Cites and Climate Change:
Science, Policy and Investments

Feb 2024

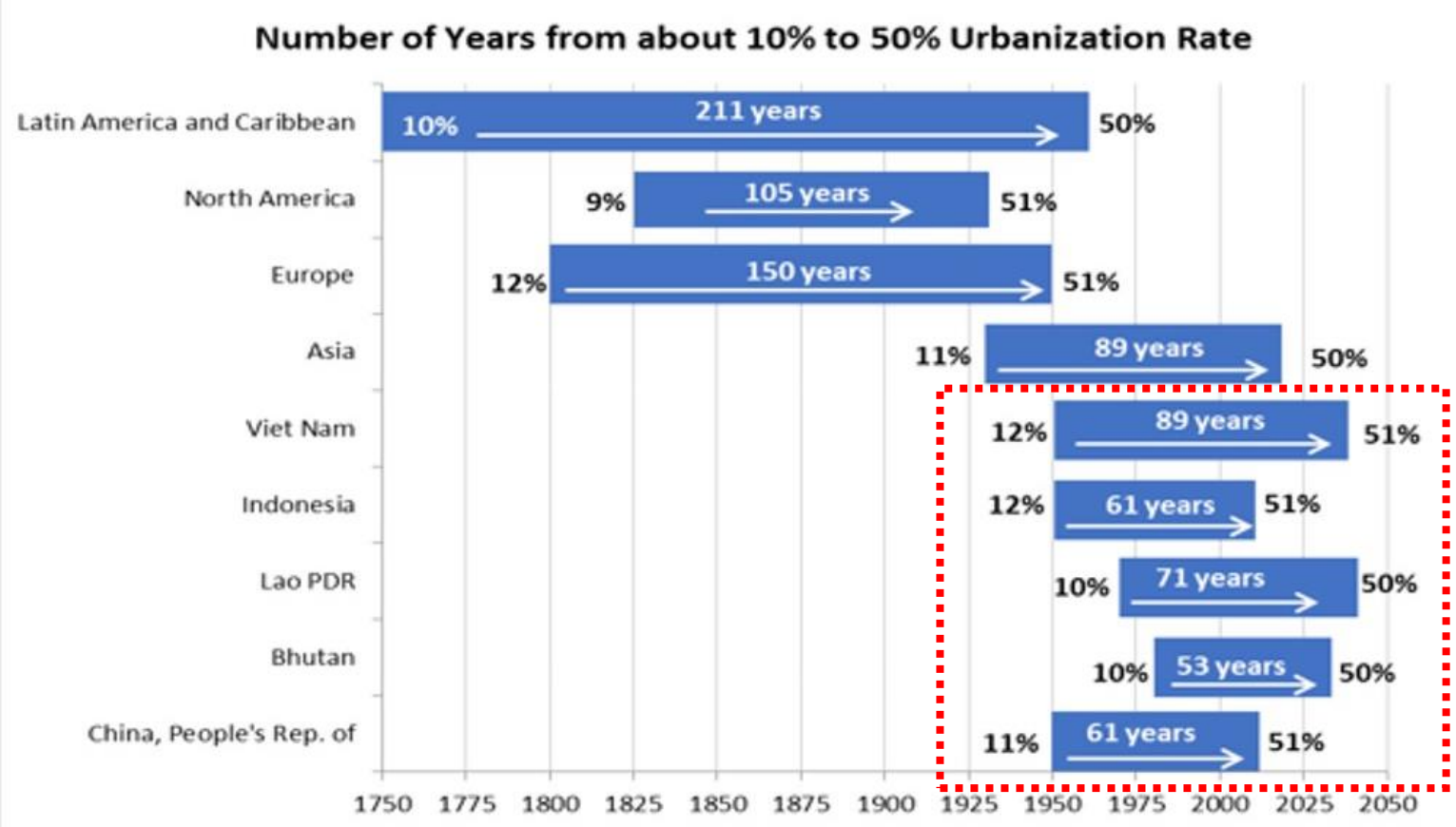
Hong Soo Lee (Senior Urban Specialist in ADB)_hslee@adb.org

Contents

1 Relationship between Cities and Climate Change

1-1. Cities are the main generators of GHG emissions

i. Urbanization Trends in Asia compared to EU, NA and LA/C



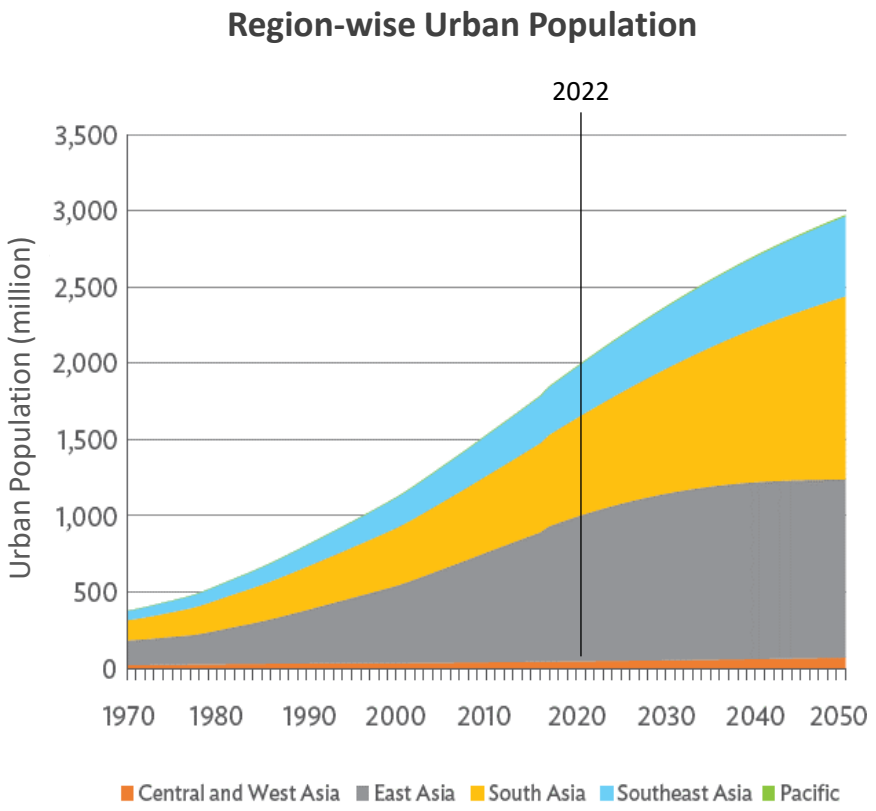
From: ADBI

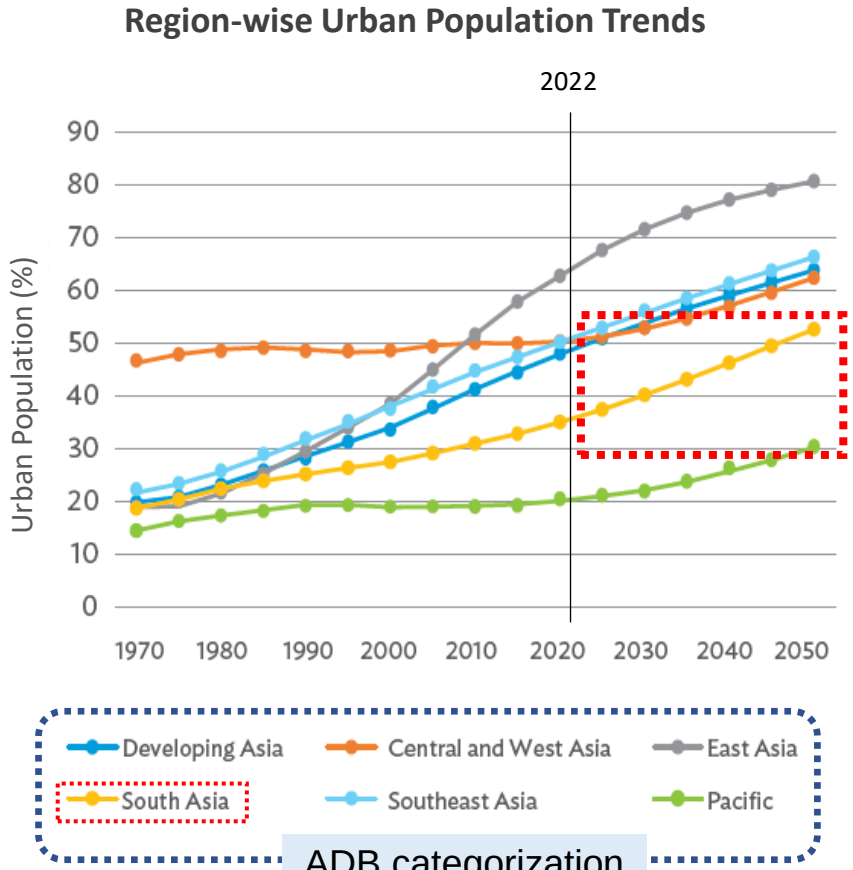
1 Relationship between Cities and Climate Change

1-1. Cities are the main generators of GHG emissions

- The Asia and Pacific region is home to **more than 56% of the world's total population** and **54% of the world's urban population**.
- The region has some of the most populated and densest cities in the world with **20 of the 33 global megacities** (10 million+).
- Of the 36 **cities that grew more than twice as fast as the global annual average rate**, **28 cities are located in Asia**, with 17 in PRC.

i. Urbanization Trends in Asia and the Pacific





From: ADB

1 Relationship between Cities and Climate Change

1-1. Cities are the main generators of GHG emissions

ii. Investment Potential in Cities by Region and Sector to 2030

WB categorization

60% of total investment

	East Asia Pacific	South Asia	Europe & Central Asia	Middle East & North Africa	Sub-Saharan Africa	Latin America & Caribbean	Total
Waste	$82 billion	$22 billion	$17 billion	$28 billion	$13 billion	$37 billion	$200 billion
Renewable energy	$266 billion	$141 billion	$88 billion	$31 billion	$89 billion	$226 billion	$842 billion
Public transportation	$135 billion	$217 billion	$116 billion	$281 billion	$159 billion	$109 billion	$1 trillion
Ciimate-smart water	$461 billion	$110 billion	$64 billion	$79 billion	$101 billion	$228 billion	$1 trillion
Electric vehicles	$569 billion	$214 billion	$46 billion	$133 billion	$344 billion	$285 billion	$1.6 trillion
Green buildings	$16 trillion	$1.8 trillion	$881 billion	$1.1 trillion	$768 billion	$4.1 trillion	$24.7 trillion
TOTAL	$17.5 trillion	$2.5 trillion	$1.2 trillion	$1.7 trillion	$1.5 trillion	$5 trillion	$29.4 trillion

85% of total investment

INCREASING INVESTMENT

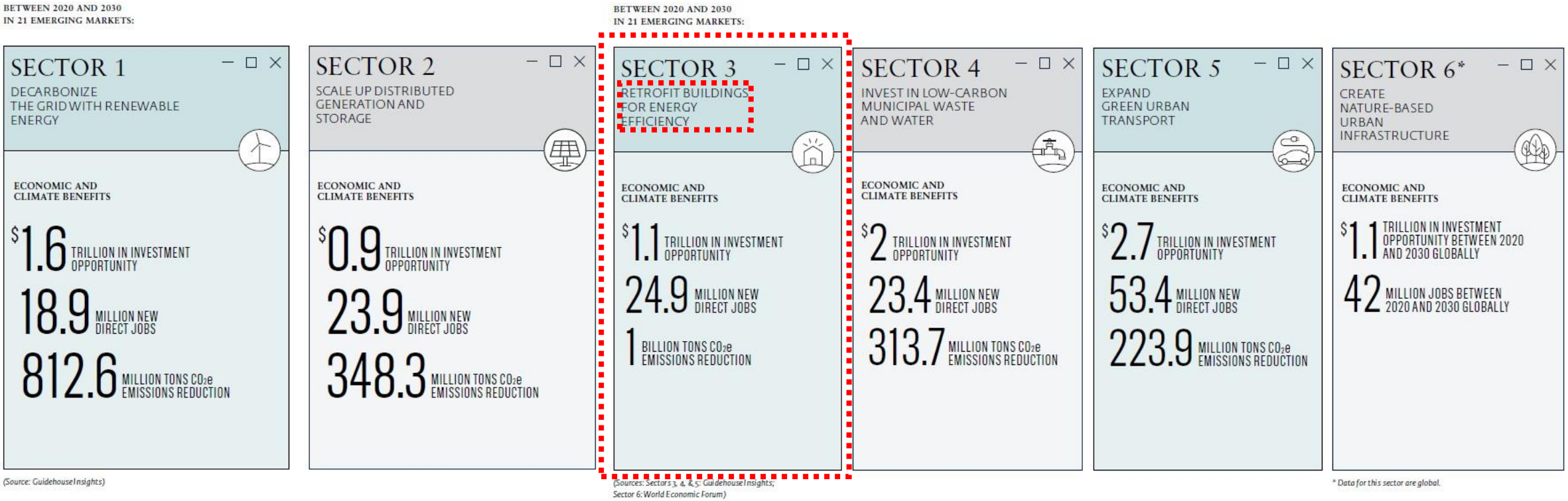
Green Buildings >>> Transport > Smart Water > Energy > Waste

