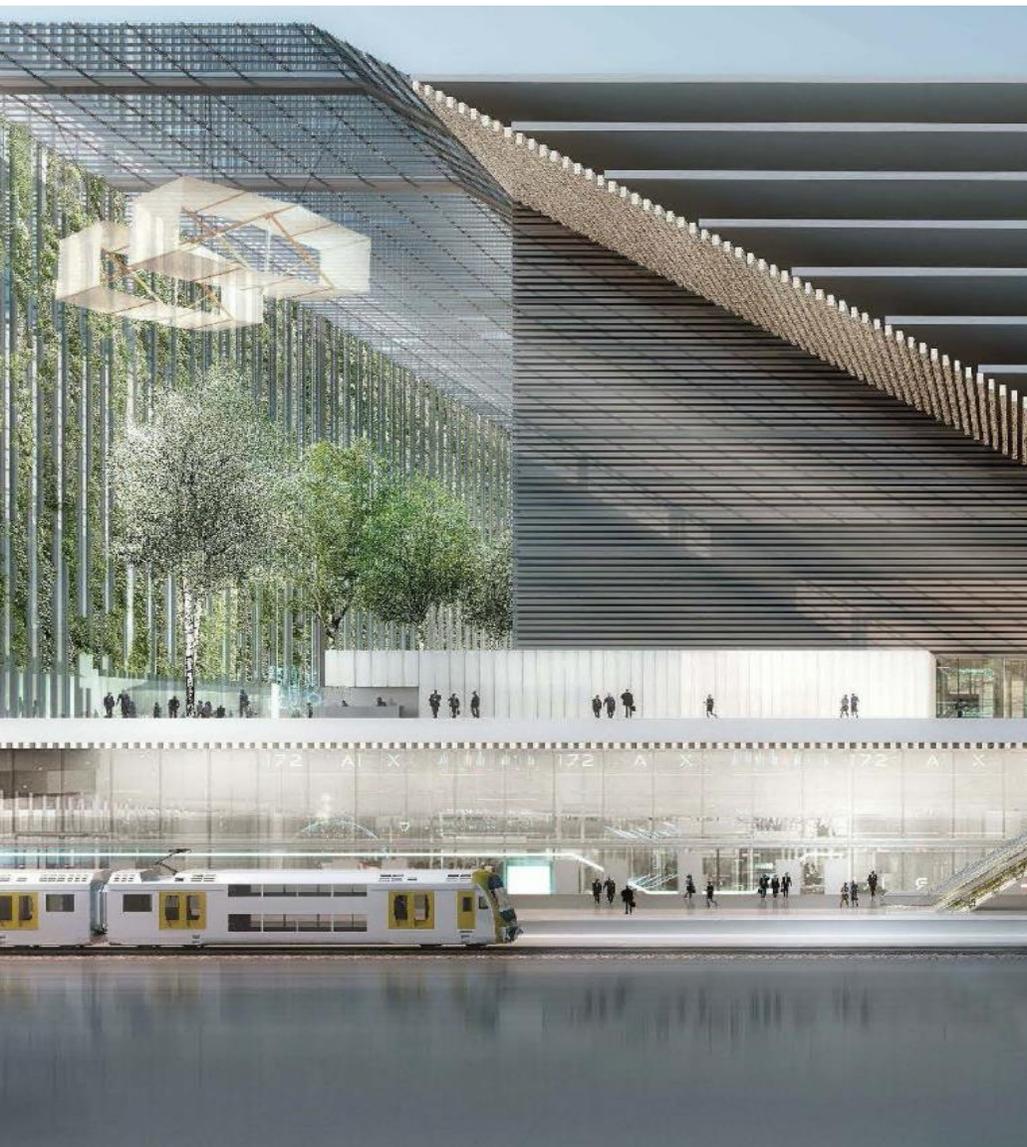




Centre for Science
and Environment



Innovative TOD Strategy on PPP & Financing Structure

International Conclave on
Clean & Low Carbon
Transport Strategies for Clean Air

Speaker: Girish Ramachandran

4th September 2018

27ADVISORY | Socio-Economic
Transformation

#RebuildingHumanity

An Overview of Current Indian Railway

Some major investments & development in recent years:

- A **US\$ 14.52 billion** high speed passenger corridor project between Ahmedabad to Mumbai was undertaken in Railway Budget 2016-17. Estimated to be operational by 2022.
- In May 2018, Parcel Cargo Express Train (PCET) commenced operations. The train connects the North-Eastern region with the coast as its initial and penultimate stops are New Guwahati in Assam and Kalyan in Maharashtra.
- In March 2018, Alstom completed production of the first all-electric locomotive at the manufacturing facility in Madhepura, Bihar
- In order to develop three new arms of Dedicated Freight Corridor (DFC) in the various regions of the country, Indian government is planning to invest Rs **3,30,000 crores (\$50.98 billion)**.



Key Facts:

- One of the world's largest rail networks.
- Route length of rail network = 67,368 km (as of 2016-17)
- Passenger carried (2016-17) = 8.1 billion / 22 mil per day

1,65,292.20 (in crore) during 2016-17
Gross Traffic Receipts of Indian Railways

1,59,029.61 (in crore) during 2016-17
Total Working Expenses of Indian Railways

6,262,59 (in crore) during 2016-17
Net Traffic Receipts of Indian Railways

Recent news on Indian Railways

THE ECONOMIC TIMES

Railways to spend Rs 9000 crore in 3 years on new wagons

By Rajat Arora, ET Bureau | Apr 16, 2018, 11.16 PM IST

“The Indian Railways will spend Rs 9,000 crore over the next three years to procure new wagons as it seeks to up its game in goods transportation.”



Indian budget trebles railway investment

02 Feb 2018

“A major increase in Indian Railways’ capital expenditure to Rs1 485bn in the 2018-19 financial year was announced by Finance Minister Arun Jaitley as part of the national budget unveiled on February 1. This is almost three times the Rs540m allocated for capital works in 2013-14.”

THE ECONOMIC TIMES

Railways to use Rs 73,000 crore on safety: Piyush Goyal

PTI | Feb 01, 2018, 08.25 PM IST

“The railways will spend over Rs 73,000 crore on safety out of the Rs 1.48 lakh crore capital expenditure earmarked for it in 2018-19 union budget”

Piyush Goyal, Railway Minister

Delhi ranked the top in terms of transport-related emission in megacities

DownToEarth

By DTE Staff

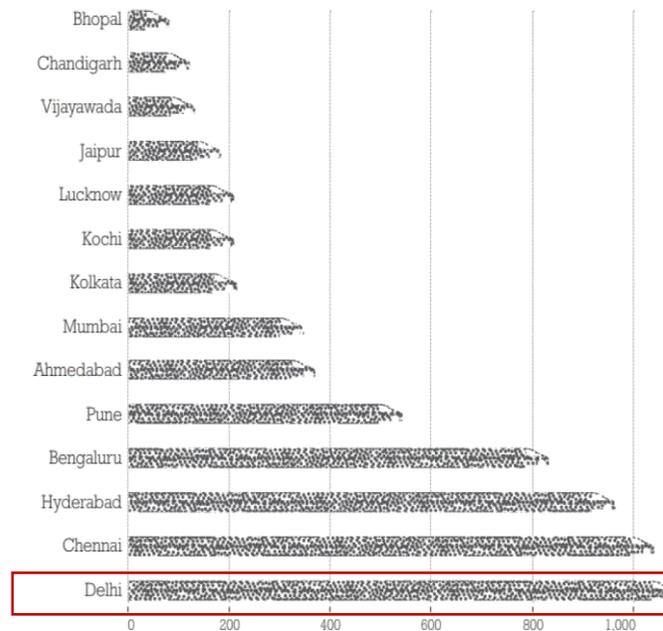
Last Updated: Friday 24 August 2018 | 06:30:08 AM

Transport-related emissions in megacities: Delhi on top, Bhopal emits the least

Urban commute in even smaller cities is becoming highly polluting and energy-intensive, finds CSE's latest analysis

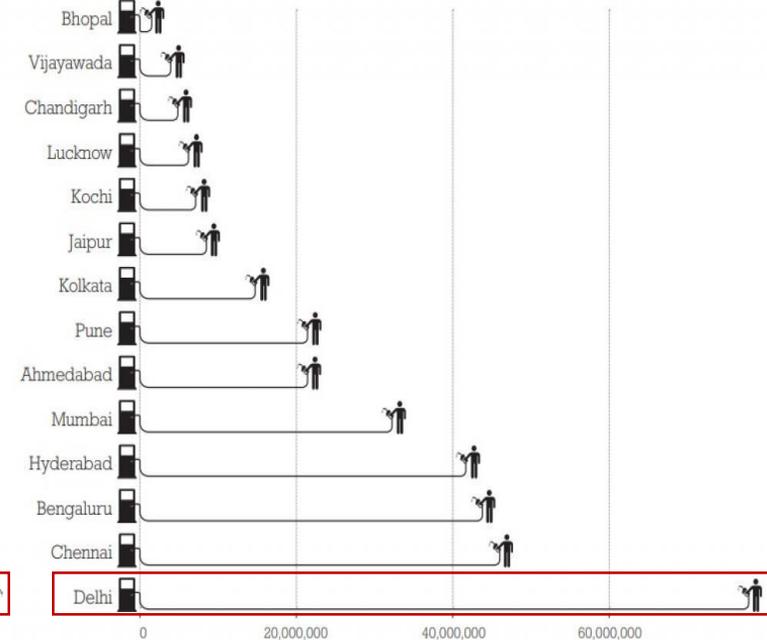
Based on a diagnostic analysis of key cities of India by the Centre of Science & Environment (CSE), **Delhi ranks the worst** in terms of **overall toxic emissions, heat-trapping emission and energy consumption**, due to highest vehicle stock and relatively higher population than other megacities.

