## 绿色基础设施投资框架:广州探索与实践 Green Infrastructure Investment Path Exploration of Lighthouse City of UNP: Guangzhou Case

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绿色基础设施网络:为城市带来生态、社会与经济多重效益 Green Infrastructure: A multi-functional network with multi-benefits.

## Eco Benefits & Climate Adaptation

Enhance ventilation

Adapt to rainstorm risks

2.4

Biodiversity

Mitigate air pollution

## **Social Benefits**

- Improve physical health
- Mental health
- Educational function

Cultural diversity

## **Economy Benefits**

Enhance land value

Create new jobs

Attract investment

Lower construction cost

广州通过绿色基础设施网络的实践,探索建立城市自然计划灯塔城市 Guangzhou builds a Lighthouse City of UNP through the practice of green infrastructure networks

Ecological Ring Part of the beautiful China Action 3 categories 10 ecological strategies

**Enjoyable Ring** 

Create 160km "Challenger" belt road, 6 themed emerald trails, 24-hour dynamic experience

Valuable Ring Innovative 9 types of green consumption scenarios



#### 在旧城改造、新城建设、生态空间等不同类型区域项目中探索绿色基础设施实践 Exploration of GI Practices in Different Types of Regions



#### Natural Areas 生态空间

Eco-Restoration and utilization projects Government with Market Participation Eco-Protection and Restoration Targets: Enhancing Ecological Functions and Values



### New Town 新城建设

New town development projects Government-led, market implementation Towards planning and management Targets: Sustainable Cooling & Low Carbon



## Old Town 旧城改造

Urban renewal projects Market-driven Towards implementation Targets: Sustainable Cooling

## 生态空间:三山连通系统构建生态网络节点 Nature Areas: El Nodes, Connectivity Plan for Three Mountains

#### 基于丰富自然资源,构建珠江口-大湾区生态踏脚石系统

Based on the abundant natural resources ,build the Pearl River Estuary - Ecological Stepping Stone of the Bay Area.

**Location:** The project is located in the southwestern part of Panyu District, Guangzhou-City, including three mountain areas, as well as the surrounding urban and rural areas.





## 绿色基础设施:通过绿色基础设施系统性连接修复生态断点 GI: Linking Ecological Disconnections by Infrastructure

By corridor bridges, break through the ecological disconnections in the Dafushan-Manggang-Dishuiyan area, and enhance the biodiversity of the entire ecosystem in the region.





#### 海绵系统、小微湿地与新型游憩模式协同提升节点区域生态价值 Integrating Sponge Systems, Small Wetlands, and New Recreational Formats to Enhance the Ecological Value of Node Areas





Typologies: Wetlands with dike



Typologies: Wetlands with lake

#### 山体生态修复与周边社区协同发展模式 Mountain Eco-Restoration Integrated with the Development of Surrounding Neighborhoods

- Breaking the dilemma of separation of mountains and neighborhoods
- Plan 6 themes of neighborhoods integrated with the forest parks and mountains, with multi-functions and benefits the citizens in ecological way.

#	Name of Neighborhoods	Development Theme	Area (Ha)
1	Pingshan	Dafu forest parkland	106.72
2	Zhongcun	Smart-Tech	70.44
3	Tinggeng	Headquarters	194.65
4	Hengjiang	Tourism	78.5
5	Nanshuangyu	Water farmland	288.2
6	Shawan	History and fashion	71.55







Hengjiang Kaifong

**Tinggeng Kaifong** 

Zhongcun



Pingshan Kaifong



Nanshuangyu Kaifong



Shawan Kaifong

#### 基于山水湖田林草生态底色挖掘经营项目 Developing Operational Projects Based on the Diverse Ecological Foundation

- Providing services to nearly 6 Million visits per year
- Multi-dimensional mountain sports experience & events
  with a projected annual revenue exceeding RMB 1 million
- Multi-functional aquatic sports training & entertainment experiences with a projected annual revenue surpassing RMB 10 million
- Nature-based education ecosystem with a projected annual revenue over RMB 10 million

