From: IFC

1 Relationship between Cities and Climate Change

1-1. Cities are the main generators of GHG emissions

ii. Investment Potential in Cities by Region and Sector to 2030

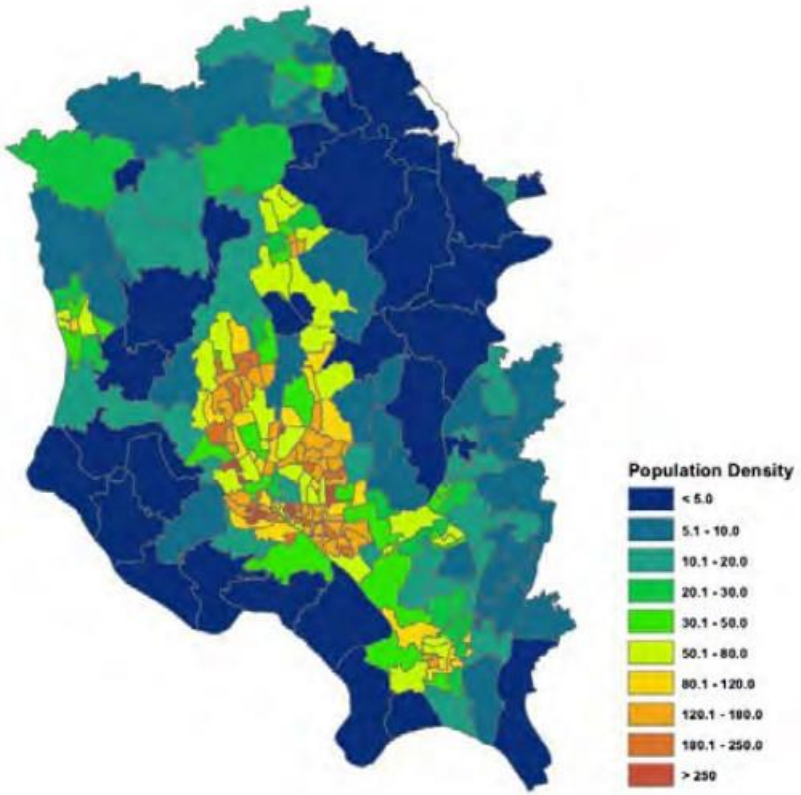


From: IFC

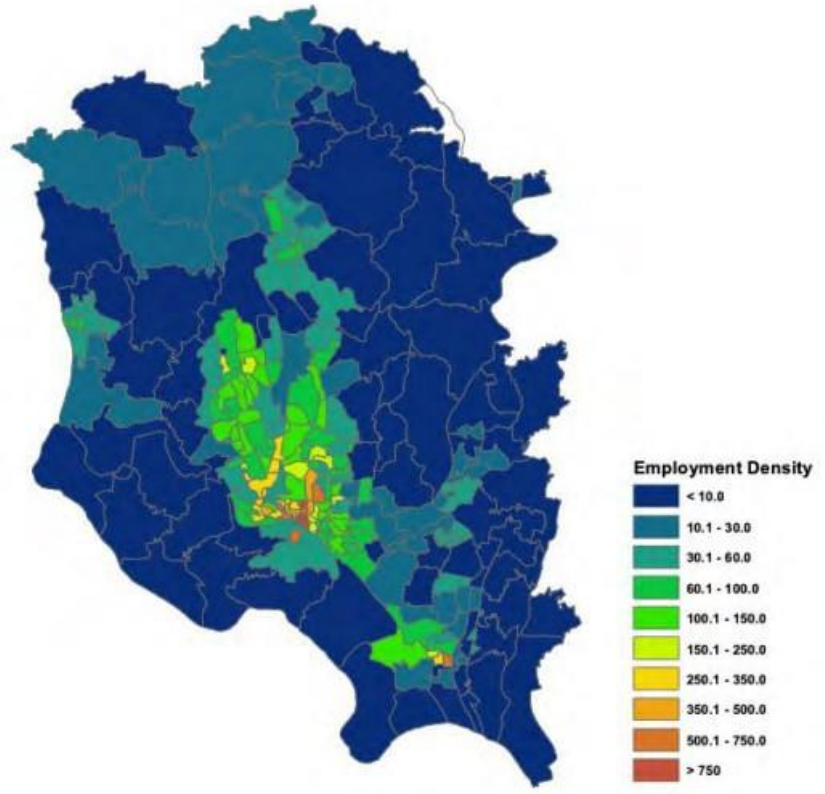
1 Relationship between Cities and Climate Change

1-1. Cities are the main generators of GHG emissions

iii. Population and Employment Density in Dhaka, Bangladesh



Population Density



Employment Density

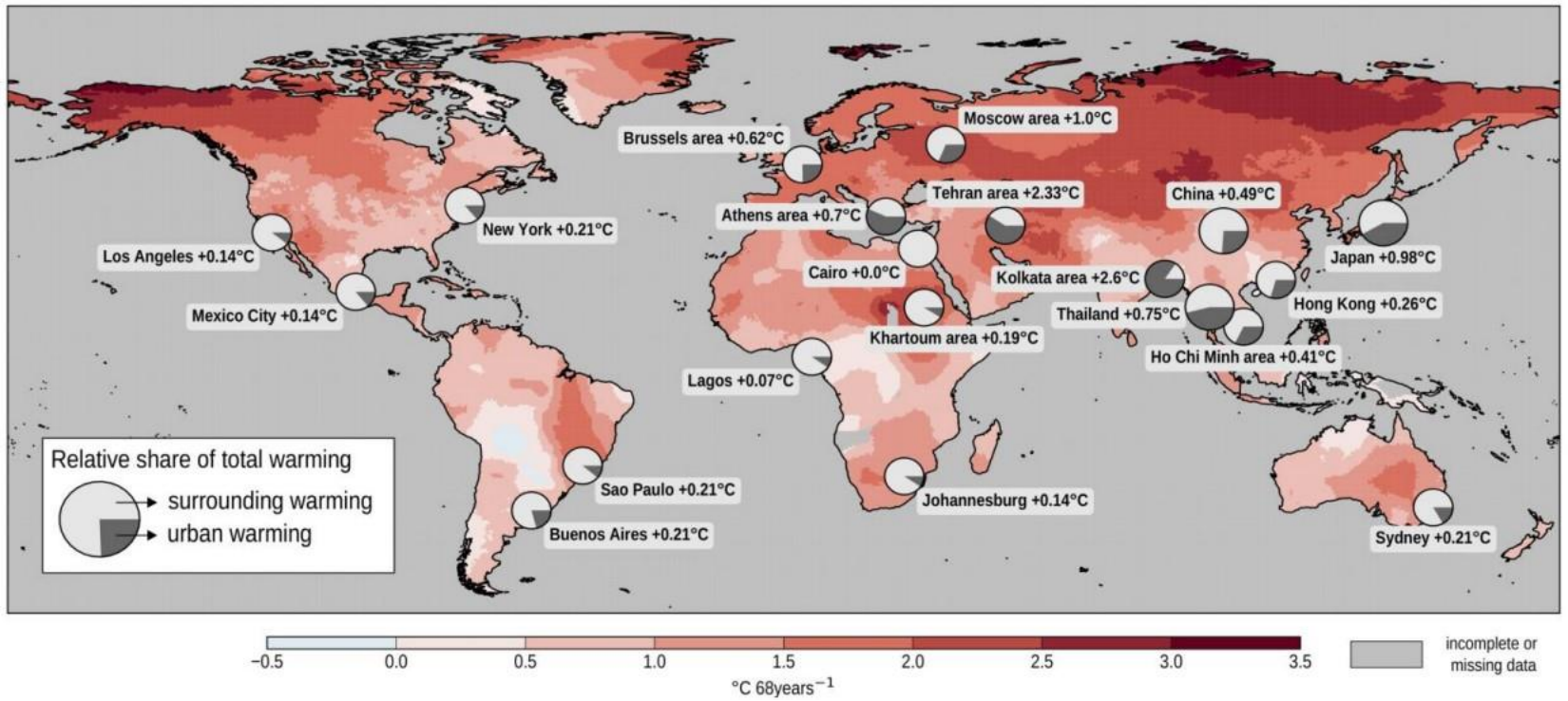
From: ADB

1 Relationship between Cities and Climate Change

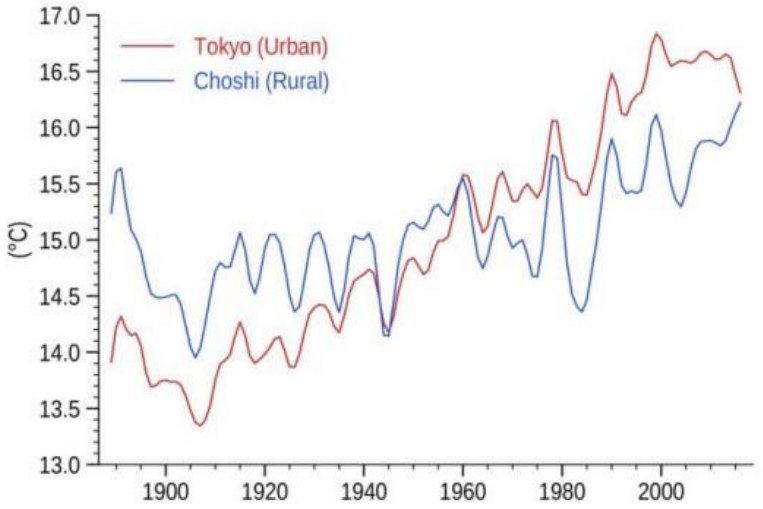
1-2. Climate Change is the most serious threat to urban infrastructure and quality of life

i. Urbanization impact on global warming in cities

(a) Trend in global (near) surface air temperature (CRU TS, 1950-2018)



(b) Temperature evolution Japan examples



Urban heat island effect

i) Urban geometry
ii) Human activity
iii) Materials that make up cities
iv) Lack of vegetation / water bodies

From: IPCC

1 Relationship between Cities and Climate Change

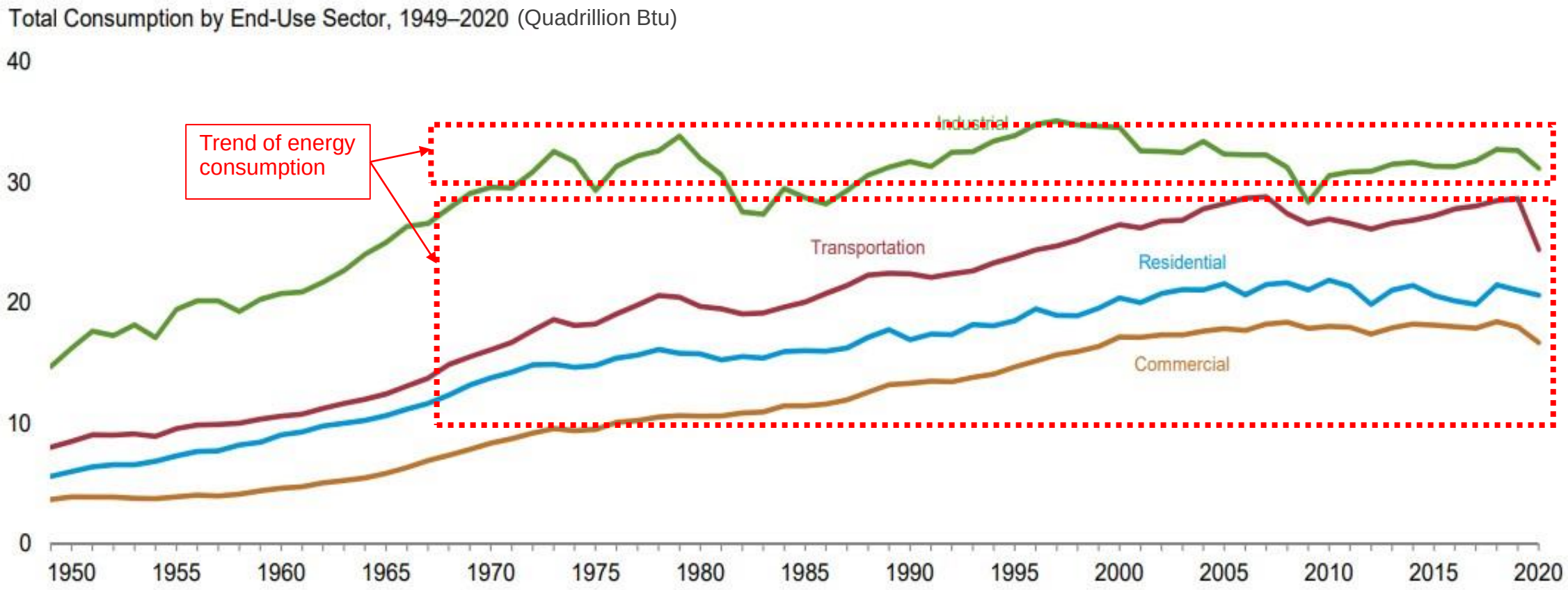
1-2. Climate Change is the most serious threat to urban infrastructure and quality of life

ii. Climate Change's impacts on Low-Income / Vulnerable Groups

2 The main Issues is not the city itself rather urban form and lifestyle

2-1. How are cities dealing with urbanization, haphazard urban morphology, and organic growth energy demand?