Total particulate emission load from urban commuting in the 14 cities (kg per day)



Source: CSE analysis

Energy consumption for urban commuting in the 14 cities (in MJoules per day)



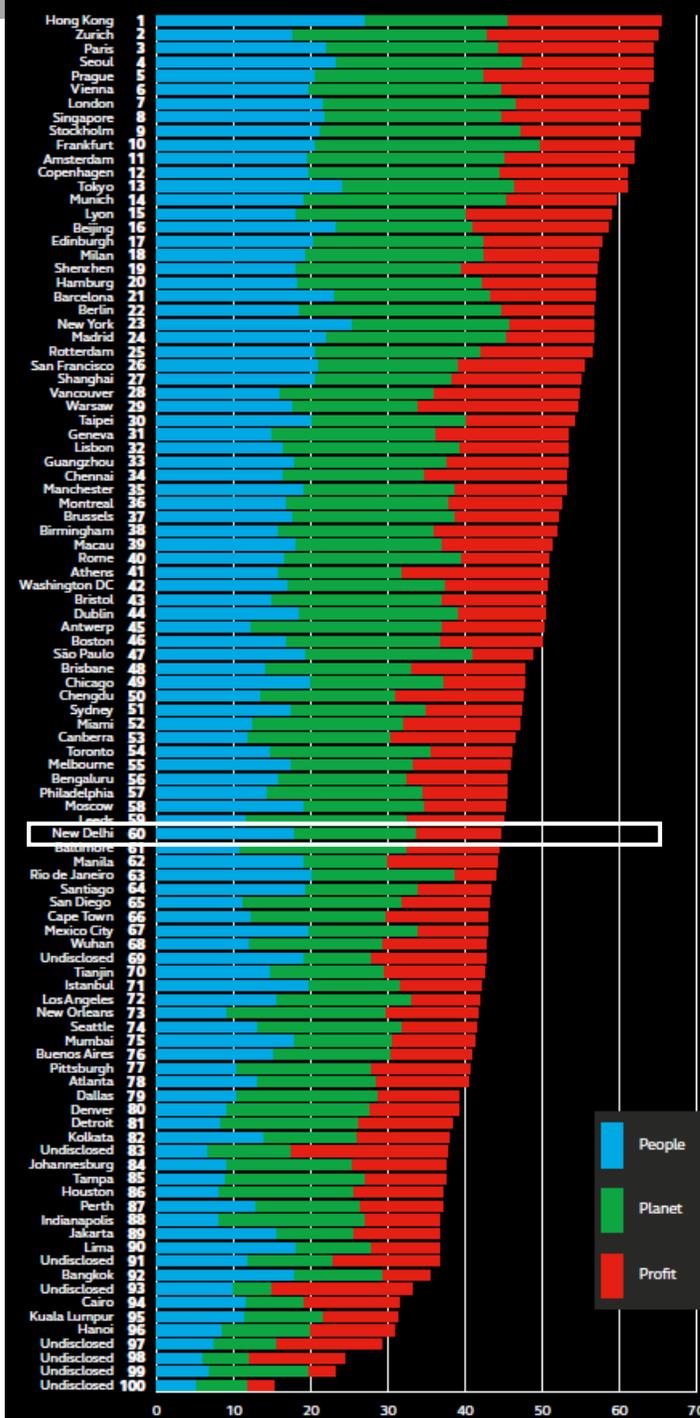
New Delhi ranked 60th worldwide in terms of Sustainable Cities Mobility



Mobility systems are key to the everyday functioning of a city. Arcadis' 2017 Sustainable Cities Mobility Index, compiled in partnership with research firm, Cebr, tracks the overall performance of the mobility systems in 100 cities around the world. The Index is built from 23 individual indicators, each reflecting a component of urban mobility, from infrastructure spending commitment to affordability of public transport. These indicators are grouped into **three sub-indices: People, Planet and Profit**. Combining these individual metrics and sub-indices into an overall Index score gives an indicative picture of the current state of a city's urban mobility environment.

Key Takeaways

- New Delhi **ranked 60th over the 100 cities evaluated.**
- By region, **European cities most consistently rank the highest**, occupying seven of the top ten spots.
- Asian cities also rank highly, taking three of the top ten spots. **Modern metro systems, large airports and low usage of private vehicles help boost the rankings of developed Asian cities** such as Hong Kong and Singapore.
- The data highlights that the **wealth, size or age of a city does not necessarily equal sustainable urban mobility.**
- **Mobility favors the bold.** Those cities that have pursued bold moves of innovation and planned for future growth see the greatest sustainability and quality of life benefits.



What is Transit-oriented Development (TOD)?

An aerial night view of a city with a transit line and TOD development. The image shows a dense urban area with numerous skyscrapers and buildings, illuminated at night. A prominent transit line, likely a subway or light rail, runs through the center of the city, with several stations and platforms visible. The surrounding area is filled with residential and commercial buildings, creating a vibrant, illuminated cityscape.

*Transit-oriented development (TOD) is a planning and design strategy that consists in promoting urban development that is compact, mixed-use, pedestrian- and bicycle-friendly, and closely integrated with mass transit by **clustering jobs, housing, services, and amenities around public transport stations.***

Based on the premise that economic growth, urban transport, and land use can be managed more efficiently if planned together, TOD has been successfully applied at a city scale in cities around the world including Stockholm, Copenhagen, Hong Kong SAR, Tokyo, and Singapore.

WorldBank

Driving factors for TOD



People are keen and looking forward to a TOD with the following reasons:-

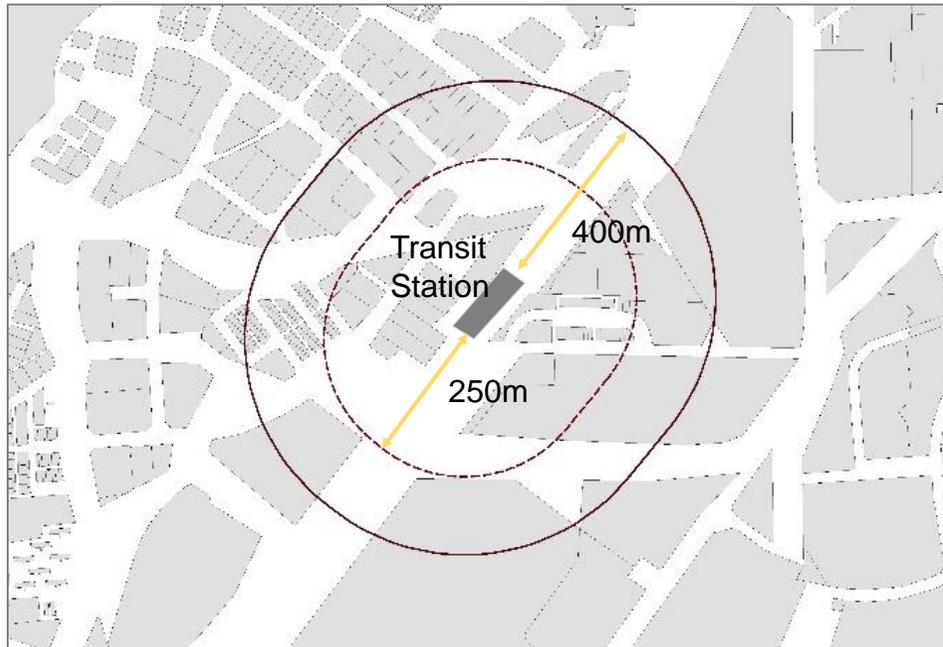
- ✓ Rapidly growing, mind-numbing **traffic congestion** nation-wide
- ✓ Growing **desire for quality urban lifestyle**
- ✓ Growing **desire for more walkable lifestyles** away from traffic
- ✓ Changes in **family structures**: more singles, empty-nesters, etc
- ✓ Growing national support for **Smart Growth**
- ✓ New focus of Federal policy

"Traffic congestion has increased so much in virtually every metropolitan area that two-hour commutes now are routine. Attempts to alleviate the problem by constructing more highways almost always have led to more sprawl and, eventually, more congestion."

