The Planning of Sino-Singapore Tianjin Eco-city

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URA – Singapore’s National Planning Authority

Mission: “To make Singapore a great city to Live, Work and Play in”
**Planning Framework**

1. **CONCEPT PLAN**
   - Guides long term physical development of Singapore

2. **MASTER PLAN**
   - Translates Concept Plan to detailed local level

3. **LAND SALES & DEVELOPMENT COORDINATION**
   - Implementation through Land Sales & Development Coordination

4. **DEVELOPMENT CONTROL**
   - Realising our Planning Intentions
Regular review of strategic plans
Master Plan – Guiding Development

Reviewed once every 5 years
Urban Leadership Programme

Visits

Integrated Land Use Planning Course

Seminars

Customised Courses on urban planning, Urban Design etc
Overseas Projects

Suzhou Industrial Park

Tianjin Eco-city

- Nantong Eco-Technological Park – Master plan
- Guangdong Knowledge City – Conceptual plan
- Mumbai Master Plan – Selection of consultant
- Dugapur Aerotropolis – Advisory service to the developer
- Royal Bafukeng (South Africa) – Devt Control System
Sino-Singapore Tianjin Eco-city
SM Goh proposed to Premier Wen in Apr 2007 for Singapore and China to jointly an Eco-city. Premier Wen readily agreed to the proposal.

PM Lee met Vice-Premier Wu Yi in Jul 2007. She put forward two principles for site Selection
i) Eco-city to be built on non-arable land and in area lacking in resources, esp water.
ii) To be near major city to tap on existing Infra & services to save on construction cost

Site Selection between Aug – Nov 2007
4 Sites in Tianjin, Tangshan, Baotou & Urumuqi evaluated and Tianjin is the winner.

Framework signed between the two leaders. Another supplementary agreement signed between Min (ND) and Min(MOC)
Asia today already has some of the highest density cities in the world. The struggle faced is in creating a quality living environment that enhances the lives of all the residents, and takes into account environmental considerations in the context of rapid economic growth. To address this, we need to find a new sustainable development model, one that is realistic, immediate, replicable and scaleable that can be adopted by Asian cities.
Our Vision

A thriving city which is socially harmonious, environmentally-friendly & resource-efficient – a model for sustainable development.

社会和谐，环境友好，资源节约，经济蓬勃 – 可持续发展的楷模
Our Objective: 3 Harmonies (三和)

- Attractive, high-quality living
- Socially harmonious, tolerant communities
- Strong sense of ownership & belonging
- Healthy eco-environment
- Better resource efficiency, minimize waste generation
- Vibrant local economy with opportunities for enterprise & innovation
Our Objective: 3 Key Abilities (三能)

- Replicable
  能复制
- Practical
  能实行
- Scaleable
  能推广
Main Planning Strategies
Key Planning Strategies – Comparison in Population & Area

- **TJ Eco-city**: 3,000 ha, 350,000 people, 117 people/ha
- **Masdar**: 700 ha, 40,000 people, 57 people/ha
- **Hammarby**: 200 ha, 25,000 people, 125 people/ha
- **Malmo**: 160 ha, 10,000 people, 63 people/ha
- **Freiburg**: 38 ha, 5,000 people, 132 people/ha
Key Planning Strategies – Comparison in Density & Area

Density Comparison with Other Eco-City

280, 40
2500, 350
0
50
100
150
200
250
300
350
400
0 500 1000 1500 2000 2500 3000
Buildable Area (ha)
Population ('000)

- TJ Eco-city
- Masdar

- 400 pple/ha
- 200 pple/ha
- 140 pple/ha
- 100 pple/ha
- 50 pple/ha
- 280, 40
- 2500, 350
### Key Planning Strategies – Gross Density & Area

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Key Planning Strategies – Human-centric: Provision of Facilities

- **Transportation**
  - LRT Station
  - Tram Stop
  - Transit Stop
  - Neighbourhood Parks
  - Sports & Recreation Facilities