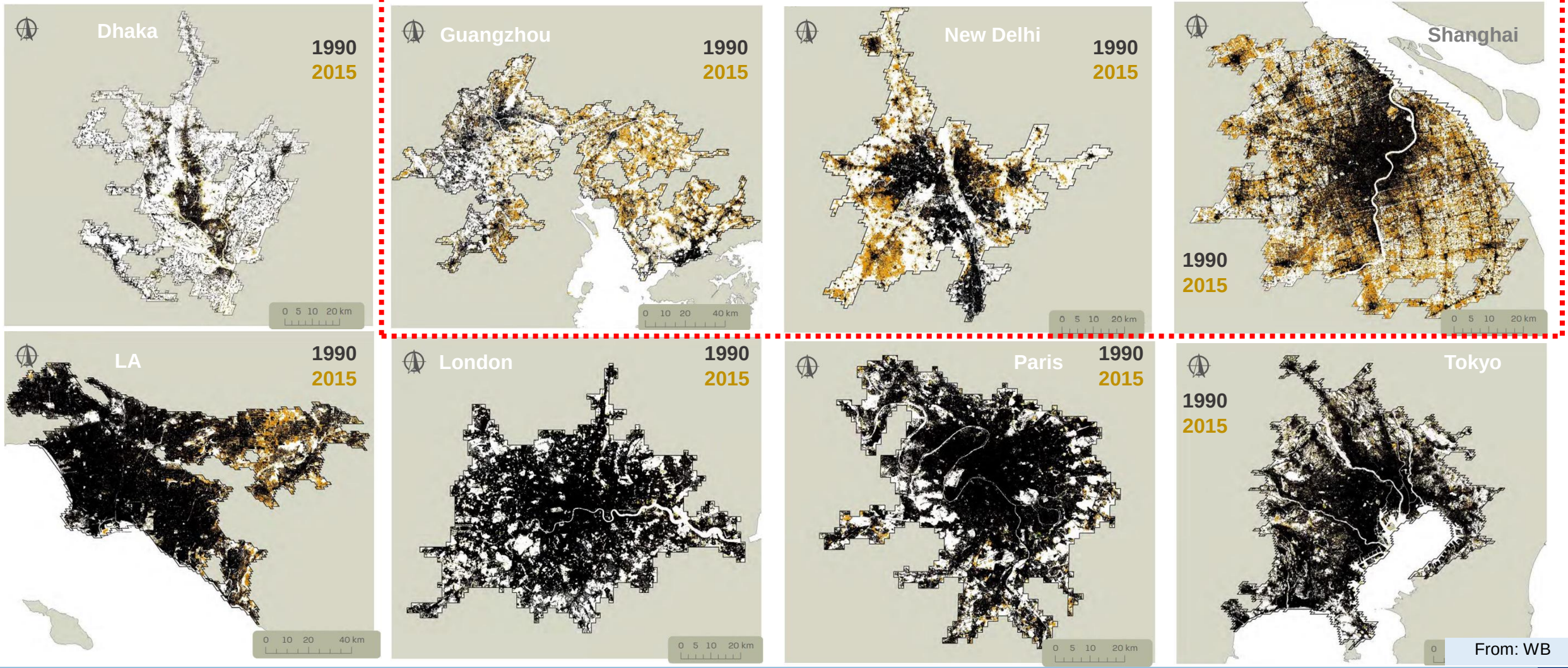
i. Energy Consumption by End-Use Sector 1949-2020 (US)



2 The main Issues is not the city itself rather urban form and lifestyle

2-1. How are cities dealing with urbanization, haphazard urban morphology, and organic growth energy demand?

ii. Spatial Development _ Cities in Developing and Developed Countries

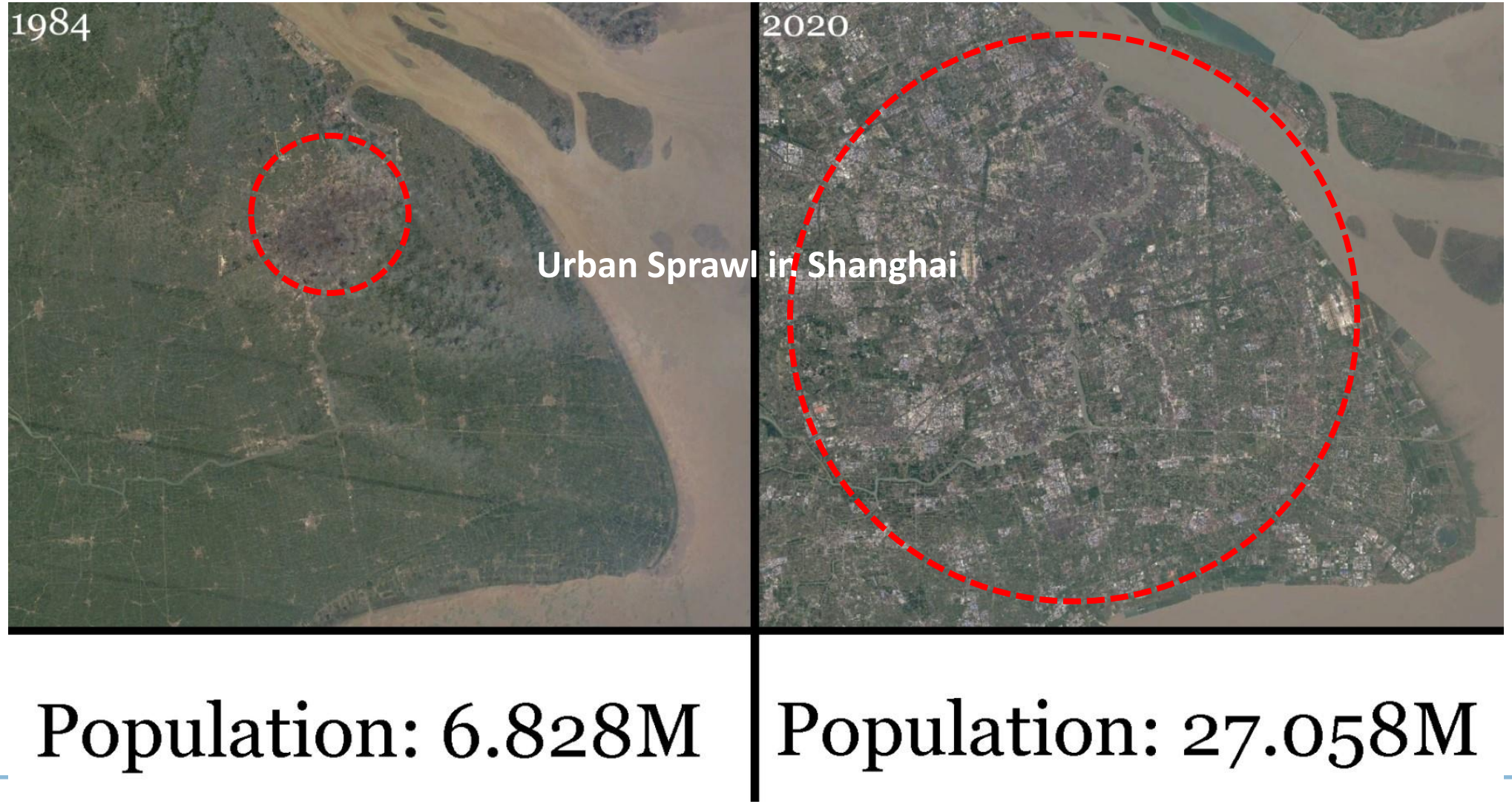


From: WB

2 The main Issues is not the city itself rather urban form and lifestyle

2-1. How are cities dealing with urbanization, haphazard urban morphology, and organic growth energy demand?

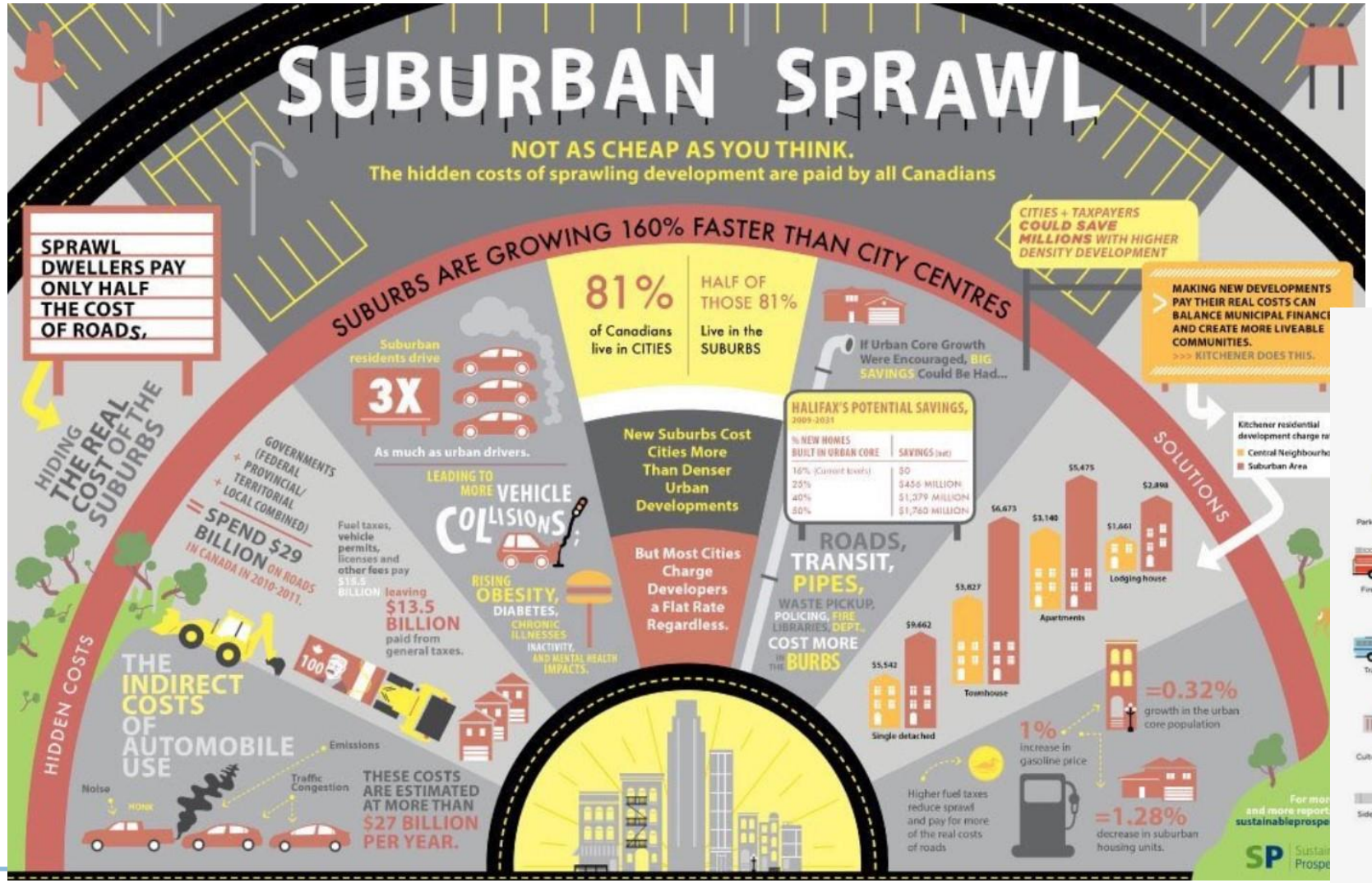
ii. Spatial Development _ Cities in Developing and Developed Countries