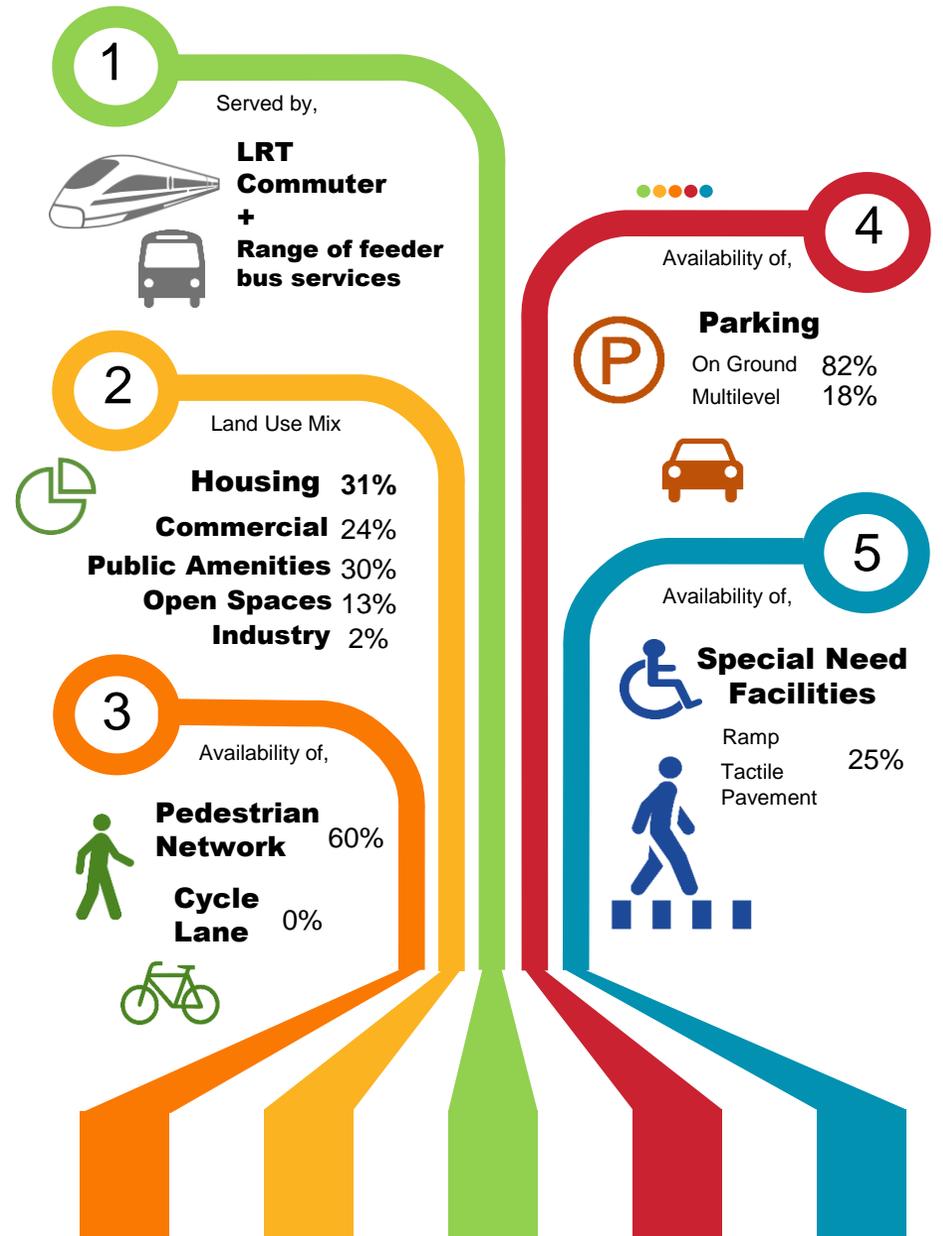
Jim Miara

Components of Transit Oriented Development

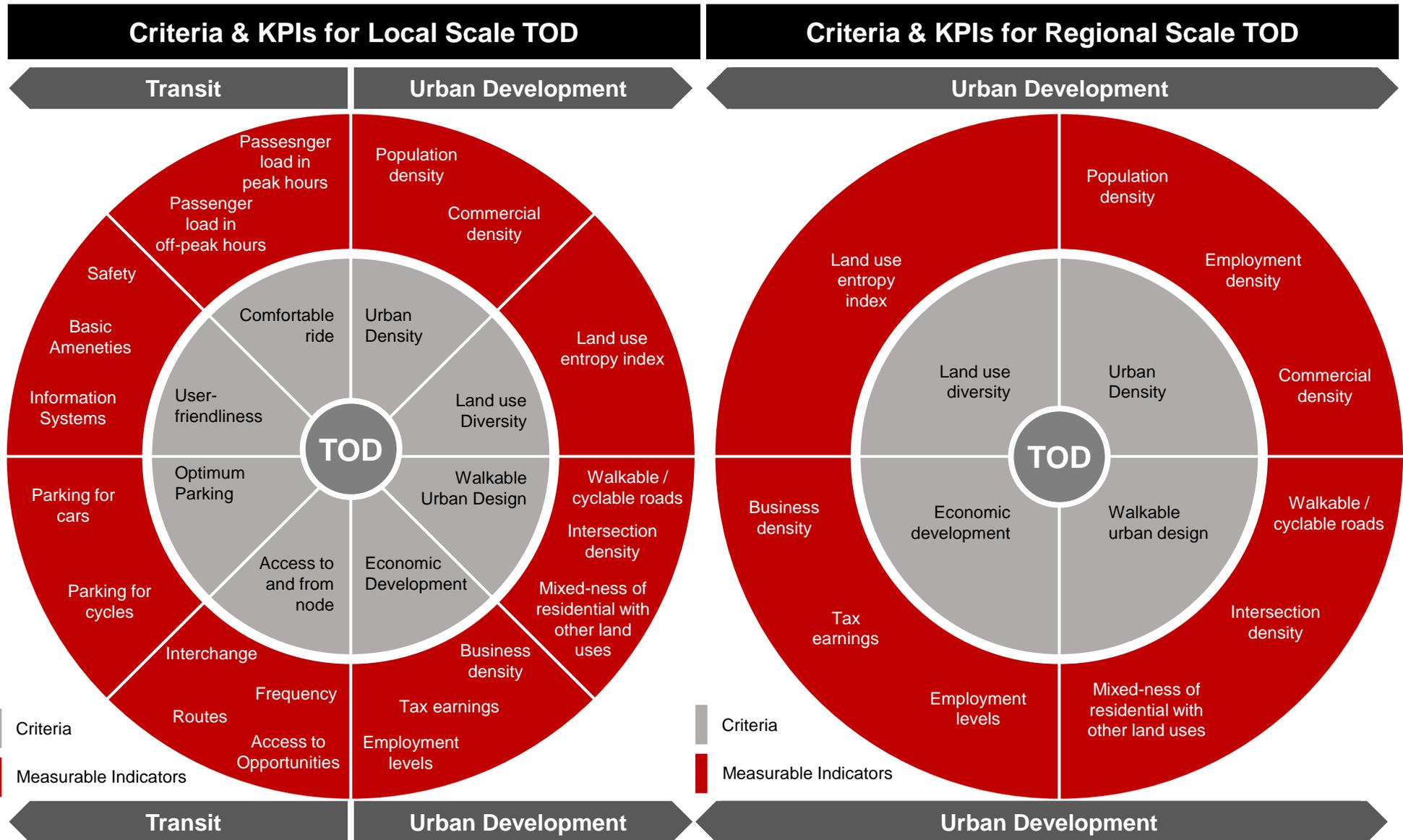
The rule of thumb is that TOD occurs within **400m radius**, or a 5 to 7 minute walk, of a transit station, while Transit Planning Zone (TPZ) occurs within **250m radius** of a transit station.



Facilities / Infrastructure within a TOD



Some key criteria in measuring the TOD at local scale & regional scale

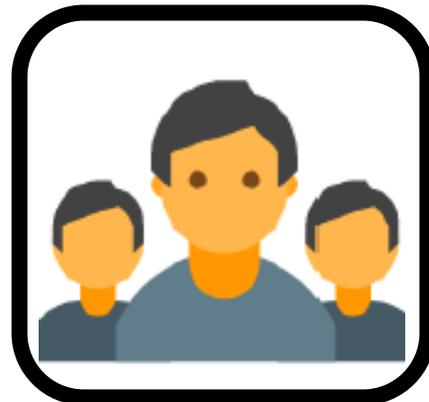


Benefits of TOD



Mobility Benefits

- Increase access to jobs and amenities city wide
- Improve access to a low cost transport solution (public transit/ walkable urban space/ bicycle infrastructure)
- Reduce automobile-dependency



Social Benefits

- Revitalize neighborhoods
- Promote social equity through creation of mixed-income housing near transit
- Increase accessibility for less mobile
- Improve health and increase physical activity through creation of walkable neighborhoods



Environmental Benefits

- Lower air pollution and GHG emissions by reducing automobile-dependency and urban sprawl
- Reduce energy consumption
- Conservation of green and natural spaces



Economic Benefits

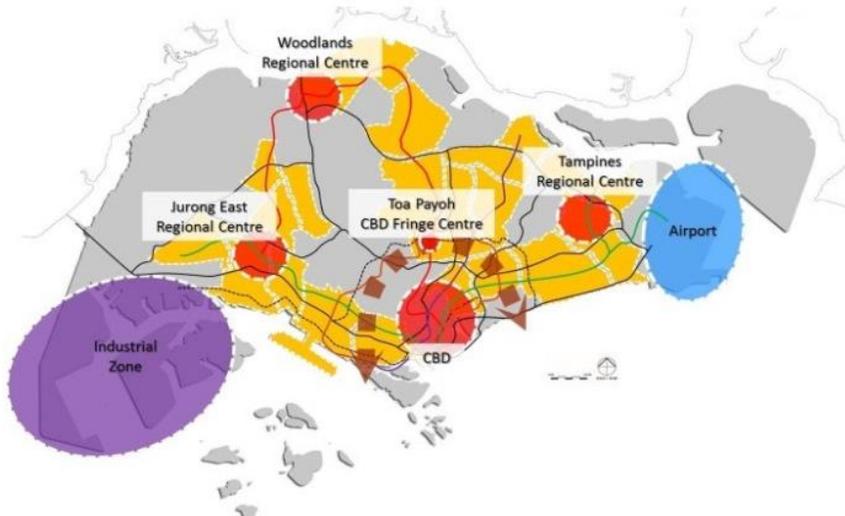
- Increase agglomeration and access to employees
- Encourage economic resilience through diversity
- Energize local economy
- Increase property values along corridors to help fund needed infrastructure
- Reduce infrastructure costs
- Reduce transport cost

A hand in a dark suit jacket holds a black magnifying glass. The lens is focused on the text 'case study' which is underlined with a red line. Below the underline is the text '# 1'.

case study

1

Case Study: TOD in Singapore



Land Size	710 km ²
Population	5.6 Mil
Density	7,887 people / km ²

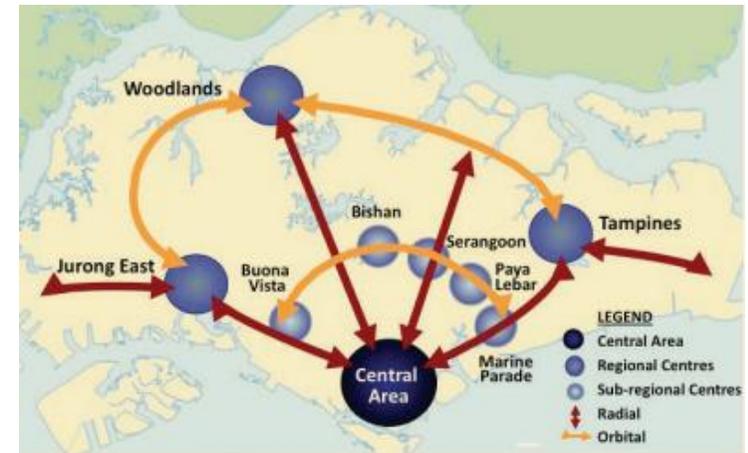


Singapore is a small island state that can be traversed through within one work day.

But in its development planning, which looks at future prospects in magnitudes of decades rather than years, space is a constraint requiring specific attention.

As part of a national economic development strategy, Singapore has embraced Scandinavian planning principles that call for radial corridors that interconnect the central core with master-planned new towns.

Its structure plan, called the **Constellation Plan**, looks like a constellation of satellite “planets,” or new towns, that surround the central core, interspersed by protective greenbelts and interlaced by high-capacity, high-performance rail transit.



Implementation of Singapore New Rail Financing Framework



Chronology of Key NRFF Events



New Rail Financing Framework (NRFF)

SMRT and the Land Transport Authority (LTA) have agreed on a new rail financing framework in 2016. Rail operating **assets** will **now be owned by LTA**, who will decide when to build up, replace and upgrade the operating assets to meet rail ridership and commuter expectations.

The intention behind this move is to **free the rail operators**, SMRT and SBS Transit, **of heavy capital expenditure**. The Government has been taking over all operating assets from SMRT from Oct 2016.