- **Education & Institutional**
  - Community Parks
  - KG
  - PS

- **Parks & Greeneries**
  - NCs
  - Commercial Centres

- **Commercial & Amenities**
  - NCs
  - $
Key Strategies

Live

• Variety of housing
• Ample provision of amenities and facilities nearby
• Focal points, communal and open spaces - sense of community & promote interaction
• Minimized segregation between public and private housing for harmonious living.
• Vehicular free access network

Work

• Range of employment options for different segments of society.
• Live near work - minimizing traveling.
• Priority for environmental-related businesses & industries

Play

• Wide range of leisure, recreational, entertainment & cultural activities.
• Different types of well-connected open spaces & water bodies.
• Conservation of local culture and memories
Key Performance Indicators (KPIs)

- KPIs to guide planning and development of Eco-city
  - Derived from Singapore and Chinese standards
  - Take into account local conditions & constraints

- 26 KPIs under 3 broad categories
  - Economic
  - Social
  - Ecological
A vibrant economic hub providing good jobs and opportunities for enterprise and innovation

- Generate jobs for at least 50% of the population
- At least 50 scientists and engineers per 10,000 labour force by 2020
Social Development

A cohesive community and strong sense of shared ownership

- At least 20% subsidized public housing
- All public infrastructure will be barrier-free
- Free recreational and sports facilities within easy access of homes
Water Management

- Potable water from taps
- 50% of water supply from non-traditional sources
- Environmental rehabilitation of the waterbodies
All buildings must meet green building standards
At least 20% of energy usage from renewable sources
Green Transportation

- Clean public transport options e.g. Light Rail Transit
- Promote non-motorized transportation
- At least 90% traveling to be green trips
Site Analysis
The Tianjin Binhai New Area (TBNA) is identified as the 3rd important development area in China after the Pearl River delta & Yangtze River delta.

TBNA Structure:
“一轴、一带、三城区”
8 Functional Zones

Site located in Coastal Leisure & Tourism Zone
Relationship with Surrounding Plans
Regional Transportation - Roads

京津塘高速公路一线
Beijing-Tianjin-Tanggu Highway No.1

京津塘高速公路二线
Beijing-Tianjin-Tanggu Highway No.2

津汉快速路
Tianjin-Hangu Expressway

中央大道
Central Boulevard
(2010)

天津机场
Tianjin Airport

塘沽
Tanggu

滨海大道
Coastal Highway
(2008)

泰达
TEDA
(2010)

滨海核心区
Binhai Core

Eco-city Site

曹妃甸
CAOFEIDIAN

北京
BEIJING

天津
Tianjin City

天津
Tianjin

滨海
Binhai

滨海
Binhai

京津
Beijing-Tianjin

塘沽
Tanggu
Regional Transportation - Rail

- **Regional Transportation - Rail**
- **Beijing-Tianjin-Tangshan Inter-city Rail**
  - **Tianjin City**
  - **Tianjin Airport**
  - **Tanggu (2008)**
  - **TEDA**
  - **Binhai Core**
  - **Tianjin-Qinhuangdao High Speed Rail**
    - **(2010)**

**Key Points**:
- **京津塘城际铁路**
- **津秦高速铁路**
- **Tanggu**
- **Binhai Core**
- **TEDA**
- **Beijing**
- **Tangshan**
- **Qinghuangdao**
- **轻轨** (Light Rail)
- **津秦高速铁路** (Tianjin-Qinhuangdao High Speed Rail)
**Site Area:** Approx 30 km²

**Key Characteristics**

- **Mainly Salt Pans**
  - Non-arable land
  - No loss of agricultural land to development
- **Extensive waterbodies**
  - > 1,000 yr old river course
  - Wastewater storage pond
Existing Land Conditions