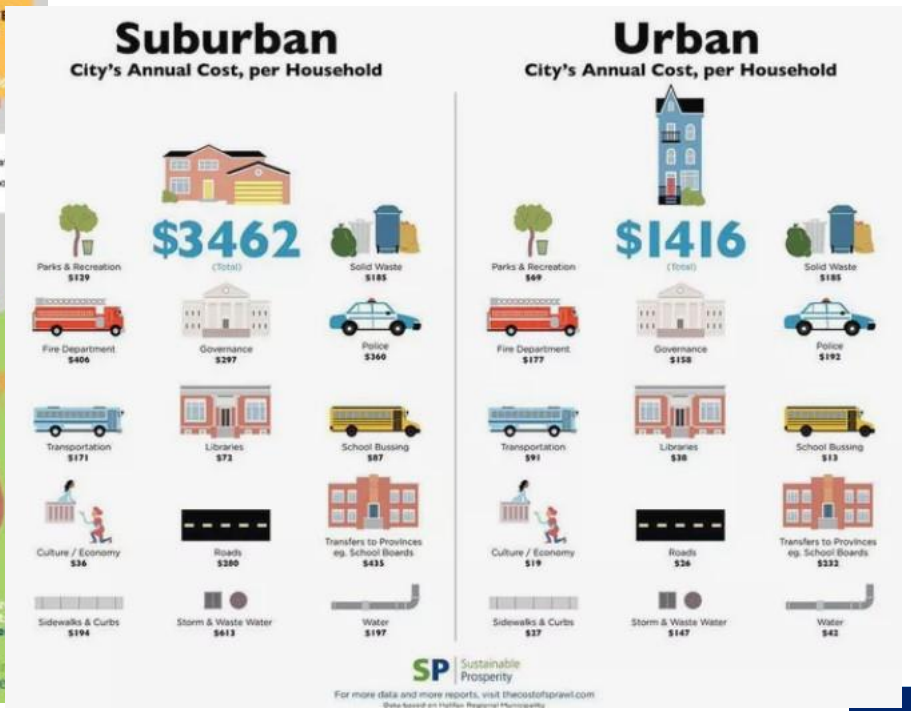


2 The main Issues is not the city itself rather urban form and lifestyle

2-1. How are cities dealing with urbanization, haphazard urban morphology, and organic growth energy demand?

ii. Spatial Development _ Cities in Developing and Developed Countries



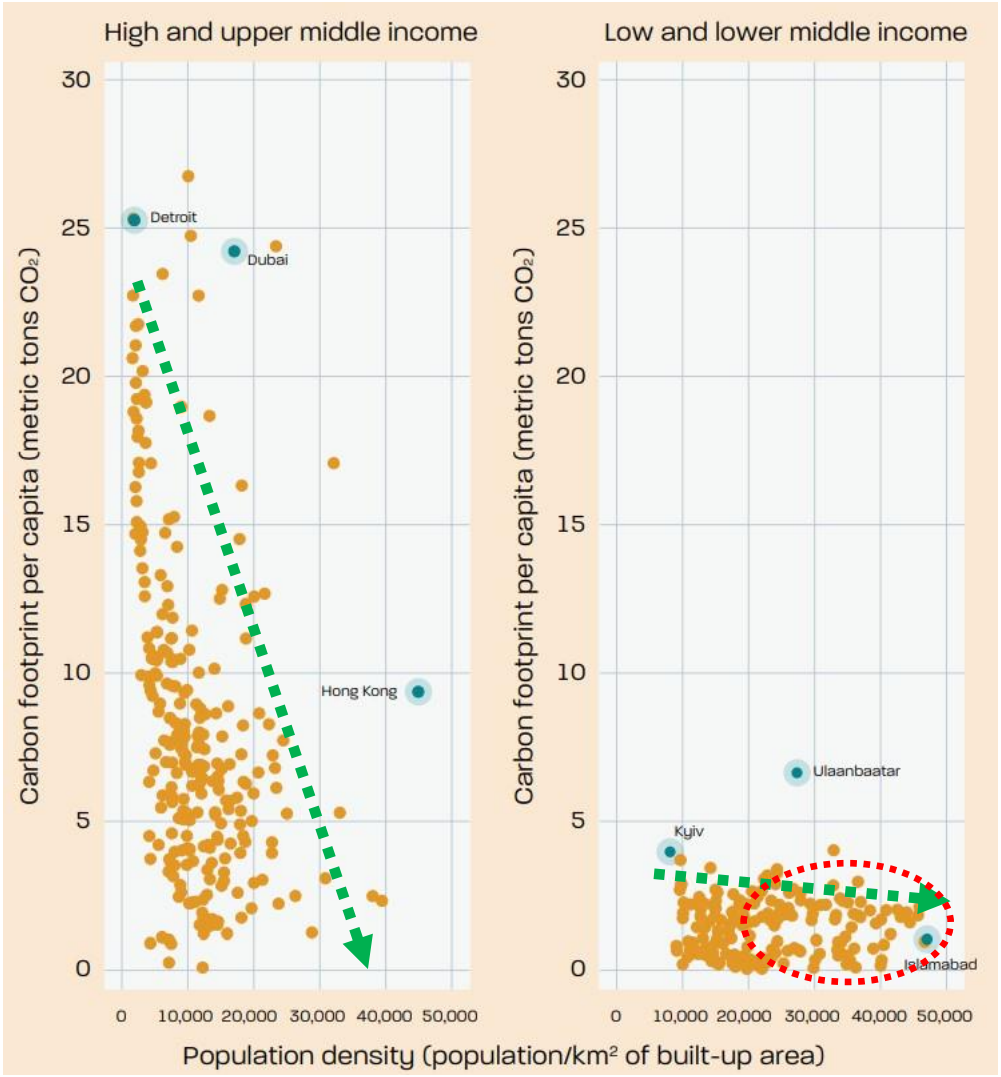


2 The main Issues is not the city itself rather urban form and lifestyle

2-1. How are cities dealing with urbanization, haphazard urban morphology, and organic growth energy demand?

iii. Urban Density and GHG emission

While GHG emissions per capita decline with urban density in high- and upper middle-income countries, low- and lower-middle-income cities buck the trend.



From: WB

2 The main Issues is not the city itself rather urban form and lifestyle

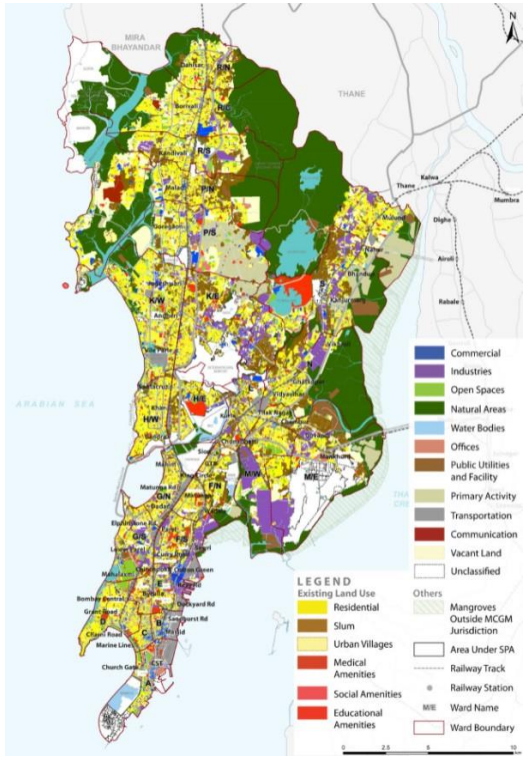
2-1. How are cities dealing with urbanization, haphazard urban morphology, and organic growth energy demand?

iv. Urban Density / Mixed-use Development

Dharavi, Mumbai
Average household income
Approximately $ 812
62,000 people per km²
Total floor space 96,000 m²

Midtown East, New York
Median household income
$ 137,130
58,000 people per km²
Total floor space 760,000 m²

Overcrowd vs. Density



Mumbai

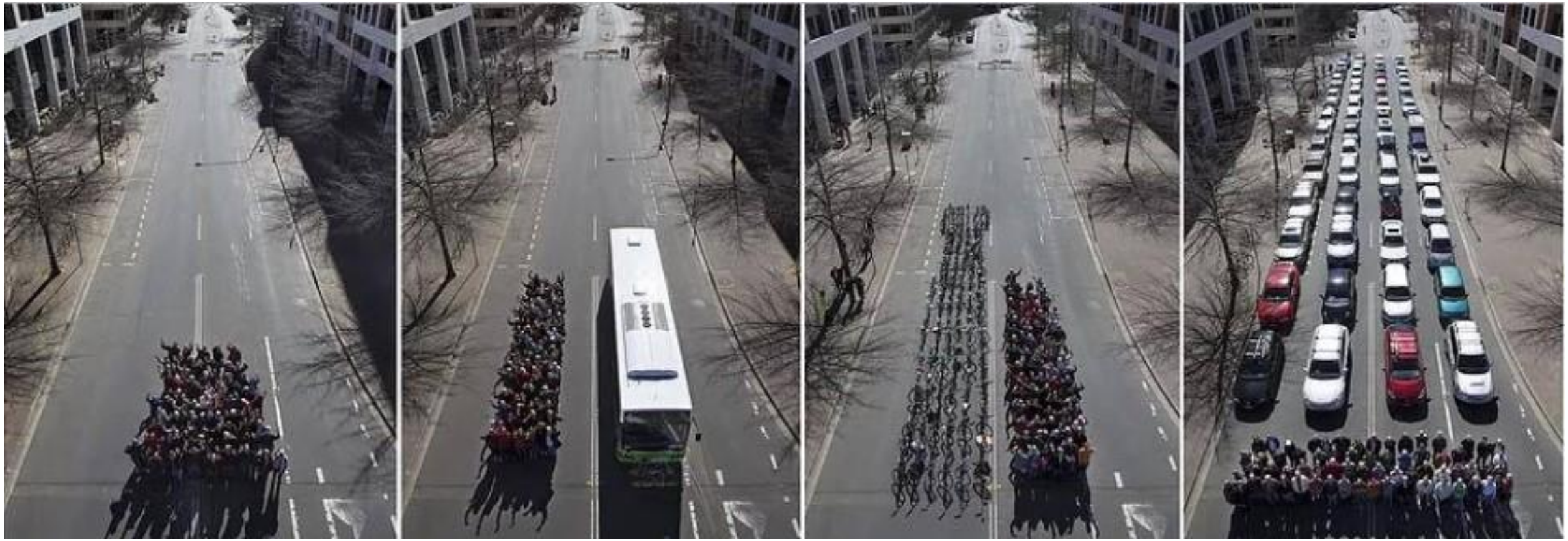
NYC

From: WB

2 The main Issues is not the city itself rather urban form and lifestyle

2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

i. Public Transport System



Bus | Cycling | Car

2 The main Issues is not the city itself rather urban form and lifestyle

2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

ii. Walkable City

Orchard Road, Singapore

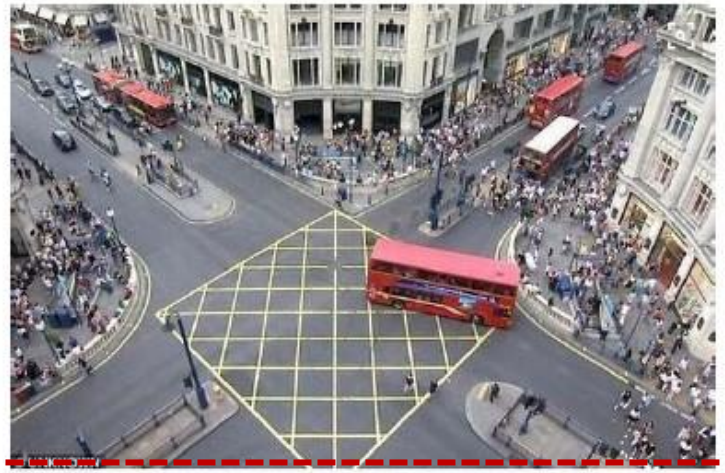
Time square, NYC

2 The main Issues is not the city itself rather urban form and lifestyle

2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

ii. Walkable City

Before



After

Midtown, NYC

London

Time square, NYC

2 The main Issues is not the city itself rather urban form and lifestyle

2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

iii. Public Space (Park and Waterbody)

Before

After

Bishan Park, Singapore

2 The main Issues is not the city itself rather urban form and lifestyle

2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

iii. Public Space (Park and Waterbody)

Before

After

Cheonggyechun, Seoul

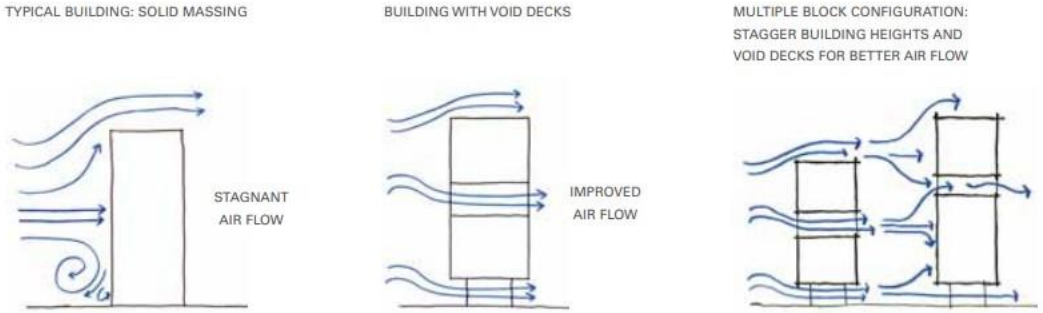
2 The main Issues is not the city itself rather urban form and lifestyle

2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

iv. Building

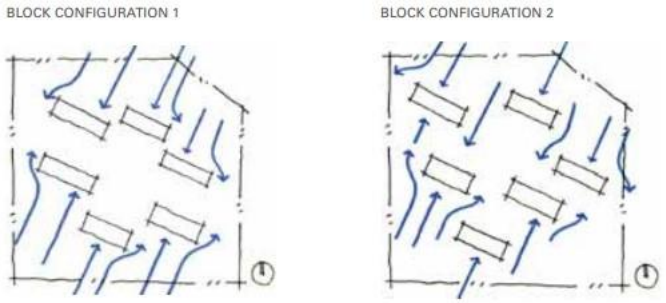
a. Building Siting, Massing and Orientation

Buildings consume 36% of final energy, produce 40% of global solid waste and 40% of GHG emissions.