LTA will pay SMRT the net book value of its operating assets as at Sept 30, 2016. This amounts to \$991 million or \$1,060 million including GST. There are over 60,000 operating asset items. These include the trains, signalling system, maintenance equipment such as rail grinding vehicles, electrical and fire protection equipment, as well as equipment for power and building services.

LTA owns and makes decisions on building-up, replacement and upgrading while **SMRT remains responsible for maintenance**.

Key benefits to Commuters

More responsive to increased ridership



1

Enabling the Government to ensure timely procurement of additional trains and operating assets **to enhance reliability and keep pace with growing ridership demand**

Focus on providing reliable services



2

Relieving rail operators from heavy capital expenditure and large fare revenue risks so that they can focus on their core role of operating and maintaining the rail network

More competitive rail industry



3

Making the industry more contestable by shortening the licence period from 30 – 40 years under the previous financing framework to 15 years, with a possible 5-year extension

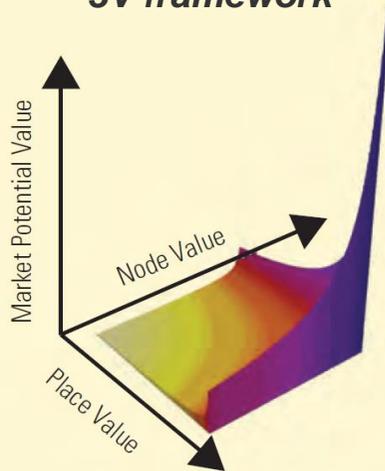
Comparison between Previous and New Rail Financing Framework

Key Elements	Previous Financing Framework	After Transition
License Period	30 to 40 years	15 years, and possibly a 5-year extension
Rail Infrastructure (Viaducts, tunnels, tracks, etc.)	LTA owns and make decisions on building-up, replacing and upgrading while Rail Operator maintain the rail infrastructure	
Operating Assets (Trains, signalling system, etc.)	Rail Operators own, maintain and make decisions on building-up, replacement and upgrading	LTA owns and make decisions on building-up, replacement and upgrading, while Rail Operator remains responsible for maintenance
Regulatory Regime	Outcome-based regulation	Outcome-based regulation coupled with process-based regulation for maintenance (e.g. Maintenance Performance Standards)
Revenue Risk	All fare and non-fare revenue risk borne by Rail Operators	LTA shares in revenue risk with Rail Operator
Regulatory Risk	All regulatory risk borne by Rail Operators	If there are any regulatory changes introduced by LTA after 1 October 2016 that results in changes to costs or revenues, LTA may provide grants to Rail Operator (if Rail Operator' costs increase or revenues decrease consequentially) or require Rail Operator to reimburse LTA (if Rail Operator' costs decrease or revenues increase)
License Charge	No License Charge	Rail Operator pays an annual License Charge into the Railway Sinking Fund, which will help pay for the building-up, replacement and upgrading of operating assets
Operators' Profit Margin	No cap on EBIT margin	In line with comparable asset-light rail operators in other jurisdictions. The License Charge which Rail Operators pay to the Railway Sinking Fund increases with higher profits
Fares	Regulated by Public Transport Council	

TOD in Singapore are adopting a framework similar to the “3V”

3V Framework

Singapore has been planned for decades along principles of integrated land use and transport planning similar to the **3V framework**



The 3V Framework is applicable to large cities with extensive networks and smaller cities with only a few mass transit lines or a bus rapid transit system. The model works for growing cities and declining ones. It seeks to determine the relative areas of potential within a city rather than across cities.

The 3 values are:

1. **Node Value** = the level of access offered by a mass transit station
2. **Place Value** = the attractiveness of the area in terms of diversity and accessibility of community spaces
3. **Market Potential Value** = the prospects of the community in the future.

Policy Levers to Increase Value

Node Value	Place Value	Market Potential Value
<ul style="list-style-type: none"> • Increase the number of hubs and the number of lines/modes they connect to. • Interlink neighboring stations into clusters. • Increase accessibility for all within the network. 	<ul style="list-style-type: none"> • Increase compactness (proximity to existing urban activity and short travel time to main destinations). • Increase the diversity of uses. • Increase the concentration of commercial, cultural, and educational amenities. • Design neighborhoods that promote walking and cycling. • Create a vibrant public realm. 	<ul style="list-style-type: none"> • Increase residential density. • Increase job density. • Increase human density. • Increase the diversity of land parcels to create a vibrant land market. • Increase floor area ratios.

A close-up photograph of a person's hand holding a black magnifying glass. The magnifying glass is held over the text 'case study' which is written in a white, handwritten-style font. Below the text 'case study' is a thick red horizontal line. Below the red line is the text '# 2' also in a white, handwritten-style font. The background is a dark, out-of-focus blue-grey color.

case study

2

Case Study: TOD in Hong Kong



Land Size	2,754 km ²
Population	7.347 Mil
Density	2,667 people / km ²



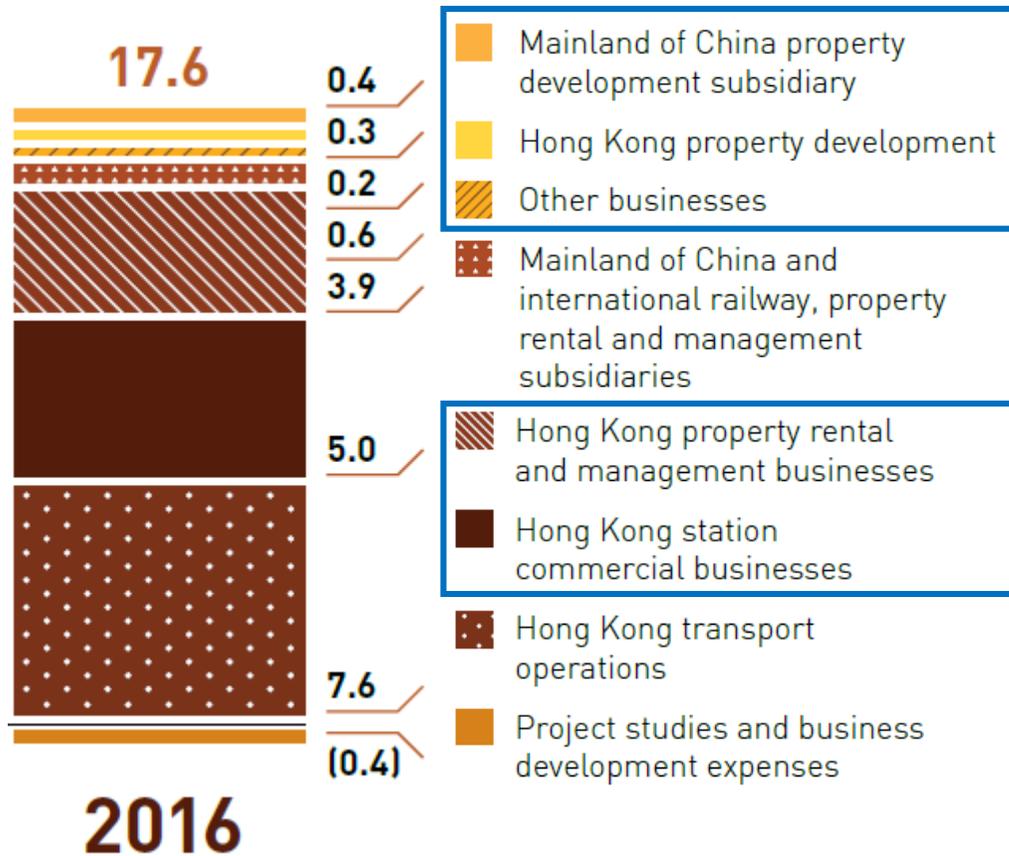
In 2016, on average we carried approximately 5.6 million passengers each weekday across our rail network and bus passenger services in Hong Kong.

While a stable fare revenue is one of most important sources of recurrent income for the Hong Kong MTR. They also use a number of proven financing models such as the Rail plus Property model, Public-Private Partnerships, and service concessions and cash grants to support the delivery of high quality railway services over the long term.

Integration of land use and transit planning has put 75 percent of people and 84 percent of jobs in Hong Kong SAR, China, less than 1 kilometer from a mass transit station. The city has one of the highest rates of public transit use (90 percent of motorized journeys) and lowest rates of car ownership (56 cars per 1,000 people, compared with an average of 404 in OECD countries).

An Overview of the Hong Kong MTR's Financial Performance

Breakdown of Operating Profits for Hong Kong MTR
(2016, HKD Billion)

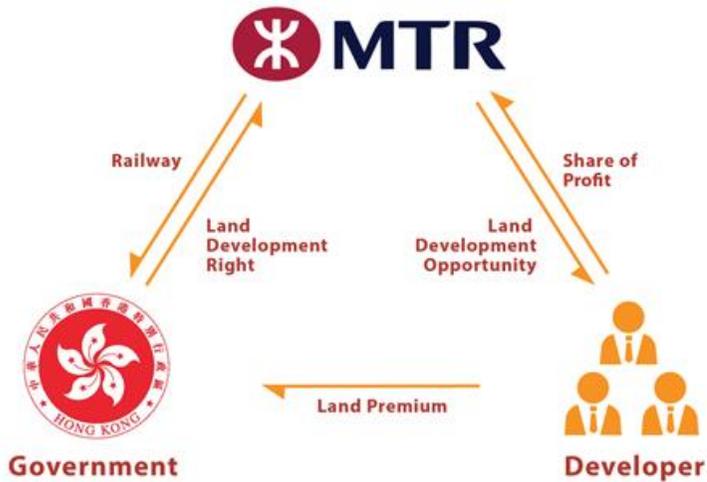


HKD 9.8 billion (56%) out of the HKD 17.6 billion operating profits, are from non-fare box receipts

These non-fare box receipts are mainly come from:

- **Station Commercial Businesses**
(Retail Rental, Advertising, Telecommunication)
- **Property Businesses**
(Property Rental, Property Management, Property Development)
- **Mainland China & International Businesses**
(Railway, Property Rental & Management subsidiaries, Property Development subsidiaries, Railway subsidiaries)

A self-sustainable model : Rail + Property

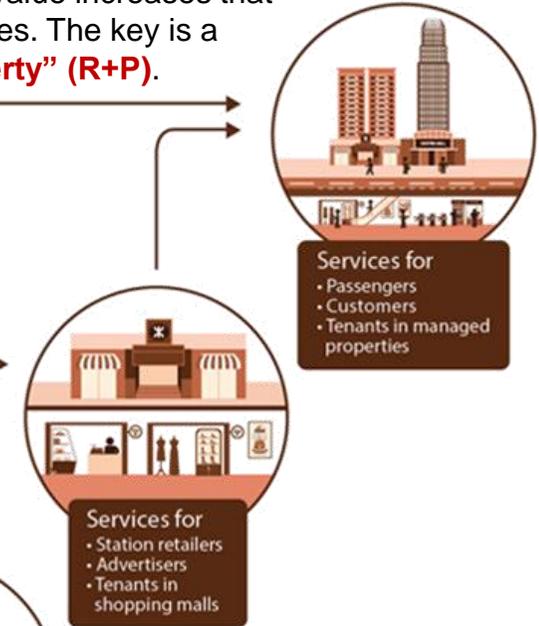


One important reason the system has been able to perform so well is that the government of Hong Kong has enabled MTR to make money from the property-value increases that typically follow the construction of rail lines. The key is a business model called **“Rail plus Property” (R+P)**.

