑之间的最小距离，建筑间距是指建筑之间的最小距离，建筑间距是指建筑之间的最小距离。
 3. 本图例中，建筑退线是指建筑与道路、绿地、水体、红线等的最小距离，建筑退线是指建筑与道路、绿地、水体、红线等的最小距离。
 4. 本图例中，建筑风貌是指建筑的外观、色彩、材质、形式等，建筑风貌是指建筑的外观、色彩、材质、形式等。
 5. 本图例中，建筑密度是指建筑基底面积与总用地面积的比值，建筑密度是指建筑基底面积与总用地面积的比值。
 6. 本图例中，建筑容积率是指建筑总容积与总用地面积的比值，建筑容积率是指建筑总容积与总用地面积的比值。



China-Singapore Guangzhou Knowledge City: Key improvements in the cooling design are incorporated into the regulatory plan

- **Examples of architectural interface control:**

- Plots AG22, AG28, AG29 are located off Knowledge Ninth Road. Plots AG22 and AG23 are located off Innovation Avenue. Plots AG26 and AG23 are located off the green area to the south. 70% of each of these plots should have a continuous street-wall interface.

- Plots AG26 and AG29 are located off Open Fourth Road, and they should have 50% of a continuous street-wall interface.

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BOX 5 // REGULATORY PLAN OF KNOWLEDGE GREEN VALLEY

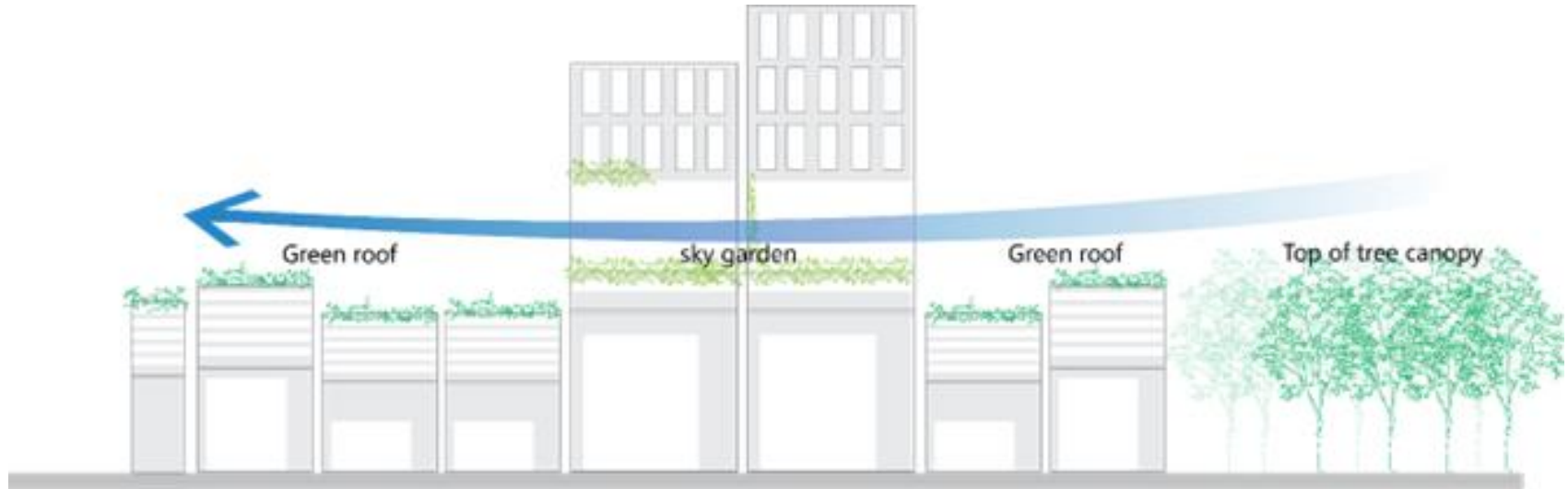
Source: China-Singapore Guangzhou Knowledge City Development and Construction Office

Table 3 // PLOT INDICATORS

Plot No.	Type	Area	FAR	Floor area	Building density	Green area ratio	Building height
AG22	commercial	26439m ²	3	79317m ²	40	30	60
AG28	residential	20012m ²	2.5	50030m ²	28	35	60
AG29	residential	26563m ²	2.5	66407.5m ²	28	35	60
AG23	commercial	25492m ²	3	76476m ²	40	30	60
AG26	commercial	24196m ²	3	72588m ²	40	30	60