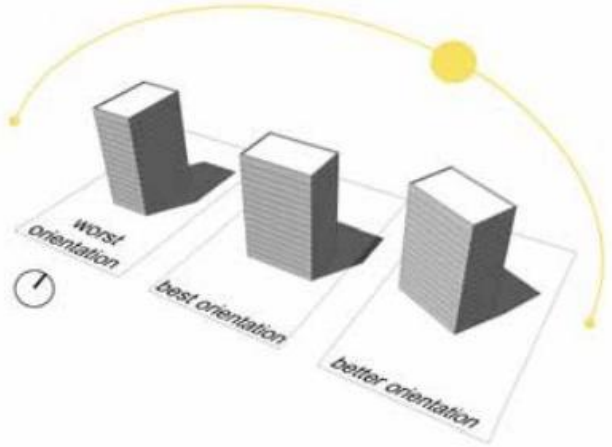
[Figure 7] Mitigation of stagnant air flow areas.

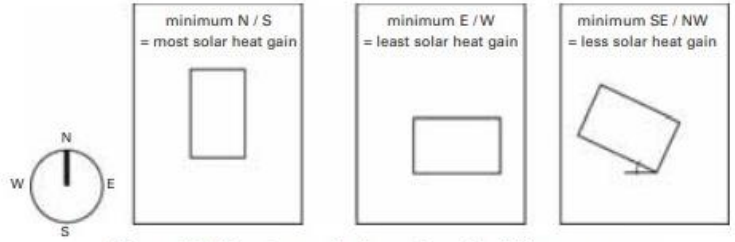
However, simply sticking to the NE / SW wind direction assumption may prove wrong on certain sites. The following conditions may affect the wind direction:



[Figure 8] Air flow diagram for different block configurations.

- The buildings adjacent and around your site. They can serve to create different wind directions. For instance, in the city area e.g. Central Business District (CBD), wind directions vary significantly due to the number of tall buildings in the area that redirect wind flows. Similarly, in a project with multiple blocks, simply orienting the buildings to NE / SW does not ensure good natural ventilation [Figure 8].





[Figure 13] Massing and orientation of buildings to prevent exposure to solar gains.

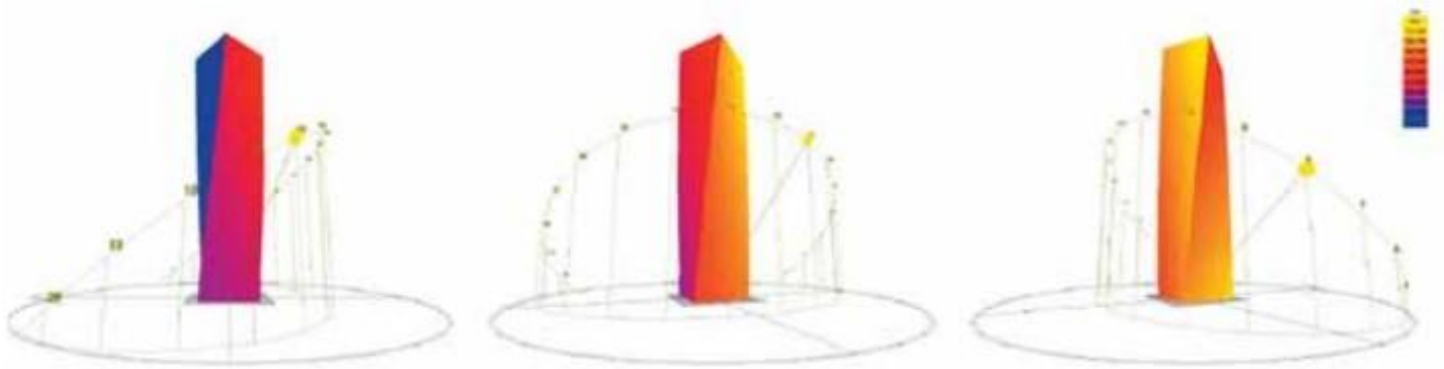
From: Singapore

2 The main Issues is not the city itself rather urban form and lifestyle

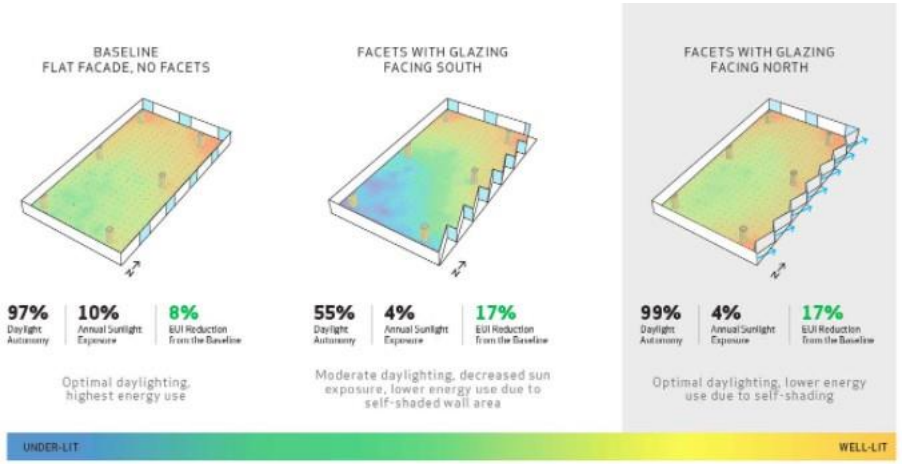
2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

iv. Building

b. Building Envelope

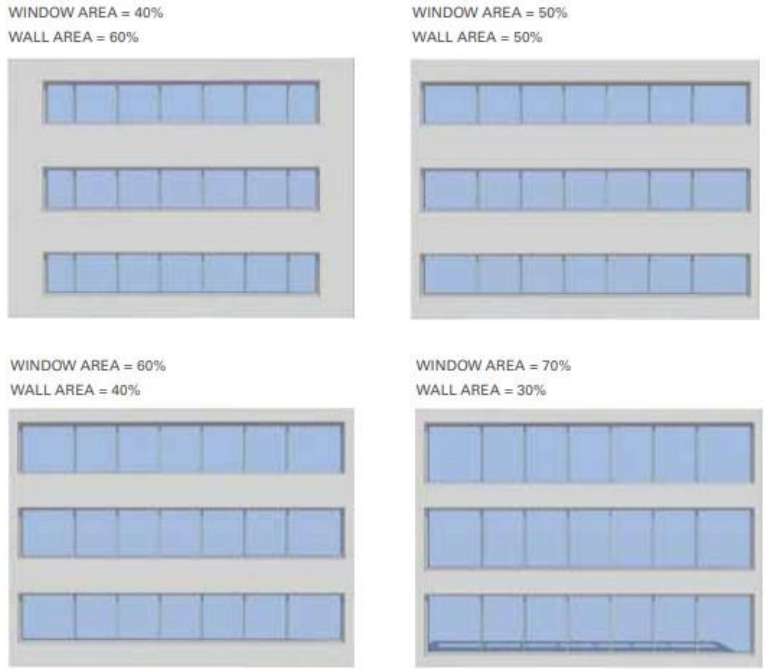


[Figure 1] Solar study to determine distribution of incident solar radiation on building envelope.



WINDOW-TO-WALL RATIO

Adjusting the window-to-wall ratio (WWR) of the building envelope affects the amount of heat entering a space [Figure 2].



[Figure 2] Window-to-wall ratios.

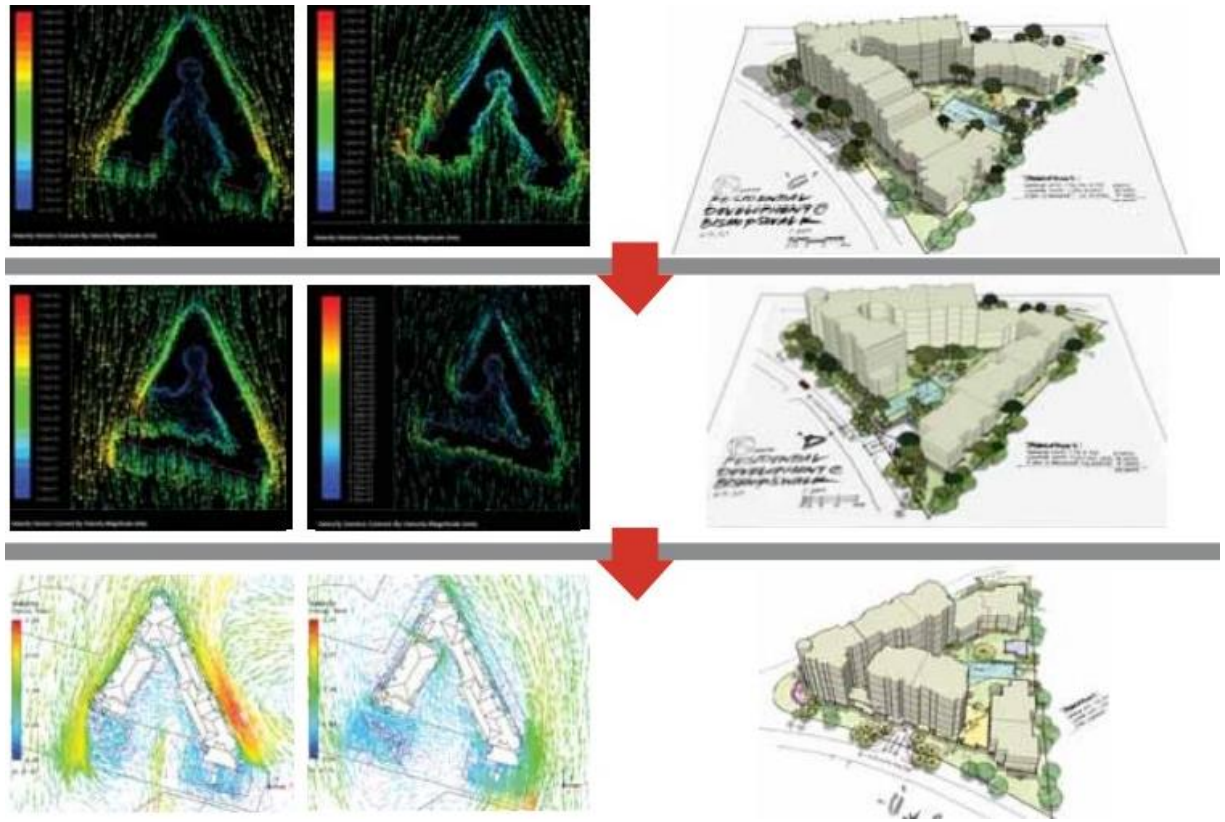
From: Singapore

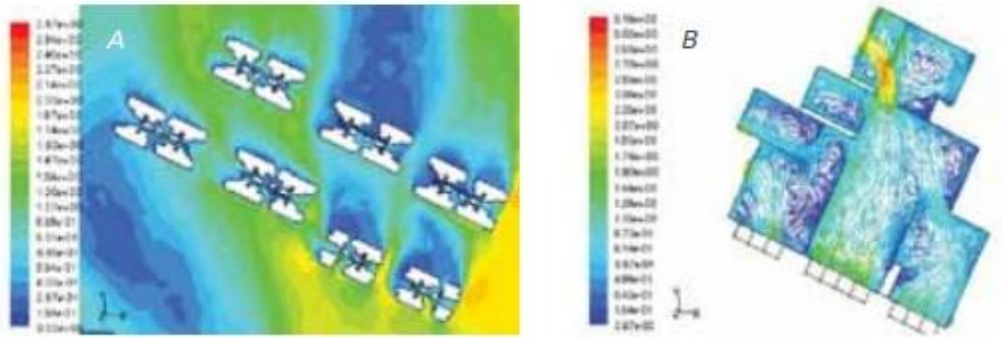
2 The main Issues is not the city itself rather urban form and lifestyle

2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

iv. Building

c. Natural Ventilation





[Figure 23] Air velocity contour plots at estate level (left) and vector plots at unit level (right) conducted for HDB's demo eco-precinct: Treelodge @ Punggol.