Salt pans

Saline-alkaline non-arable land

Water shortage parched land
Existing Land Conditions

Wastewater Storage Pond

Saline-alkaline non-arable land
Regional Ecological Network

- Site continues from the Dahuangbao, Qilihai wetland district.
- Located at important junction of regional ecological corridor and coastal ecological landscape belt.
- Only entrance into Bohai Bay from the Tianjin Ji Province Nature Reserve and central wetland area.
- Planning strategy - to reserve more wetland areas at the river mouth and minimize the human footprint.
Native Species
The Master Plan & Key Features
Broad Planning Parameters

Target Population: 350,000 | Total Site Area: Approx. 34.2 sq km (3420 ha)
Total jobs provided by the major city centres:

- Main City Centre: 60,000
- Sub-centre: 22,000
- Main Neighbourhood Centres: 19,000
- Business Parks provide 63,000 jobs
- City cultural and museums facilities could provide a total of 30,000 jobs
- Other facilities will provide a total 15,000 jobs.

Total jobs created is approximately 210,000.
Spatial Structure

“一轴三心四片，
一岛三水六廊“”

“One Spine, Three Centres, Four Districts;
One Island, Three Waterbodies, Six Corridors.”
Facilities will be local & centralised

Compact, Mixed-use

Districts planned with amenities & jobs closer to homes

- Facilities will be local & centralised

- Each served by an urban centre:
  - 2 Sub-Centres
  - 1 Main Centre

- Other key facilities:
  - Business Parks
  - University
Eco-concept: Eco-cells & Eco-communities

Basic Module: Eco-cell

- Cell
  - Basic community
  - Residential Community

- Neighbourhood
  - Integrated site planning

- District

- Human-centric 400m by 400m basic module, based on comfortable walking distance
- Maximise accessibility & efficiency; scaleable
- Amenities within walking distance
- Communities and Hierarchical Allocation of Services and Facilities
Eco-concept: Eco-cells & Eco-communities

Representation of Eco-city
Eco-concept: Eco-cells & Eco-communities

Amenities include:
- Kindergartens / childcare centres
- Neighbourhood Centres
- Primary Schools
- Secondary Schools
- Public Greens
- Medical Facilities
Public Housing

• > 20% homes are Public Housing

• Housing needs of lower and middle-income families.

• Well-integrated with private housing developments for good social mix and achieve social harmony.
Ecological Green Spine

- Incorporates Water-sensitive Urban Design elements, i.e. eco-swales, dry streams

Main corridor for Public Transport & Non-motorised movement

- Connects major transit nodes, residential areas, parks, community facilities, commercial centres

Main social and public space in city

- Key public space and focal point for recreation and interaction
Eco-concept: Green Transport & Walkability

Objectives

• Create a green city transport model of low energy consumption, low pollution, low land take and high efficiency
• Priority for Pedestrians, Cyclists & Public Transport
  - Promote Green Trips (90% in long term)
  - 100% Barrier-free Accessibility
• Separation of non-motorised & motorised transport networks
Public Transport

Serves majority of population providing extensive coverage

Main Spine
- Rail system along Eco-valley;
- Connects to external region
- Service radius of 500m

Secondary System
- Public transport loops; buses or trams
- Service radius of 200m
Transportation Network

Non-motorised Network

Motorised & Non-Motorised Network
Green & Blue Network

Integrated blue & green in a three-tiered system

- Regional-level: Yongding New River - Ji Canal Green Corridor
- City-level: eco core & green wedges
- District-level: green network and green centres

Key Related KPIs

- Green & waterbodies cover > 40% of site
- Public Green Space provision: \( \geq 12 \text{ sqm per person} \)
Landscape Design Integrated with Engineering Treatment

- Treatment of alkaline soil - methods such as reclamation, excavation and removal of alkali, ecological improvements etc.
- Micro-scale landforms could be sculpted to create rich green landscape and provide leisure activity areas, as well as buffer traffic noise.
Cultural Features