## **生态区域的绿色基础设施(GI)融资机制** Financing: Green Infrastructure (GI) in Natural Areas

基于自然的解决方案	生态保护与区域发展的平衡	绿色发展与金融投资
Nature-based Solution	Regional Balance	Green Development
From Urban Environmental Engineering Management to Nature-Based Solutions	Explore the packaging of GI projects from the perspective of eco-integrity.	Leveraging Investment and Green Transformation
<b>Five Major Dimensions :</b>	<b>Project Features:</b>	<b>Financing Balance:</b>
Green and Low-Carbon,	By implementing GI, enhancing	The government guides market
Beautiful Environment,	the quality of the ecological	entities in securing financing and
Ecologically Livable, Safe and	environment and green	loans to ensure financial balance
Healthy, and Smart and Efficient	development	and sustainable operations.

## 旧城:更小尺度的日改善微气候

Old Town : Micro-scale El enhances microclimate

## 高密度旧城区通风与建成环境的关系紧密

Ventilation and heat resilience show significant correlations with building environment



## Use traditional and local passive cooling measures



筑单体

重点运用及保留

配性不强

## **Choose Modern low-cost techniques**

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#### 探讨现代技术手段在广州旧城的试用性

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## 旧城改造中的城市降温手段 Urban Cooling in Urban Renewal

#### 综合考虑产权归属、微气候特征与建筑肌理后,为历史街区降温选定的15个实施场地及对应的9类技术措施

Considering property ownership, microclimate conditions, and building characteristics, select 15 cooling sites, covering 9 measures.



# 旧城打造清凉会巷 Install Water Mist System to create cool alley

# 改造广场提供纳凉空间 Transformed Plaza to create Cooling Comfort area

旧城改造项目(永庆坊):引入建设-经营-转让(BOT)模式支持城市降温措施的实施 Old Town- Yongqing Fang: Introduce Build-Opearate-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.



### 城市更新项目中降温措施的财务可行性:低成本方案与显著长期效益 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.
- Combinations of urban passive cooling solutions (primarily solar reflective and permeable surface solutions) can generate between US\$1.50 and US\$15.20 in net benefits for each US\$1.00 invested, in a study covering 1,692 cities worldwide (Estrada, Botzen, and Tol 2017)

Category	Measures	Size	Cost	
	Fixed rooftop greening	≈220m2	Increased cost	
Greening	Ground-grown vertical greening along walls	≈240m2		
	Movable rooftop greening	Total length ≈50m		
	Rooftop reflective coating	≈790m2		
	Double-layered tile roofs	≈350m2		
Architecture	Install shading structures on the curtain walls of the east, west, and south sides as well as on the rooftop skylight.	≈320m2	Increased cost ≈35,000 dollars	
	Install flexible windows and doors such as Tanglong doors and lattice windows.	≈20		



*Source:* Guangzhou Vanke Co., Ltd.



## 在中新知识城开展绿色低碳新区降温示范项目 Sustainable cooling in the process of a new town 基于流体力学和热平衡模型,进行知识绿谷规划方案降温效果评估与改进。



### 新城开发:中低碳发展与城市降温协同下的基础设施网络 New Town-Knowledge City: Urban Cooling and low carbon development in New Town

- Integrate sustainable cooling and low carbon concept from the planning stage.
- Transmit the measures to the construction and management phase.



## 鼓励可持续城市降温相关措施

## 推广垂直绿化、屋顶绿化及配套绿色建筑技术

Encourage measures related to sustainable urban cooling.

Encourage vertical greening, roof greening and related green building technology.





## 容积率奖励机制:对建筑内公共开放空间的激励政策 Finaning: 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



## 碳金融机制:探索推动城市节能降碳与绿色发展的金融支持路径 Carbon Financing: explore financial support mechanisms to promote urban energy saving, carbon reduction, and green development

#### 推广"碳普惠"金融工具,引导公众践行节能降碳与低碳出行等行为

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



## 绿色金融工具应用:支持绿色建筑建设的创新实践 Green financing tools: 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. ( 3-year coupon rate is 3.75% per year, which is low than average coupon rate of other notes-4% )
- **Support low-carbon and colling 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. Site area: 19.71Ha. GFA:707,525m<sup>2</sup>. Highest building: 245.2m , 53F. )
- Benefits:



## Thank You

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