Source: HDB

From: Singapore

2 The main Issues is not the city itself rather urban form and lifestyle

2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

iv. Building

d. Building Greenery and Landscaping

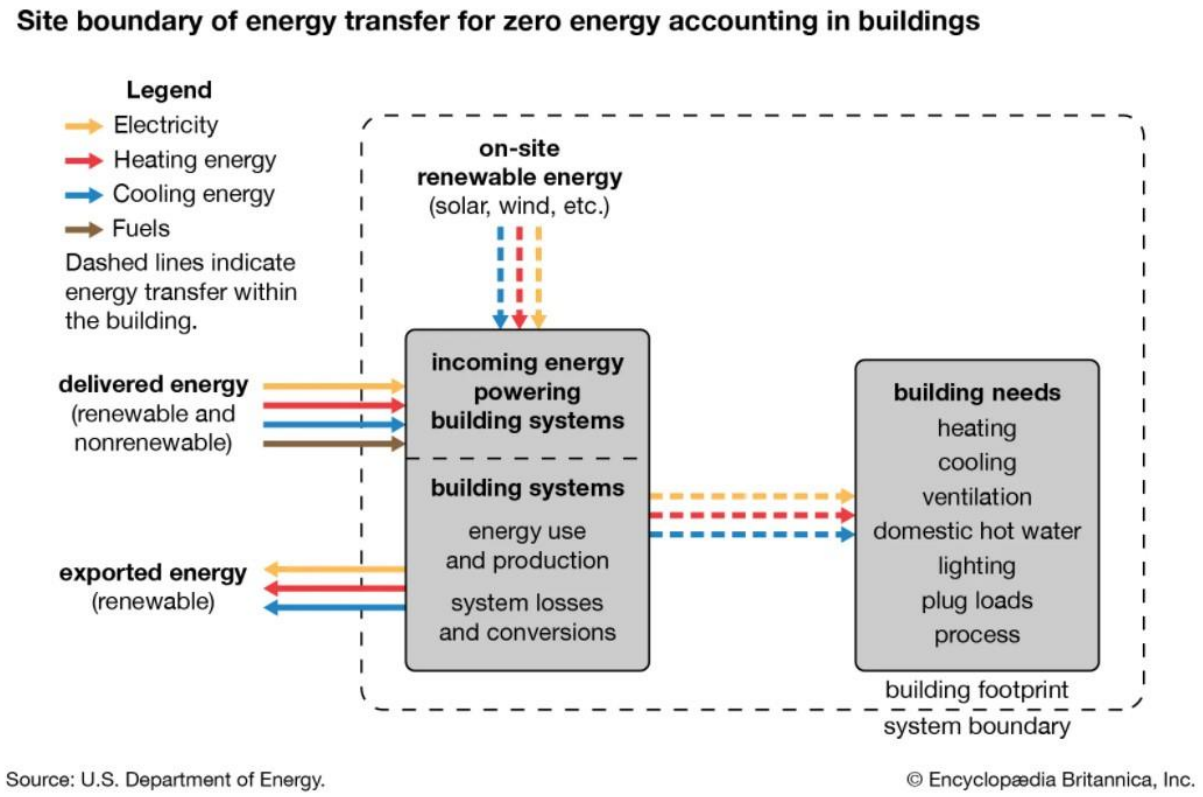
From: Singapore

2 The main Issues is not the city itself rather urban form and lifestyle

2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

iv. Building

d. Renewable Energy



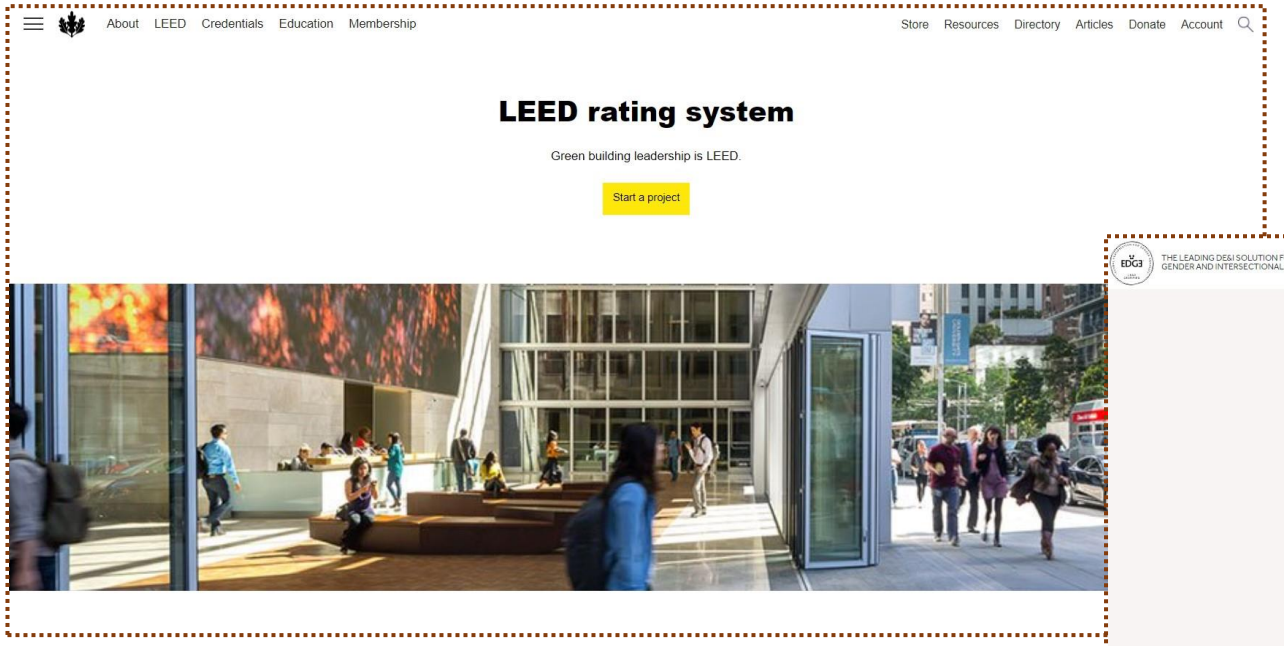
2 The main Issues is not the city itself rather urban form and lifestyle

2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

iv. Building

e. LEED and EDGE

LEED (US Green Building Council)



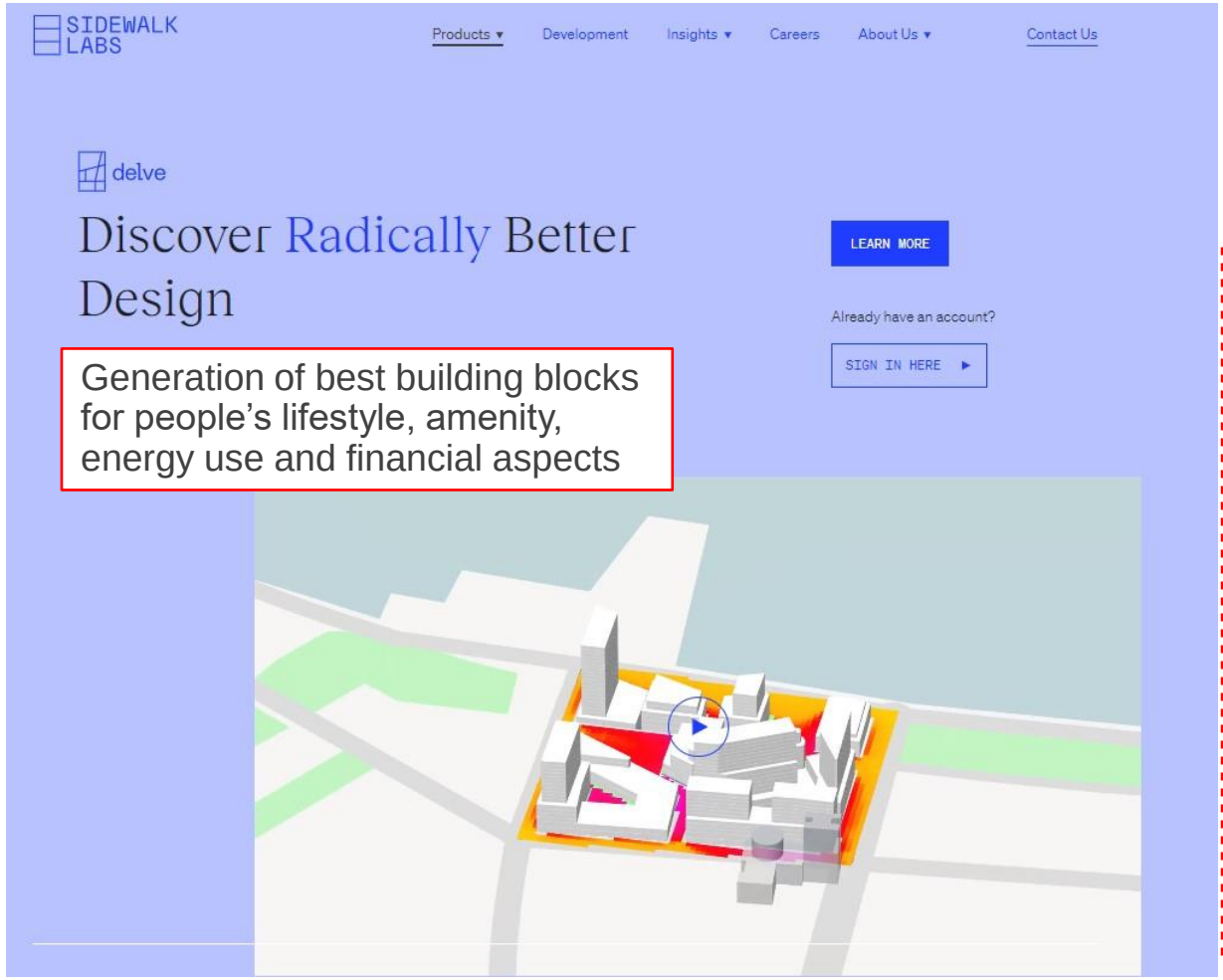
EDGE (IFC)

2 The main Issues is not the city itself rather urban form and lifestyle

2-2. Lifestyles (the way people work, live and travel) are important factor in generation of GHG emissions

iv. Building

f. Technology



Generation of best building blocks for people's lifestyle, amenity, energy use and financial aspects

Comparing a Benchmark to a High-Performing Variant

Priority Outcome	Baseline	Delve	Improvement
Unit Yield	2,417 units	2,612 units	+8%
Average Unit Size	789 sq ft / unit	802 sq ft / unit	+2%
Leasable Residential Area	1.91M sq ft	2.09M sq ft	+10%
Daylight Access	62%	63%	+2%
Sun Hours	5.9 hours	6.1 hours	+3%
Open Space	7.26 acres	8.07 acres	+11%

+ Energy use/efficiency
+ Construction cost
+ Maintenance cost
+ Transport planning

3 Urban policy can contribute to the global climate change

3-1. Late responses to climate change are costly

What We'll Pay If Global Warming Continues Unchecked

The Global Warming Price Tag in Four Impact Areas, 2025 through 2100

		In billions of 2006 dollars (Per year)				As a percentage of GDP (US GDP is $23.2 Trillion in 2021)				U.S. Regions Most at Risk
		2025	2050	2075	2100	2025	2050	2075	2100	
	Hurricane Damages	$10	$43	$142	$422	0.05%	0.12%	0.24%	0.41%	Atlantic and Gulf Coast states
	Real Estate Losses	$34	$80	$173	$360	0.17%	0.23%	0.29%	0.35%	Atlantic and Gulf Coast states
	Energy-Sector Costs	$28	$47	$82	$141	0.14%	0.14%	0.14%	0.14%	Southeast and Southwest
	Water Costs	$200	$336	$565	$950	1.00%	0.98%	0.95%	0.93%	Western states
	SUBTOTAL FOR FOUR IMPACT*	**$271**	**$506**	**$961**	**$1,873**	**1.36%**	**1.47%**	**1.62%**	**1.84%**	

*Note: Totals may not add up exactly due to rounding.