Adaptive Reuse of Villages

- Wu-Qi Village
- Qing Tuo Zi Village
Hangu PetroChem Industrial Area

Waste Water Pond

Eco-city

Industries Wastewater

Mixed Wastewater

Domestic Wastewater

Waste Water Treatment Plant

Waste Water Recycling Plant

Replenish Landscape Waterbodies

Rivers Recycling System

Sludge

Manmade Wetlands & Aquatic Plant Purification

Remove N, P

Organic Solid Waste Anaerobic Digestion

Reuse of Recycled Water

Clean Energy

Hydrogen

Methane

Desalinated water

Rainwater

Resource Recycling Model

Replenish Landscape Waterbodies

Resource Recycling Model

Replenish Landscape Waterbodies
Water Resource Utilization

Objectives

- Improve city water supply system
- Water supply from multiple sources
- Increase water supply treatment facilities
- Good quality drinking water meeting prescribed standards
- Raise management standards
- Establish guaranteed water supply system

- Restoration and rebuilt of water ecology
- Water quality of waterbodies within the district to reach Type IV water standard
- Beautiful and natural waterfront space
- Promote a close relationship between man and water
- To integrate water system planning and recycling of water resource

- Reduce reliance on external water resource
- Conserve water without compromising on resident’s comfort level
- Water supply by quality; stepped water recycling
- Increase reuse rate of recycled water
- Reasonable use of sea water resource

Wastewater Treatment
Seawater Desalination
Potable Water from Tap
Rainwater Collection
Recycling, Rainwater Collection, Rehabilitation of Waterbodies

Water Strategies

Rainwater Collection from Building Facade

Permeable Ground

Rooftop Greenery for rainwater Collection

Surface Water Collection
Rehabilitation of Yingcheng Wastewater Storage Pond

Rehabilitation of waterbodies – to achieve Grade IV water standard.

Wastewater Treatment Plant

- **Capacity:** Wastewater 150,000 ton/day, reclaimed water 150,000 ton/day
- **Investment:** RMB 267 Million
- **Commencement:** Phase one in 2008
- **Completion:** Phase one by 2010
- **Technique:** Activated Sludge Process
- **Water Quality:** Effluent quality to reach national standard of Grade I A
Renewable Energy

- New energy sources appropriate to site context
- Develop renewable energies such as geo-thermal, solar, wind and biomass energy
- Promote alternative energy technologies and tiered energy utilization
- Raise energy efficiency

100% from clean energy source

20% from renewable energy

30% from residual heat and renewable energy
Green Buildings

All buildings to meet Green Building standards

Possible Integrated energy installations for green buildings

- Small scale wind turbine: make use of wind to produce power for the building
- Solar heater system: make use of solar energy to provide hot water for living needs
- Solar photovoltaic system: make use of solar energy to produce power for the building
- Biomass combined heat and power generation: make use of biomass to provide heating and electricity for the building
- Natural ventilation hot wind hood: make use of ventilation and waste heat in the building
Solid Waste Treatment

积极推行健康的生活方式和消费方式，生活垃圾分类收集、密闭运输，实现无害化处理、资源化利用，垃圾无害化处理率达到100%，回收利用率达到60%。

The Eco-city advocates a green and healthy lifestyle and consumer pattern. It will promote segregated rubbish collection and pneumatic conveyance of domestic refuse to ensure a hazard-free and recyclable treatment. 100% of hazardous waste will be treated, and recycling of domestic refuse will be at least 60%.
Development Phasing

**First Phase—**
5 km² Start-up area

**From South to North—**
Gradually implement urban districts with comprehensive functions
Urban Design of Start-up Area
生态城市主义  Eco-urbanism

“城市肌理自然化” Urban Topography

- 等级分明的城市结构 Hierarchical framework
- 综合整体景观化方法 Total landscaping approach
- 多层次绿化联系系统 Multi-layered green connections
- 慢行快行系统分离 Segregation of fast & slow movement
- 慢行系统优先布置 Integration of slow movement with public facilities and activity spaces
- 设施和活动场所
Concept of Urban Topography