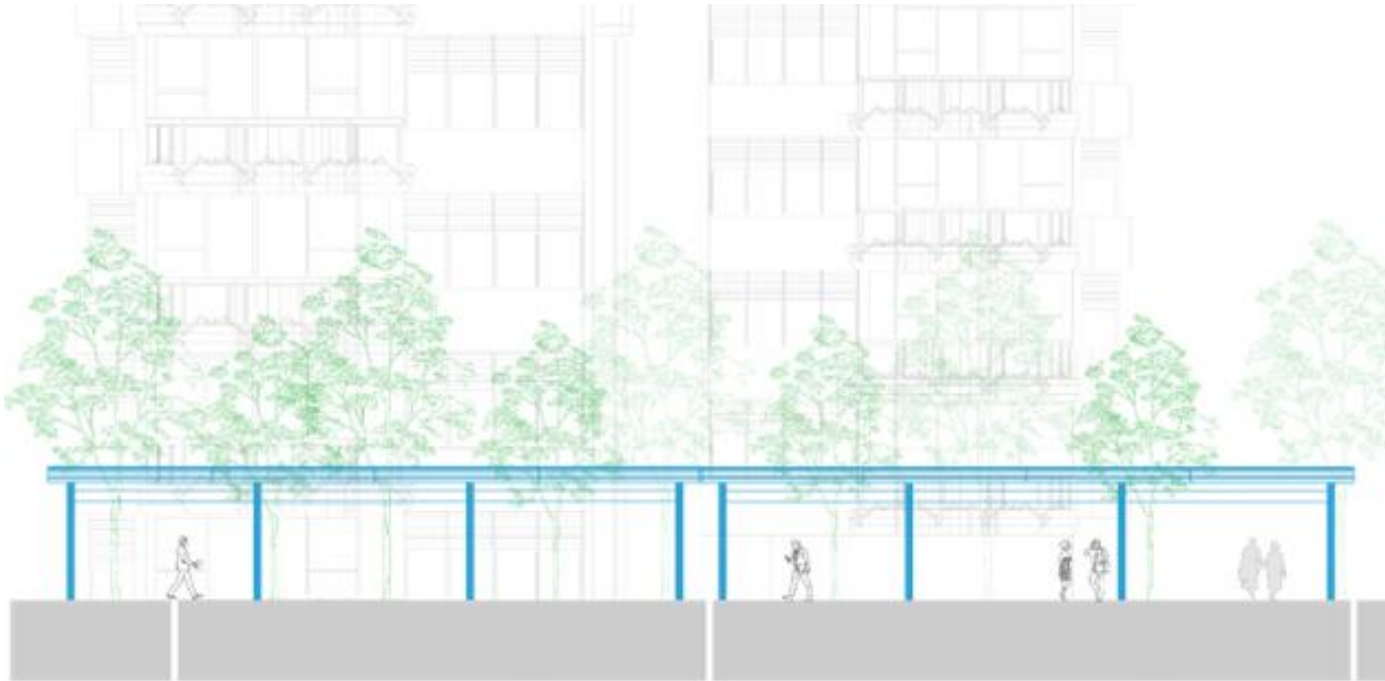
China-Singapore Guangzhou Knowledge City: Incentive policies for 3D greening and covered linkages

- Example1: 3D Greening is included in the green area ratio.



China-Singapore Guangzhou Knowledge City: Incentive policies for 3D greening and covered linkages