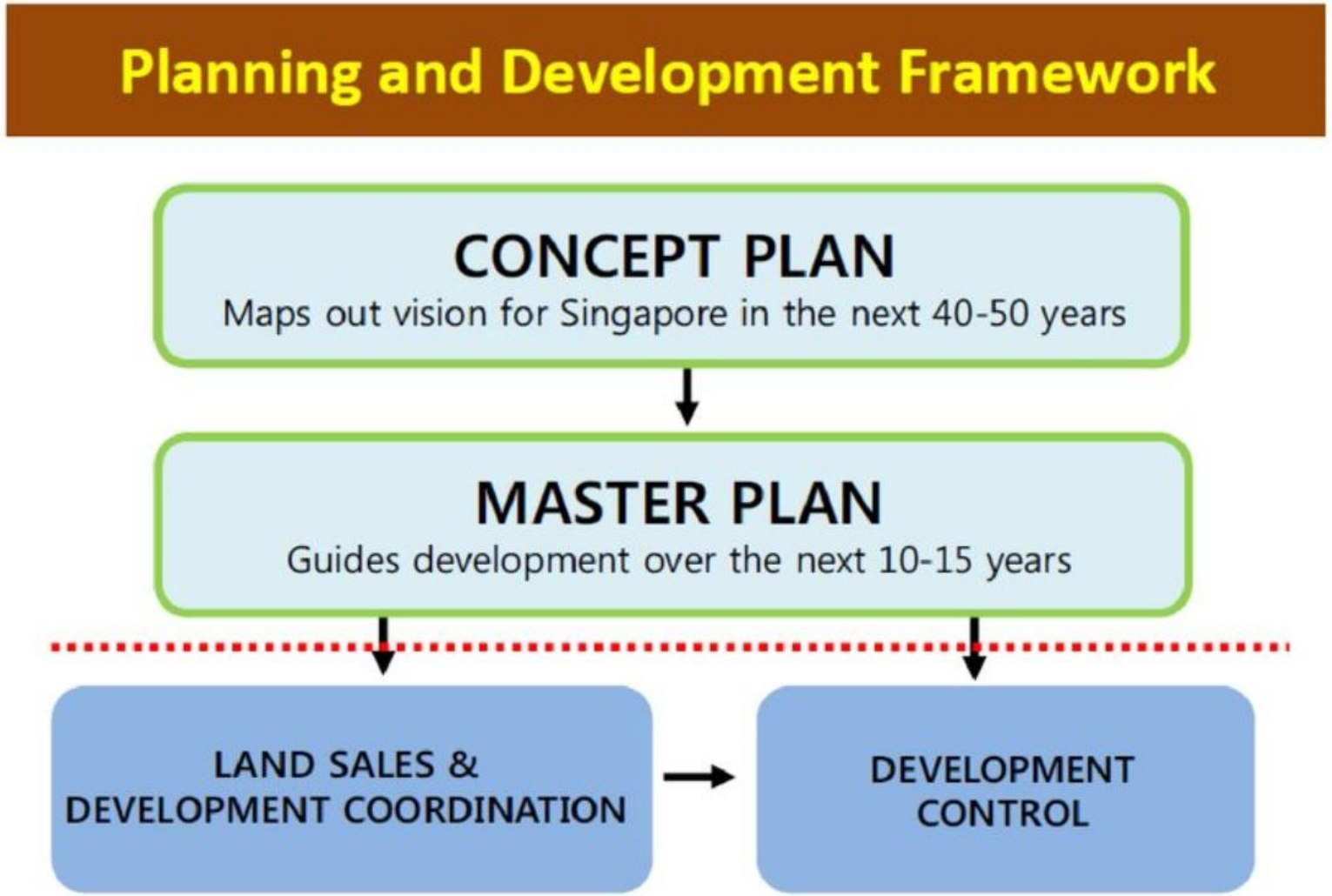
The cost of climate impacts in developing countries could be up to $300 Billion per year by 2030 and $500 Billion per year by 2050, the analysis found.

UN (in COP 26) says that the cost of climate crisis in developing world up to 10 times higher than aid pledged by richer nations.

Urban policy can contribute to the global climate change

3-2. Urban policy can contribute to national GHG emission reduction targets

Mid- and Longer-term Planning a. Concept Plan / b. Master Plan

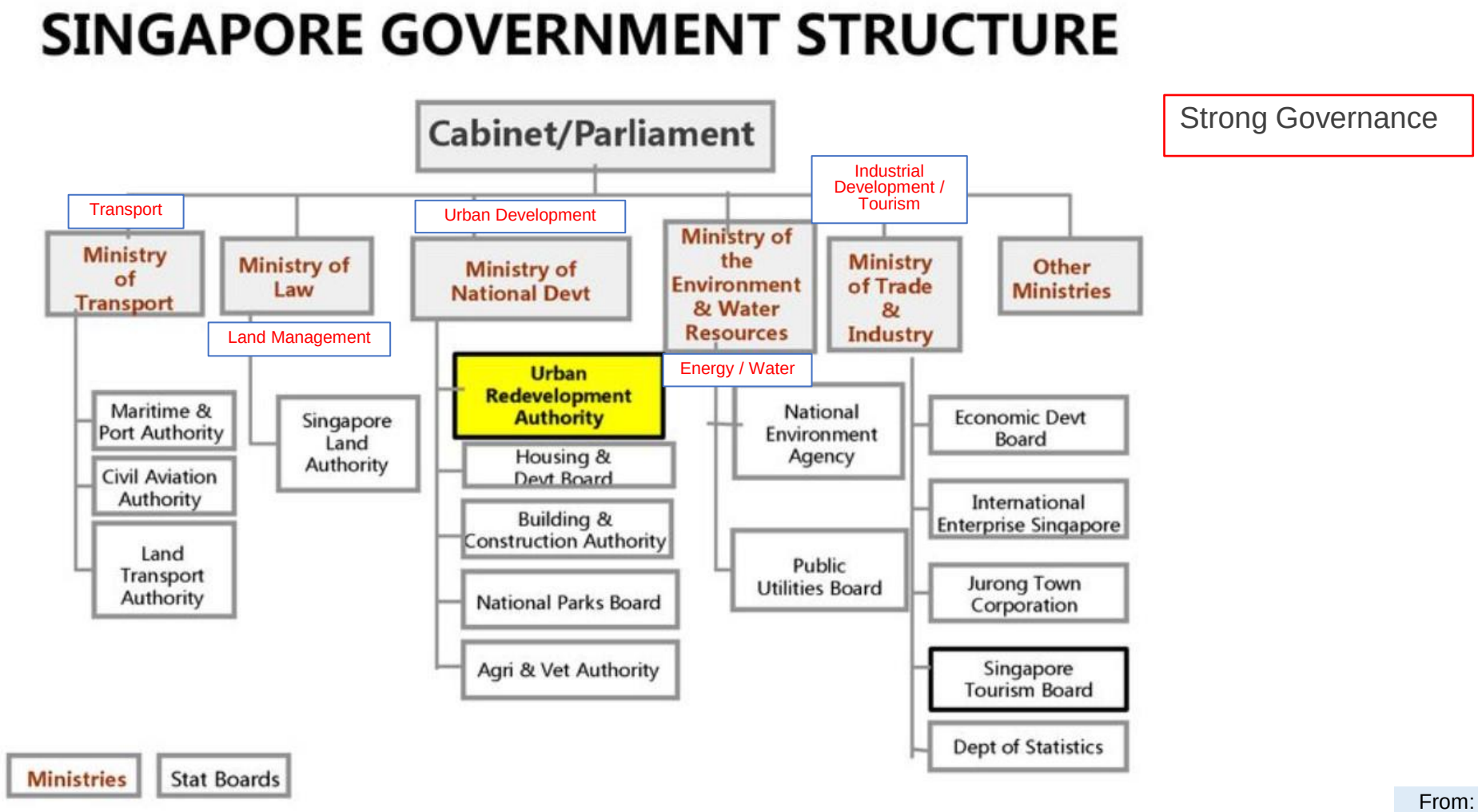


From: Singapore

3 Urban policy can contribute to the global climate change

3-2. Urban policy can contribute to national GHG emission reduction targets

Mid- and Longer-term Planning a. Concept Plan / b. Master Plan



Strong Governance

From: Singapore

3 Urban policy can contribute to the global climate change

3-2. Urban policy can contribute to national GHG emission reduction targets

Mid- and Longer-term Planning

a. Concept Plan

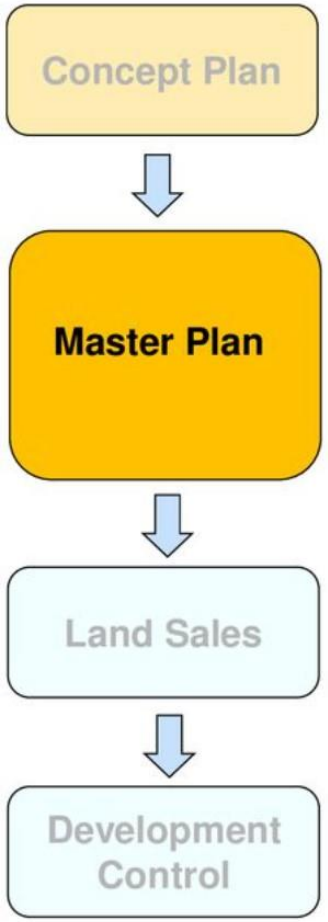
From: Singapore

ADB

Urban policy can contribute to the global climate change

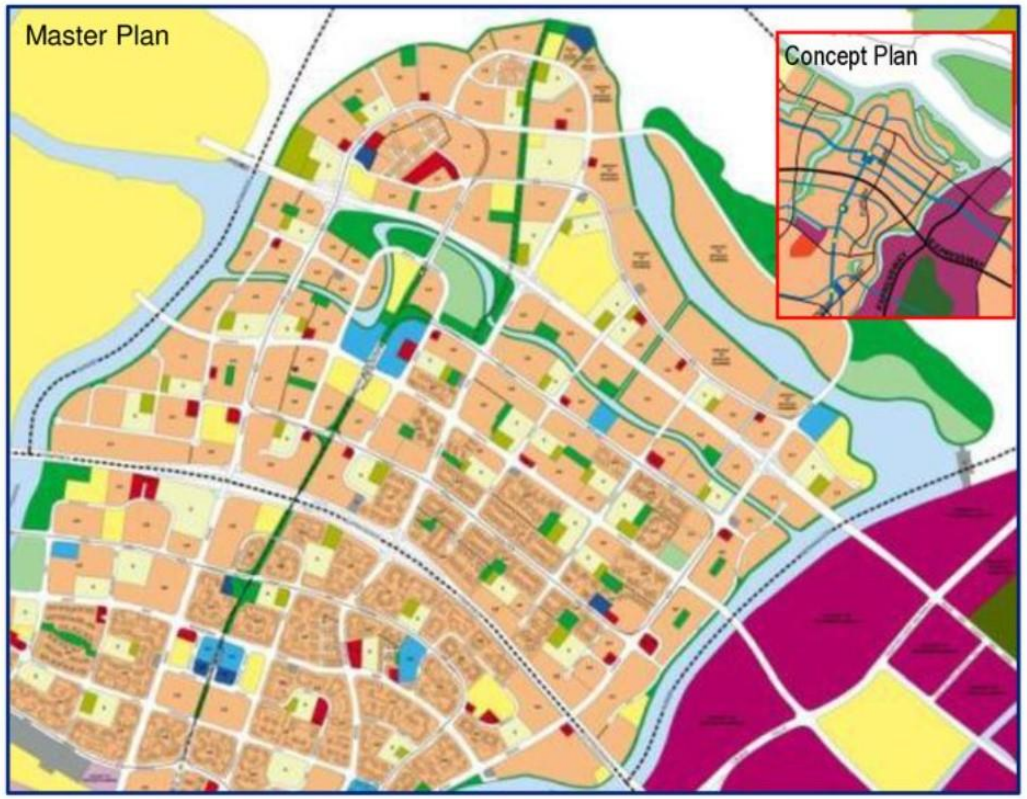
3-2. Urban policy can contribute to national GHG emission reduction targets

Mid- and Longer-term Planning b. Master Plan



Master Plan

- Statutory land use plan
- Guides development on each plot of land
- Reviewed every 5 years