城市 = 景观

CITY as LANDSCAPE
自然化城市肌理

URBAN TOPOGRAPHY

- 生态岭 Eco-hills
- 生态林 Eco-forest
- 生态原 Eco-plain
- 生态谷 Eco-valley
- 生态廊 Eco-stream
- 生态脊 Eco-edge
- 生态细胞 Eco-cell
城市设计架构 Urban Design Framework

主要活动带 major activity spine
次要活动带 minor activity spine
通道 corridor
视觉通廊 visual corridor
城市界面 urban edge
城市节点 urban node
城市入口 gateway
城市地标 landmark
生态脊 eco-edge
生态林 eco-forest
生态峡谷 eco-valley
生态谷 eco-valley
生态岭 Eco-hills
生态溪 eco-stream
Segregation of Slow and Fast Movement System

- Fast movement
- Major slow movement
- Minor slow movement
- MRT
- MRT station

Legend:
- Fast movement
- Major slow movement
- Minor slow movement
- MRT
- MRT station

Urban Redevelopment Authority
GPR BANDINGS

GPR DISTRIBUTION

GPR Distr

- 2.0 – 4.0
- 1.6 – 2.0
- 1.2 – 1.6
- 0.6 – 1.0
BUILDING HEIGHT

- < 150m (45层)
- < 80m (25层)
- < 60m (18层)
- < 40m (12层)
- < 15m (4层)
人车分离 Segregation between Pedestrians and Cars

Landscaped Deck as private space, below for car parking

Example of segregation between pedestrian and vehicular traffic using landscaped deck design in Punggol New Town
Qing Tuo Zi Scenic Area

Start-up Area Urban Design Concept

起步区城市设计概念

Business Park

Sub-centre

University Walk

Eco Valley

Eco-cell

Qing Tuo Zi Scenic Area

Business Park
• TOD-based GPR & building height 容积率与建筑高度基于TOD模式
• Maximise views to river & coast afforded by stepping up towards eco-valley
  朝生态谷渐次叠升，最佳利用面向河道与海岸的景观
Human-scale streetscape

人性化比例街道
Opportunity for iconic buildings
- South facing plaza
- Direct & weather-protected connections to adjacent developments & public spaces
University Walk

• Intimate, human-scale commercial belt
• Direct connection btw Sub-centre & future University
• Pedestrian / bicycle network can be extended to Business Park
Qing Tuozi Village

- Preserve key elements - village and prawn pond - history heritage
- Open relief area, for recreation / boutique hotel uses
- Taller blocks around to take advantage of views

青坨子特色商业中心 QING TUO ZI VILLAGE CENTRE
Business Park

- Park-like setting with Focal point, central park; create sense of community, encourage interaction
- Connectivity to surrounding, at-grade porosity
- Large floor plates, inter-connected atriums
生态谷 ECO-VALLEY

Forest zone 林木区  Subcentre 次中心  Passive/ Family zone 静态/家庭区  Meditative Zone 静思区  Interpretive Zone 诠释区  Waterfront 滨水


• “谷状”开敞空间
  “Valley-like” open space
• 城市主轴
  Main corridor in the city
• 疏密有致, 宽窄变化的景观廊道
  Visual corridor with varying widths and density
• 防火隔离带、紧急疏散通道和安全避难场所
  Fire-safety divider, disaster evacuation route and safety refuge
Recent Photos of the Site

New Yongding River

Ji Canal

Start-up Area

New Barrage under construction
Recent Photos of the Site

Road Construction

Temporary worker housing
From salt lakes, wastewater ponds and barren land, to an Eco-city that is economically vibrant, socially harmonious, environmentally-friendly and resource efficient. This is the goal for the Sino-Singapore Tianjin Eco-city.
Thank You !