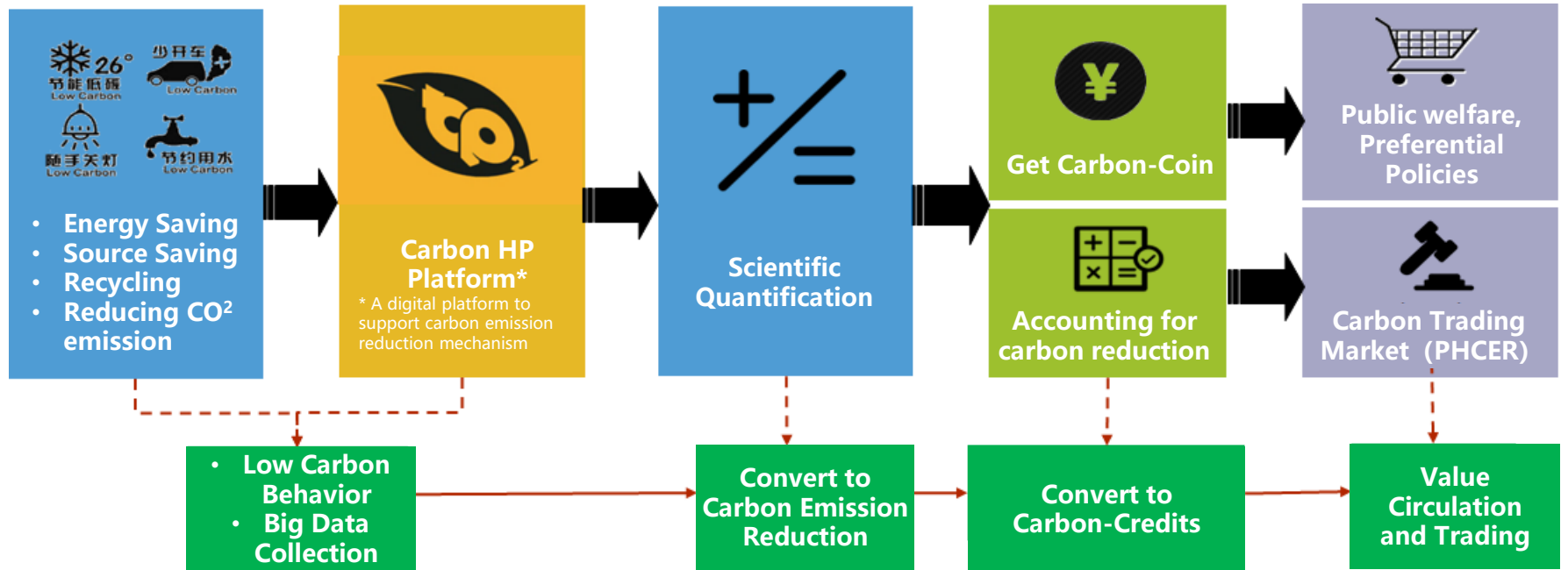
- **Example 2: Covered linkages are excluded from building intensity.**



Carbon Financing

Carbon HP: explore financial support mechanisms to promote urban energy saving, carbon reduction, and green development

- Promote Carbon HP as financial tools to encourage low-carbon and cooling behaviors of the public, such as energy and resource saving, low-carbon transportation, etc.



Green financing tools in China-Singapore Knowledge City Construction: support the construction of Green Buildings

- **Carbon-neutral green mid-term note:** In April 2021, China-Singapore Knowledge City Group successfully issued the first carbon-neutral green mid-term note for local state-owned enterprises in the Guangdong–Hong Kong–Macao Greater Bay Area. The carbon-neutral green bond is a subcategory of green bonds.
- **Support low-carbon and cooling technologies:** All funds will be used for constructing the Guangzhou Knowledge City Plaza (3-star standard green building with sky gardens, landscape atriums, and other ventilation and cooling technologies).
- **Benefits:**



Voluntary carbon market: Public welfare forest in Huadu District, Guangzhou

- **Introduce Carbon Credit trade in forestry restoration and manifest ecological value:**
- Government provides data and institutional support, formulate Carbon trade methodology and trading rules;
- Protection comes first: improve the capacity of ecological products and strictly protect and manage forest resources;
- Third-party accounting of carbon reduction and convert into carbon-credits and trading into carbon trading market.



Lessons learned and recommendations

Institutional Support for Cooling Solutions in Planning and Implementation

- **Convert urban design needs into design guidelines included in the land transfer contract;**
- **A district chief designer** for professional consulting, a technical review, and quality check services throughout the implementation process;
- **Sustainable cooling measures in the urban design plan should be translated into visual language, provisions, and requirements that guide the construction;**
- **New buildings design should emphasize cooling design and meet the requirements of high green building levels;**
- **Regularly report of green buildings** : ensure proper maintenance and operation.

Lessons learned and recommendations

Financing Urban Cooling Investments

- **Promote nature-based and cooling measures** : low-cost options that generate significant long-term benefits for the residents.
- **Strategic partnership with the private sector is critical.** Deploying a combination of policy, regulatory tools, and incentive measures can steer private sector investment.
- **Quantifying and recognizing the full economic benefits of urban cooling** : establish a link to other financial instruments such as carbon trading, green bonds, and ecological compensation mechanisms.
- **Promoting “green lease” and “green label” with private sector stakeholders can help ensure sustainable maintenance upon building construction.**

Thank you!