The Mass Transit Rail (MTR) Corporation was established in 1975 as a government-owned enterprise to build, operate, and maintain a mass transit railway system for Hong Kong’s public transport needs.

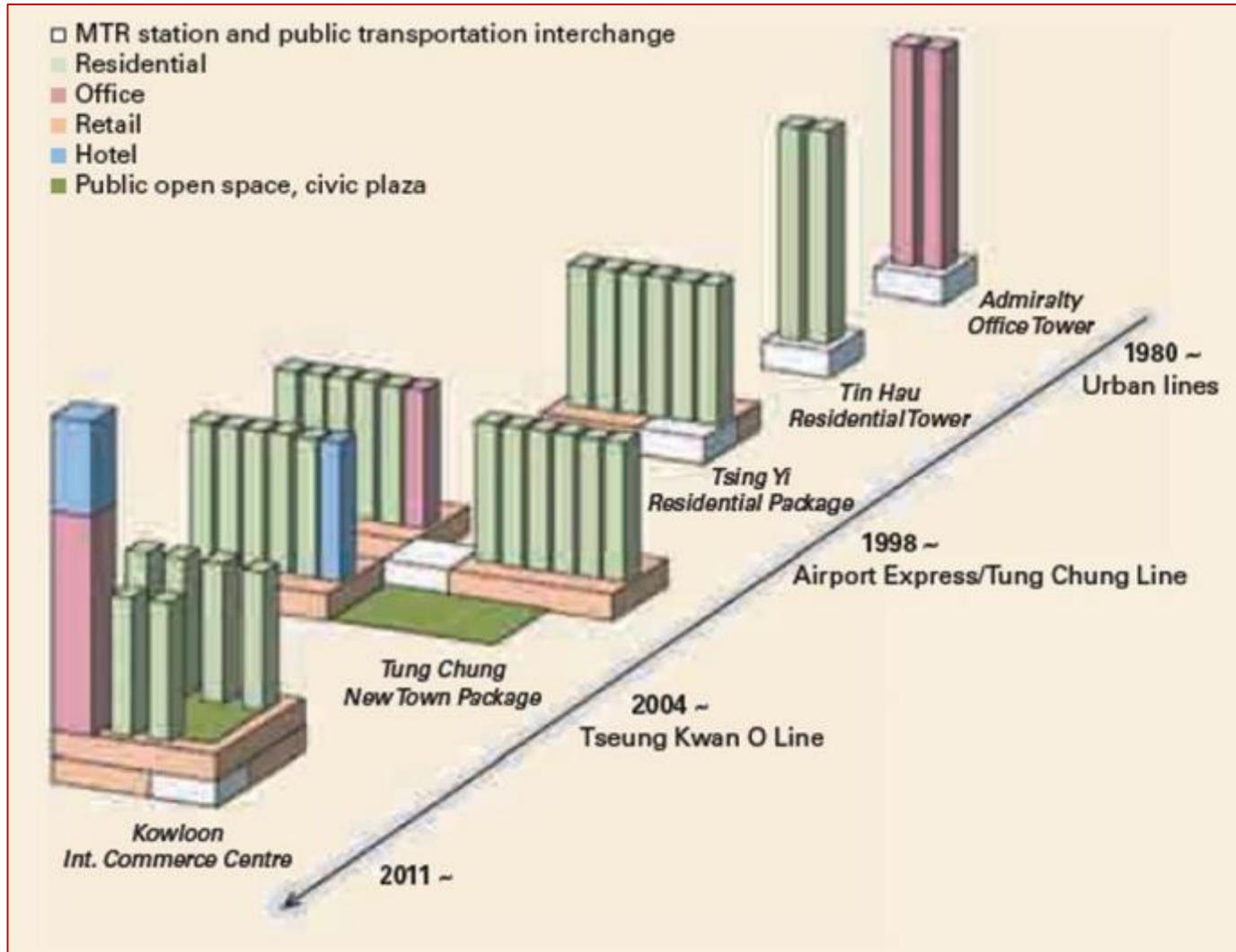
Key components which bring in most of the revenue for MTR:

- Retails & Shopping mall
- Office
- Residential
- Advertising



MTR has applied the R+P model extensively. Buildings sit over about half of the system’s 87 stations, amounting to 13 million square meters of floor area. New projects being planned or developed will add another 3.5 million square meters.

Physical typology & evolution of the Rail + Property Model

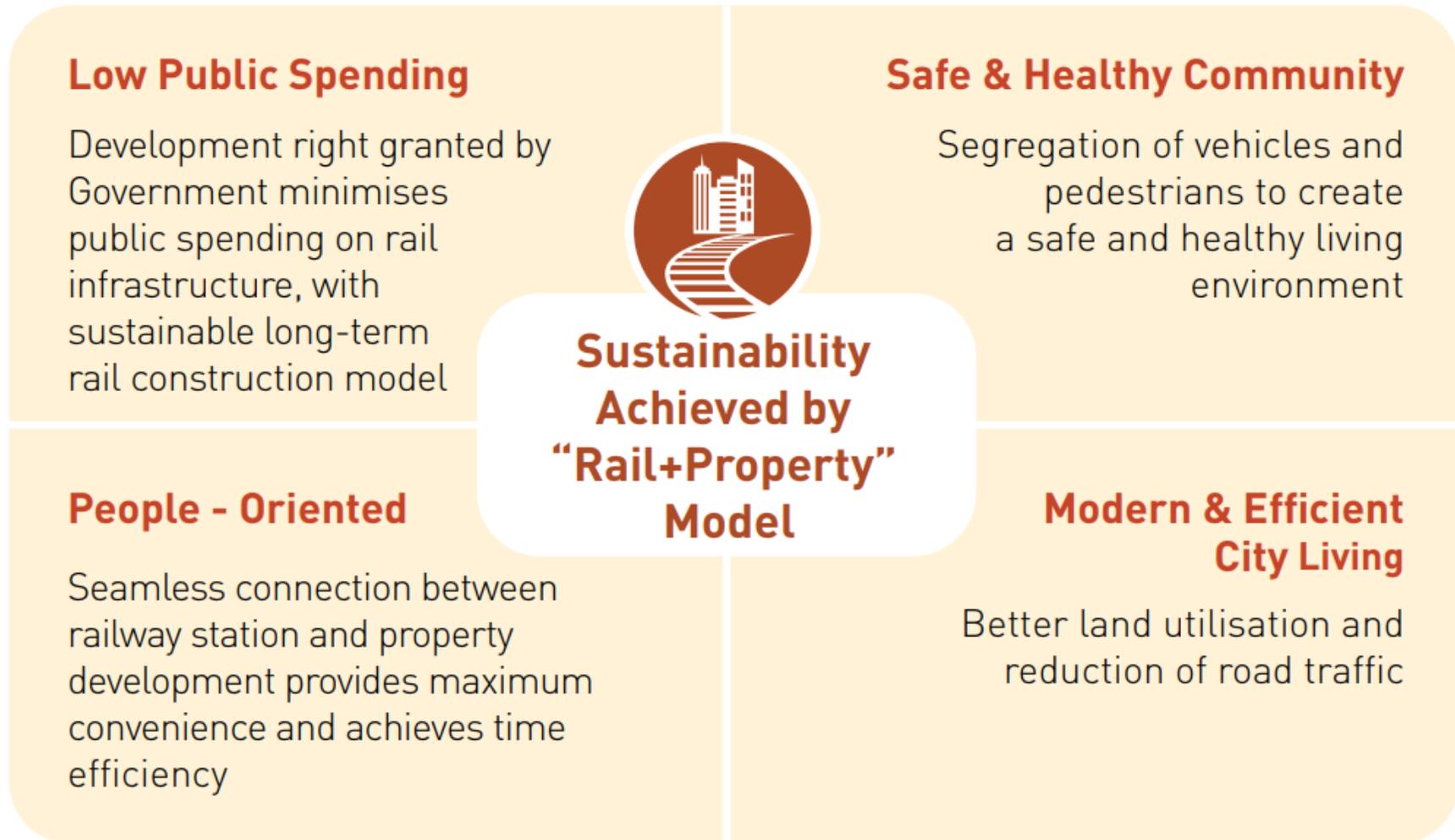


The design principles of R+P have evolved over the past 35 years. Since the late 1990s, development has integrated transit-oriented development design concepts – high-density, mixed-use, and pedestrian-friendly—in a more physically comprehensive manner than seen in the 1980s

Profits from property development and related business of MTR Corporation, including HK station commercial business and HK property rental and management business, have accounted for more than 50 percent of MTRC's total profit between 2000 and 2015.

From 1980 to 2005, the government received an estimated HK\$140 billion (US\$ 18 billion) in net financial returns (nominal value).

Summary of the sustainability benefits of *Rail + Property Model* in Hong Kong



| Some Ideas ...



Potential new revenue stream that a TOD can deliver

Walkable design with pedestrian as the highest priority

Bikeshare rental system and bikeway network integrated into stations

Business incubator

Large ride-in bicycle parking areas within stations

Reduced and managed parking inside 10-minute walk circle around town center / train station



Collector support transit systems including streetcar, light rail, and buses, etc

High density, walkable district within 10-minute walk circle surrounding train station

Specialized retail at stations serving commuters and locals including cafes, grocery, dry cleaners

Train station as prominent feature of town center

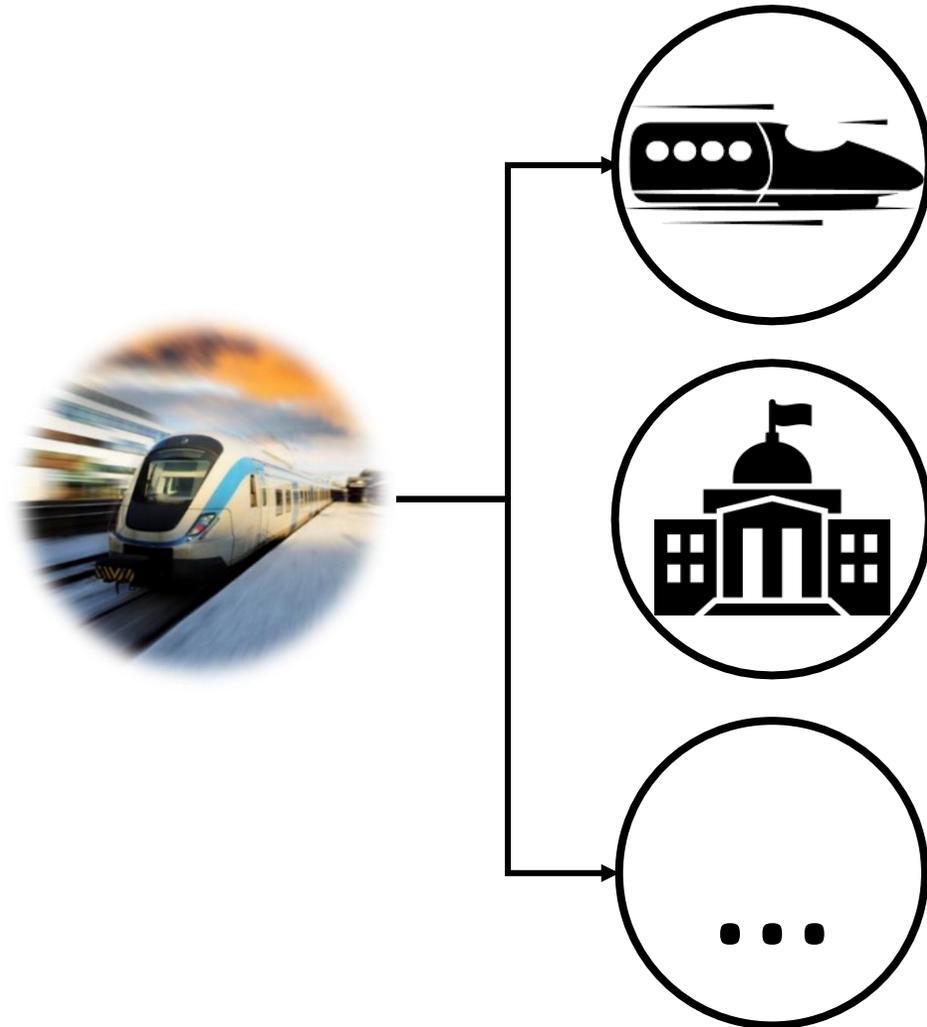
Public square fronting train station

Designed to include the easy use of bicycles and scooters as daily support transport

A regional node containing a mixture of uses in close proximity (office, residential, retail, civic)

Allowing the project stakeholders to capture multiple revenue streams

Unlocking the land value to capitalize on the appreciation of land value & people flow



Revenue Options for Rail-related Operation

- Ticket sales for transport operations

Revenue Options for Government Policy

- Business rate supplement (BRS)
- Community Infrastructure Levy

Revenue Options for Non-Rail Operations

- Ancillary services – Last miles transportation (Bus & Taxi)
- Property rental & management business
- Rental of Commercial & Retail Spaces at rail station
- Advertising at rail station, rolling stocks & other vehicles
- Telecommunication services
- Engineering Services

A top-down view of a business meeting around a table. Several people's hands and arms are visible, interacting with documents, a tablet, and coffee cups. The scene is brightly lit, suggesting an office environment. The text 'About Socio-Economic Modelling (SEM)' is overlaid on the left side of the image.

About Socio-Economic Modelling (SEM)

Introduction of Socio-Economic Modelling (SEM)

Socio-Economic Model is a handy tool to creating development strategy for mega development projects such as HSR Development

Mega Development Projects



Socio-Economic Modelling

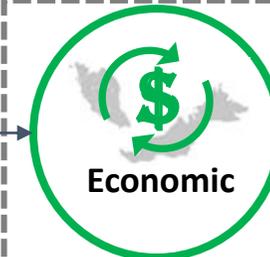
An Excel-based model which simulates the potential socio-economic impact to the Economic, Federal/State, and Employment from the development and creating customized development strategies to:

- Optimizing land opportunities and land use
- Maximize potential socio-economic benefits

And ultimately

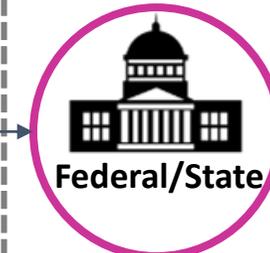
- Ensure the development can meet the project vision

Forecasted Socio-Economic Outputs



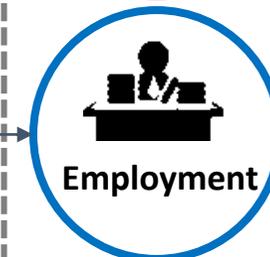
Economic

- Investment
- Net Benefits
- GDP Contribution
- GNI Contribution



Federal/State

- Tax Contribution
- Foreign Investment Dividend



Employment

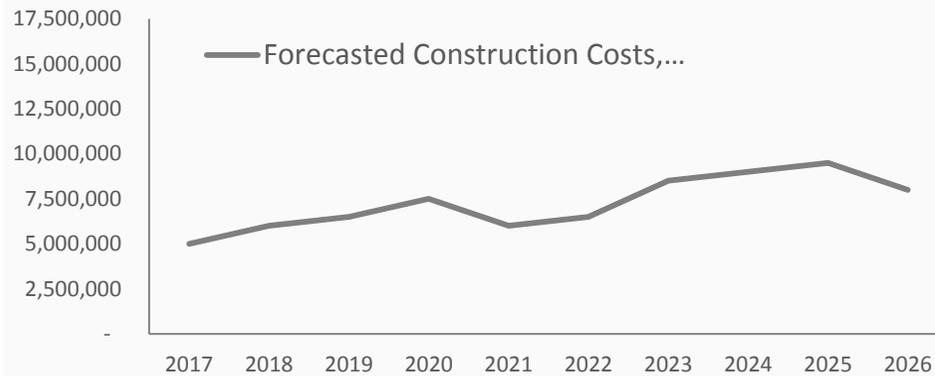
- Employment Opportunity
- Income Level
- Economic Internal Rate of Return

Conventional Construction Modelling VS Socio-Economic Modelling (SEM):

Traditional modelling only considered the costs & benefits arise directly associated to the construction

Conventional Project Modelling for Construction or Major Developments

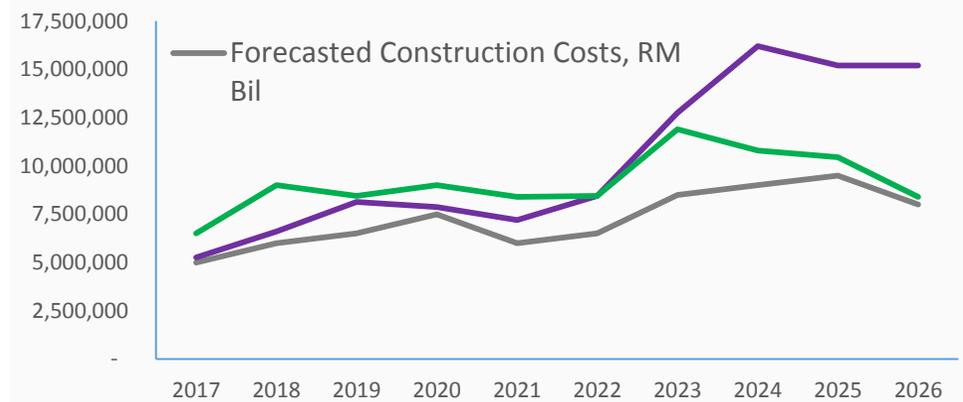
(ILLUSTRATIVE) Forecasted Construction Cost, RM Billion



- Only focus on the direct project costs from the construction alone

Socio-Economic Modelling

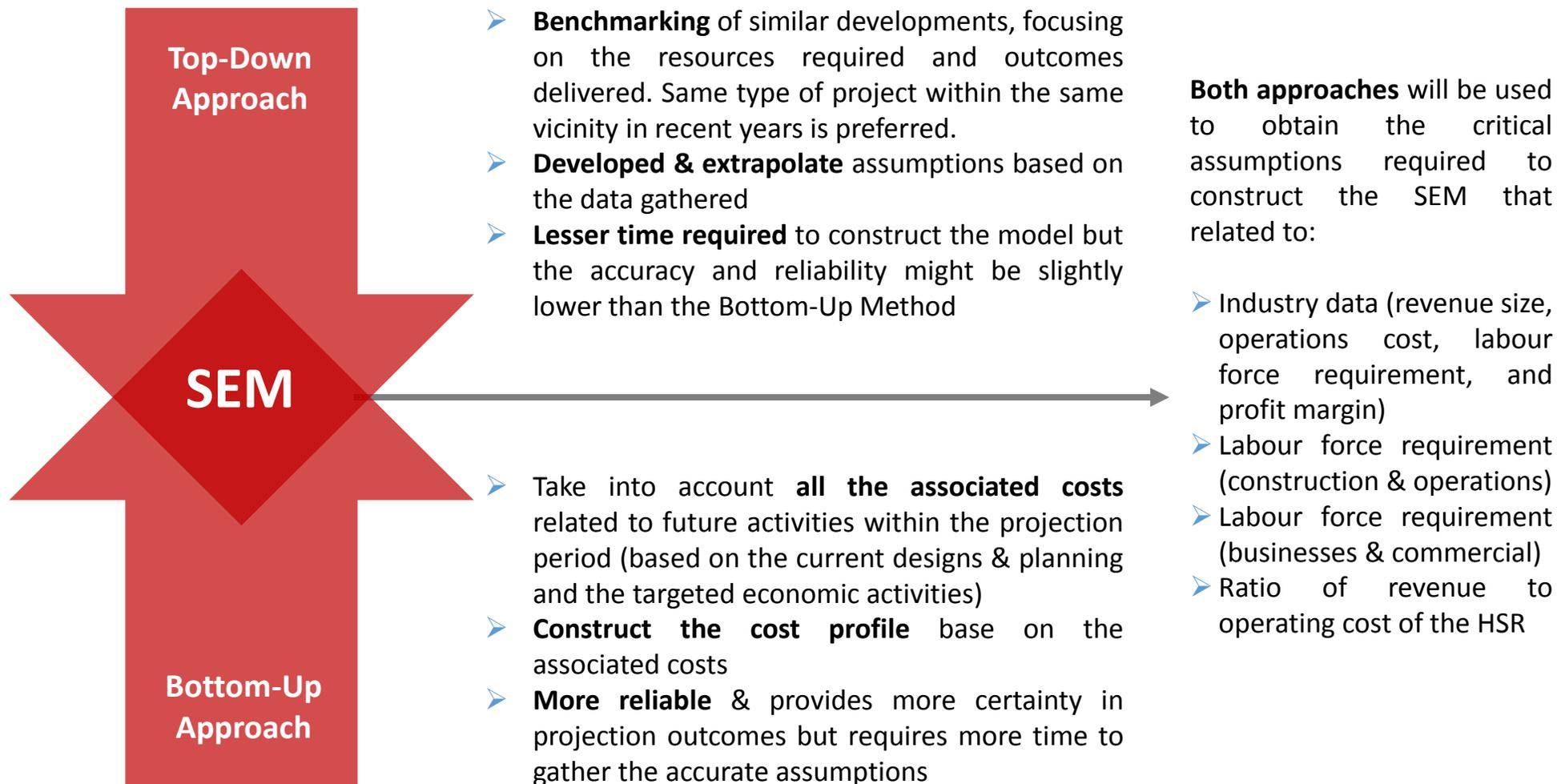
(ILLUSTRATIVE) Forecasted Cost & Benefits, RM Billion



- Looking at the “**Unconstrained Potential Developments**”
- Considered **more aspects** which contributed to the cost & benefits of the development

Methodology to built up the SEM

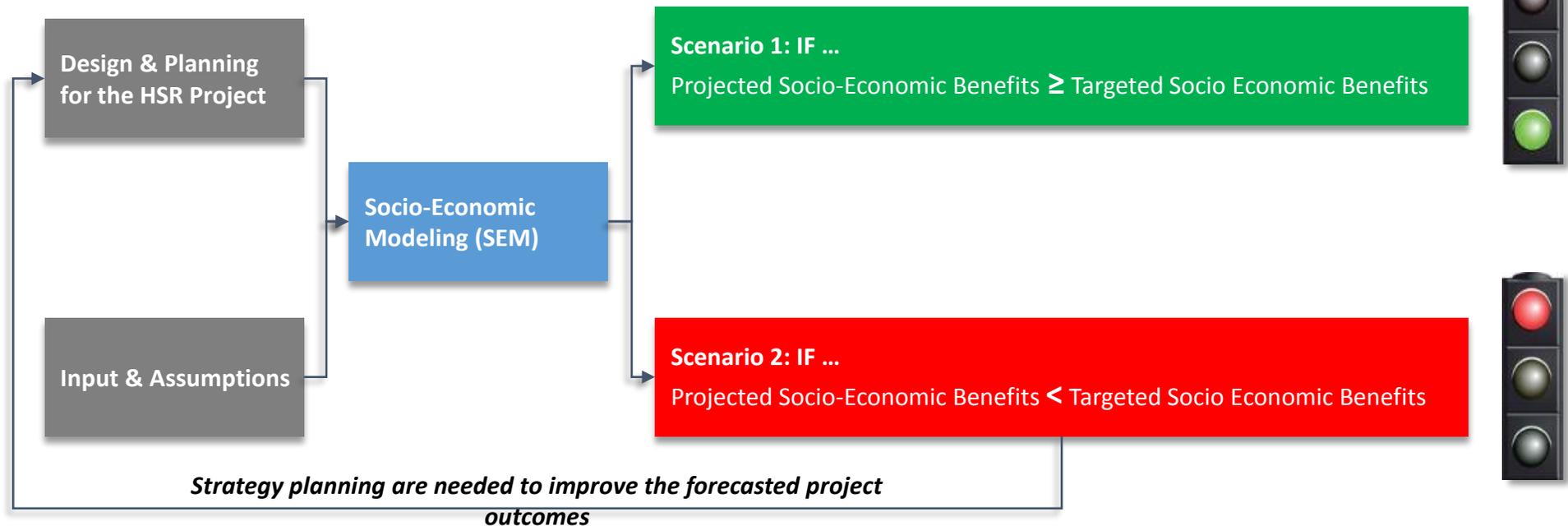
The methodology to obtain the assumptions for building a SEM can be separated into two major category and a typical SEM would requires an interchange use of both



The “True Value” of SEM lies in its flexibility ...

This allows strategy planning which aligned the forecasted project outcomes with the vision of a multi billion project

- The project is **good to go** as it is highly likely that the project will meet the expected project outcomes and Project Vision



- The project still **requires more attentions** on the design and planning as it is unlikely to deliver the expected project outcomes
- **Strategies** are **needed** to tackle the corresponding issues which are likely to cause the failure of project

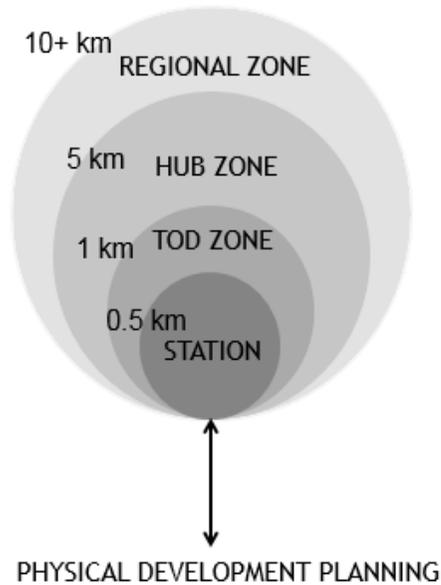
Getting the right mix of cluster developments

Comparing the Unconstrained Development & Constrained Development options

Gross Floor Areas (GFA) for Different Development Components – Unconstrained Development (ILLUSTRATIVE)



Gross Floor Areas (GFA) for Different Development Components – Constrained Development (ILLUSTRATIVE)



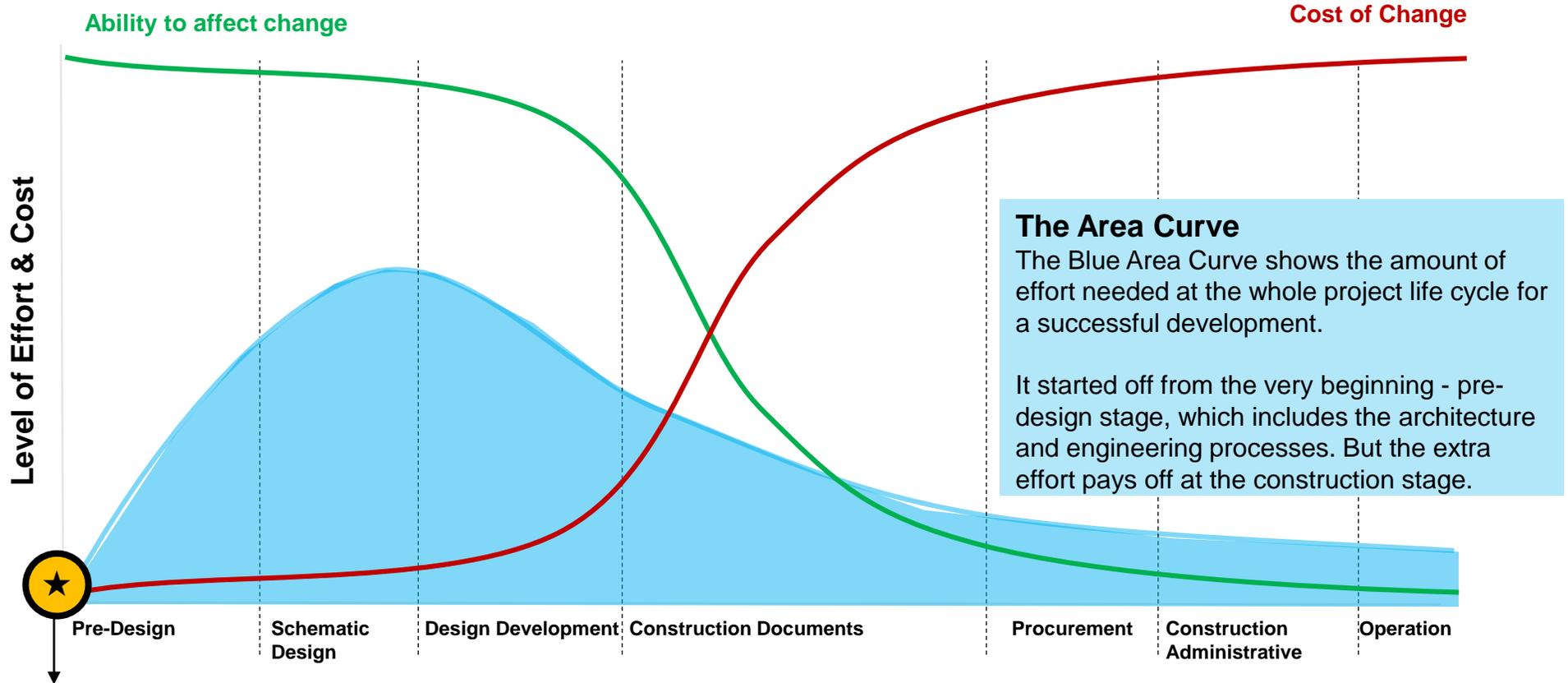
All successful developments start from the beginning of the project ...

The Green Line

The ability to impose a change on a development project is greatest at the beginning, and diminish as the project started.

The Red Line

The cost of imposing changes to a development is lowest at the beginning, and gradually increase as the project started.



The Area Curve

The Blue Area Curve shows the amount of effort needed at the whole project life cycle for a successful development.

It started off from the very beginning - pre-design stage, which includes the architecture and engineering processes. But the extra effort pays off at the construction stage.

Critical Success Factors

Well-designed TOD Plan

Incorporating the needs and demand of all potential users of the TOD, design not only for the current but also for future generations.

Comprehensive SEM Assessment

Stress testing the potential design and fine-tune a viable development plan which could deliver optimal socio-economic benefits to all stakeholders.

Future =

Income - Investment
Profit → Tax? → ROI ↑
BONUS ↑

VISION

Key Success?
Key Driver ↑

S	W
O	T

success ↑

CORPORATE

strategic Plan
Corporate Plan
Business Unit Plan

SWOT

Target

STRATEGY & TACTIC

Target

MISSION

Evaluation?
□ Excellent
□ Fair
□ Poor

45%

Milestones

About Us ... 27Group of Companies

An introduction to 27Group of Companies

Unlocking Potential. Delivering Results. Rebuilding Humanity

27Group is a network of strategic consulting and advisory firms with a shared vision of rebuilding humanity.

The 27Group was founded by like-minded professionals with a shared vision on **rebuilding humanity** with a unique blend of consulting services. The founders have collectively accumulated more than 100 years of experience in corporate restructuring & recovery, corporate finance, management consultancy specialising in natural & built assets services.

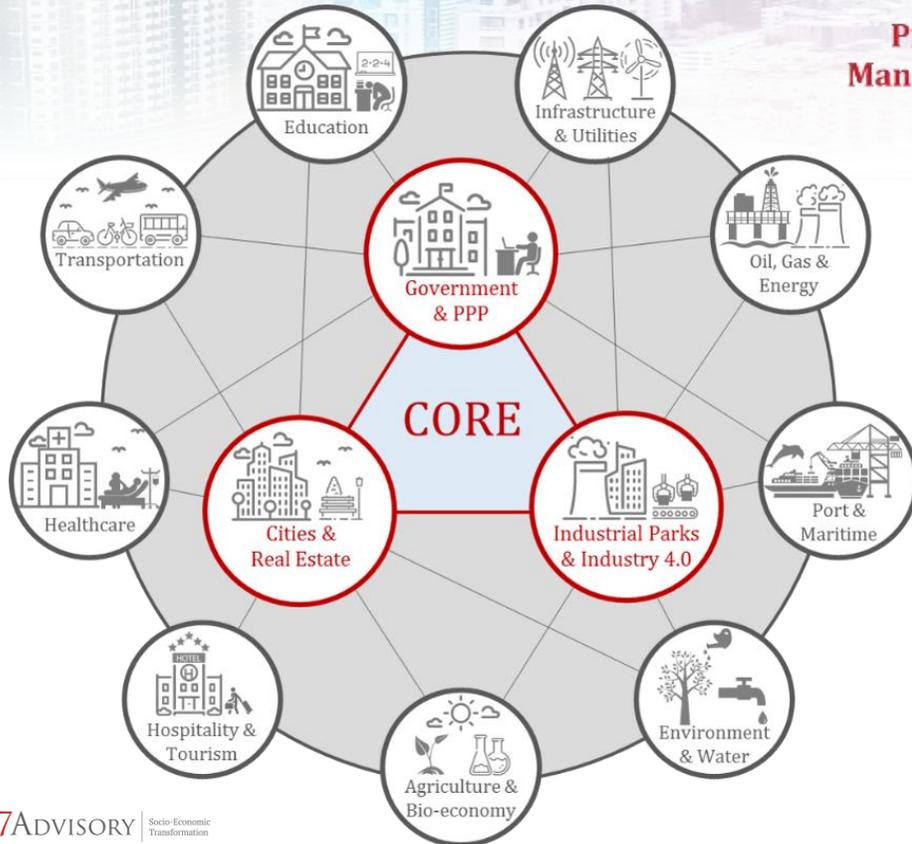


With their combination of corporate exposure & experiences in design & engineering of projects, 27Group's delivery model infuses human values into strategy, creates innovative funding solutions & implements development management to ensure your project success.

Our service offerings

OUR ECOSYSTEMS & SECTOR

Our core focus areas are Government & PPP, Cities & Real Estates, and Industrial Parks & Industry 4.0. We also support the ancillary segments around the core focus areas.



Investor Management

Development Management

Project Management

Project Transformation

Corporate Restructuring

Strategic Business Planning

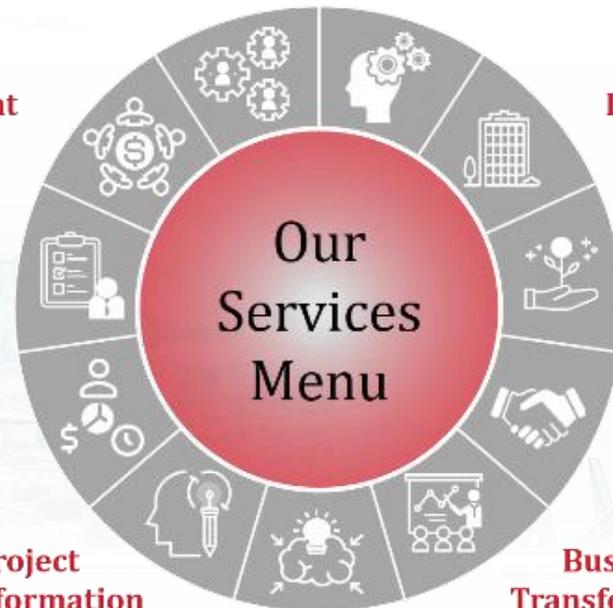
Master Plan Development

Capital & Debt Advisory

Deal Transaction Support

Business Transformation

Digital & Technology



OUR VALUE OFFERINGS

We provide a wide range of services to complement each stage of a business life cycle

Why us?



FUNDING SOLUTION: INTERNAL & EXTERNAL FUNDING SOURCES

We have capabilities to assist in sourcing and procuring external equity and/or debt funding to finance projects and corporate transactions. We may also fund selected projects / transactions from our internal funding sources which could facilitate immediate kickstart of your project.

WHY 27GROUP?



COLLECTION OF SUCCESS FEE UPON SUCCESSFUL IMPLEMENTATION

We offer special payment milestone – based on success fee and a minimal professional fee to cover for basic expenses. By doing so, our interests and that of our client’s will be aligned. Both parties stand to “win” under this success fee payment model, as it rewards based on outcome.

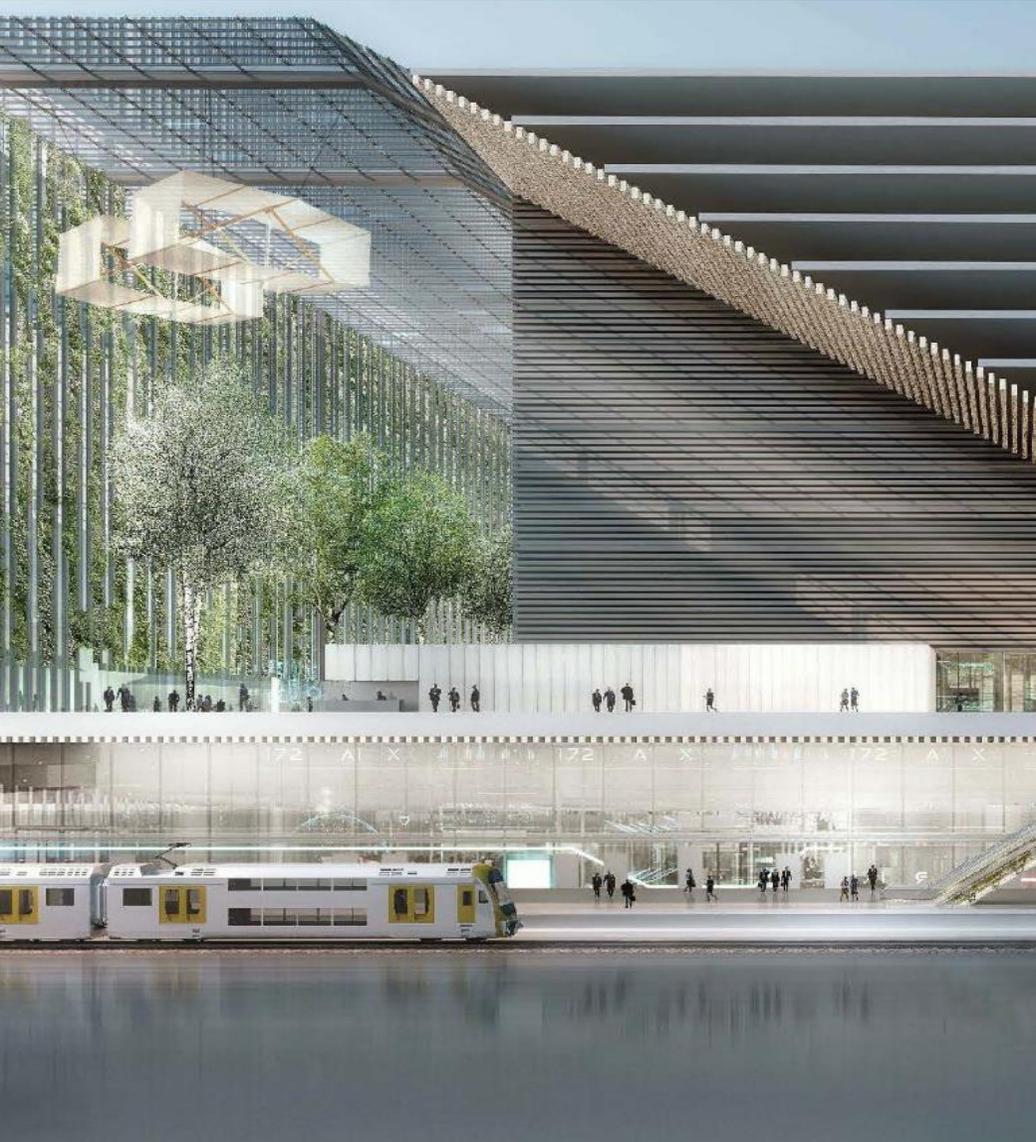


ONE STOP SOLUTION : STRATEGY + INVESTMENT + IMPLEMENTATION

Our multi-disciplinary team offers a wide range of services to complement each stage of a business or project life cycle : from crafting of business plan, investor sourcing and fund raising to project management and implementation. Our emphasis is on making it happen for our clients.



Centre for Science
and Environment



End of Presentation

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27ADVISORY

Socio-Economic
Transformation

#RebuildingHumanity