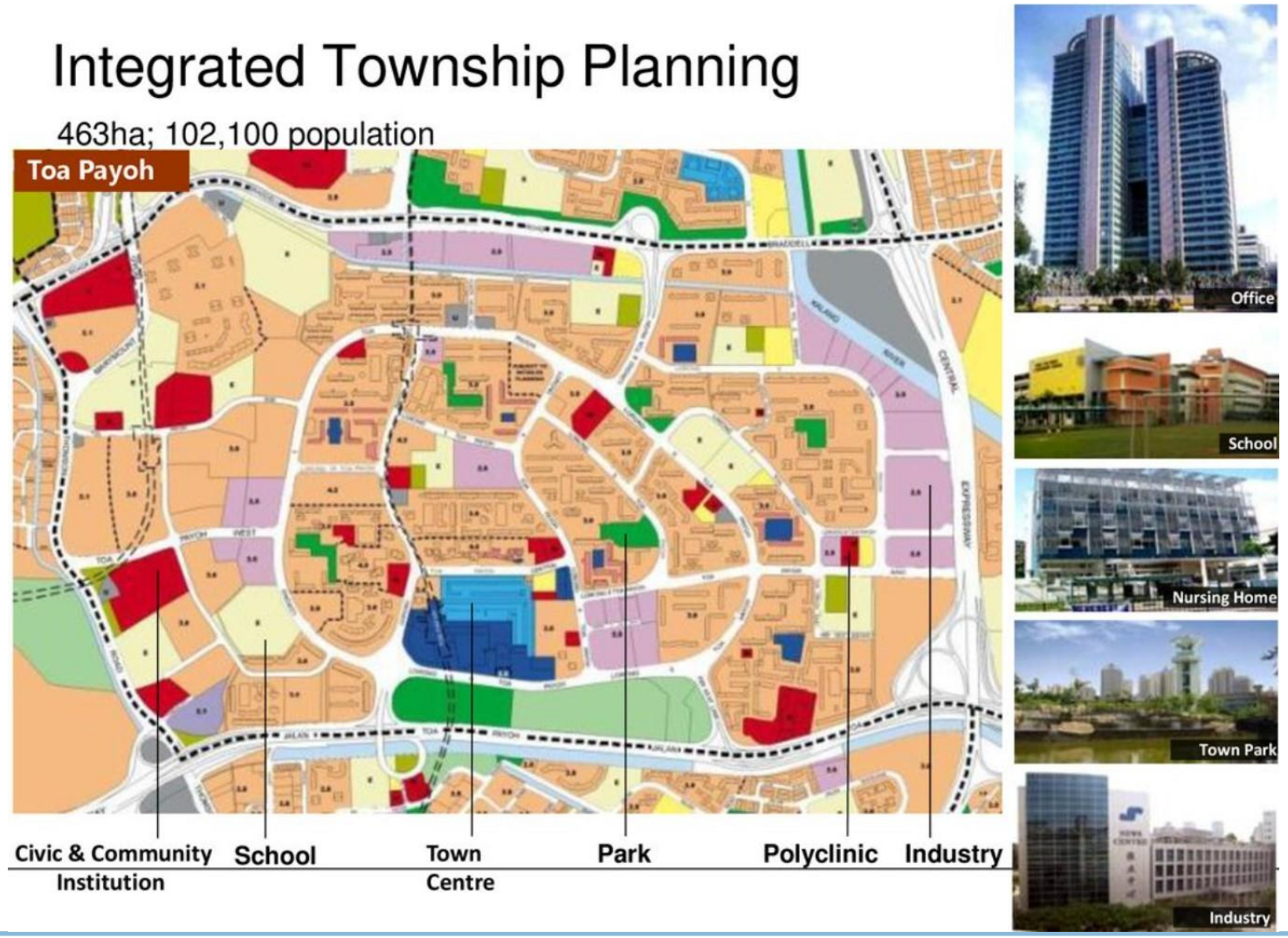
From: Singapore

3 Urban policy can contribute to the global climate change

3-2. Urban policy can contribute to national GHG emission reduction targets

Mid- and Longer-term Planning b. Master Plan

For self-sufficient town planning within neighborhood



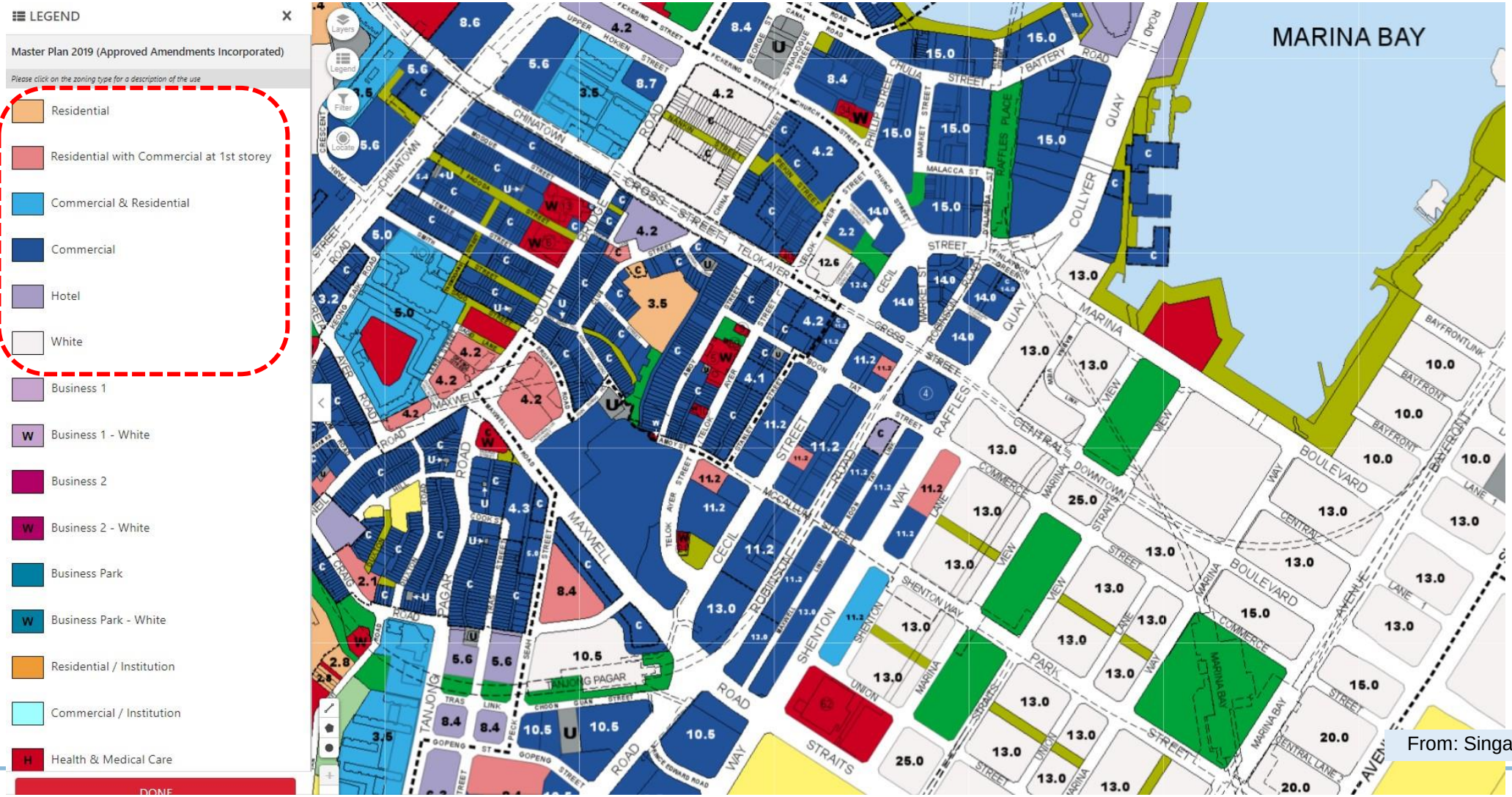
From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design a. Land Use Planning

Main contributors of GHG in the city

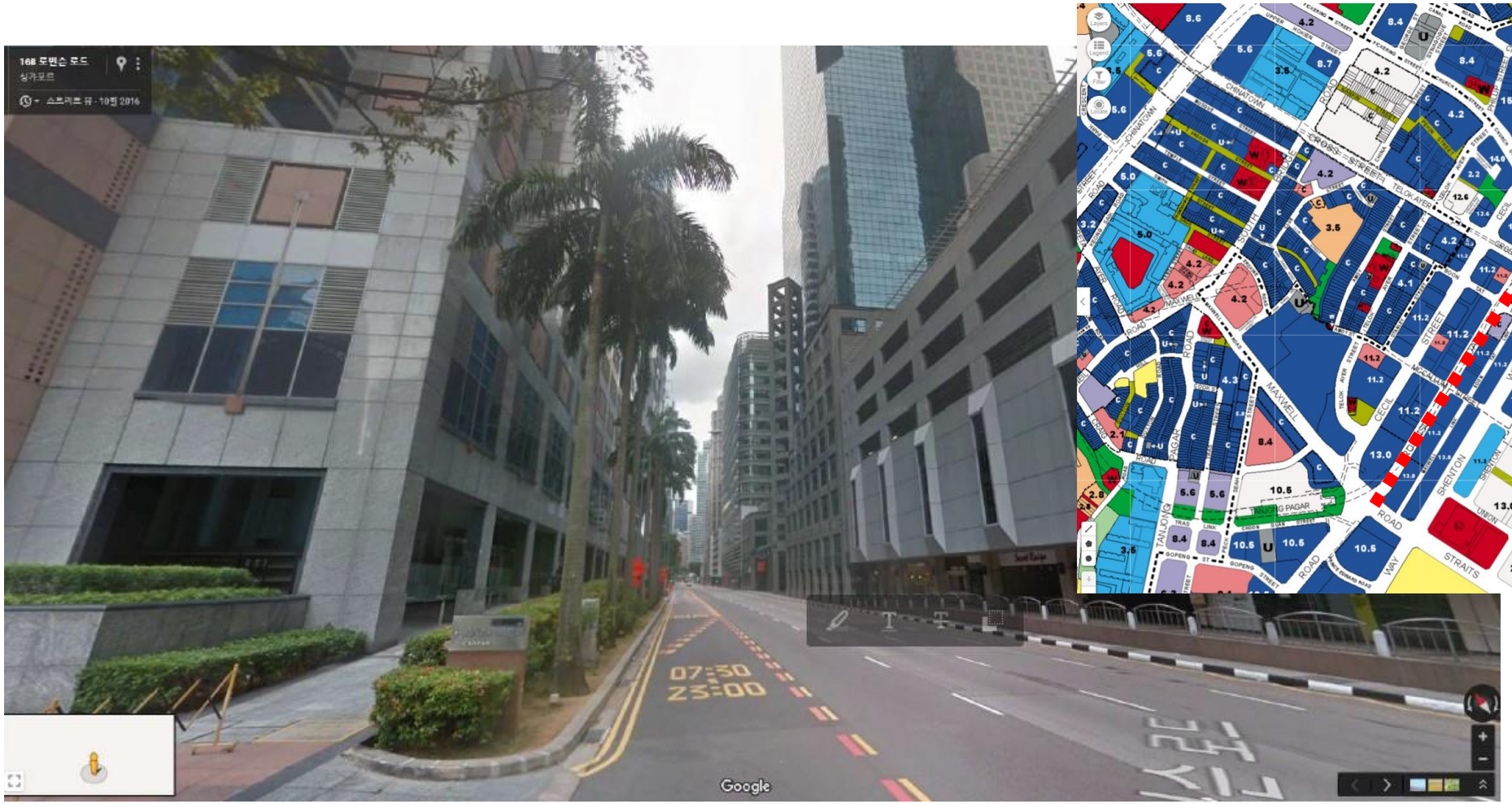


From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design a. Land Use Planning



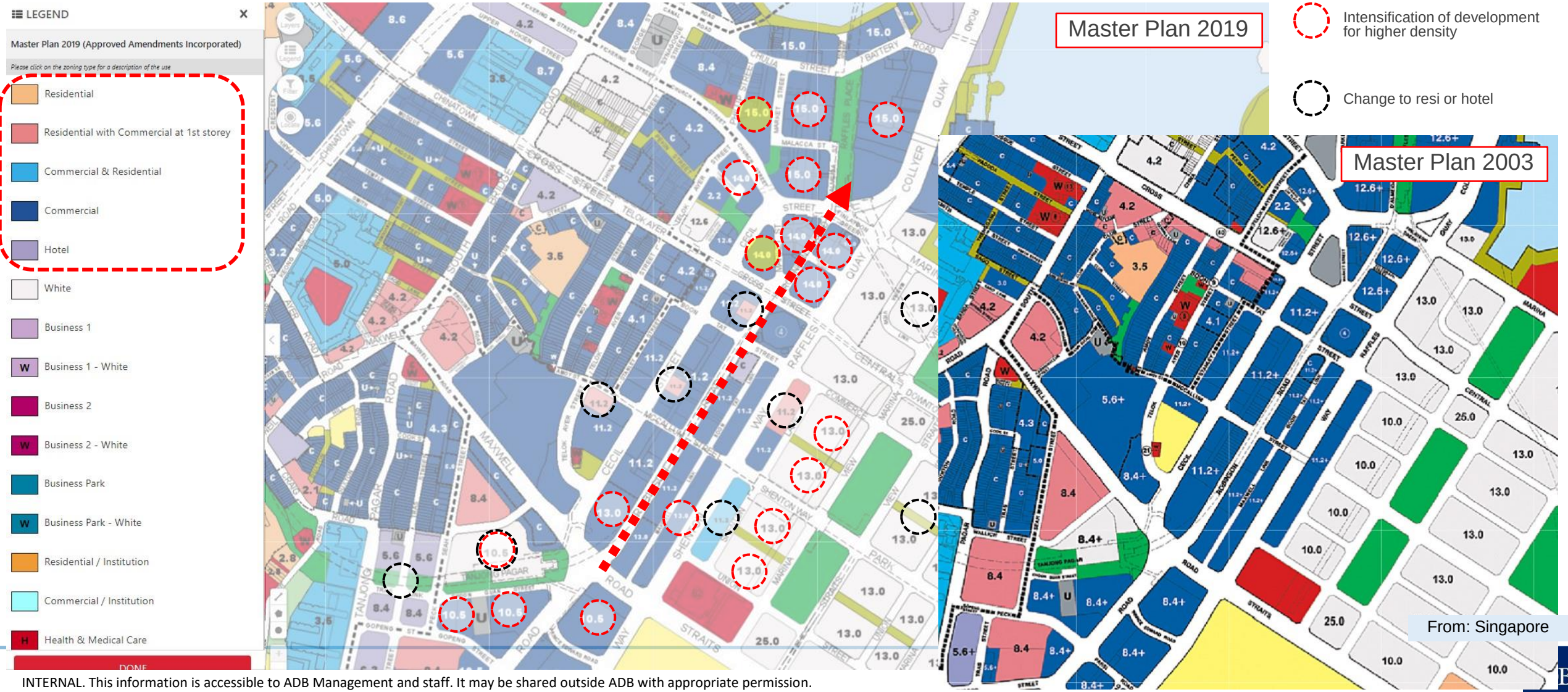
From: Singapore

ADB

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

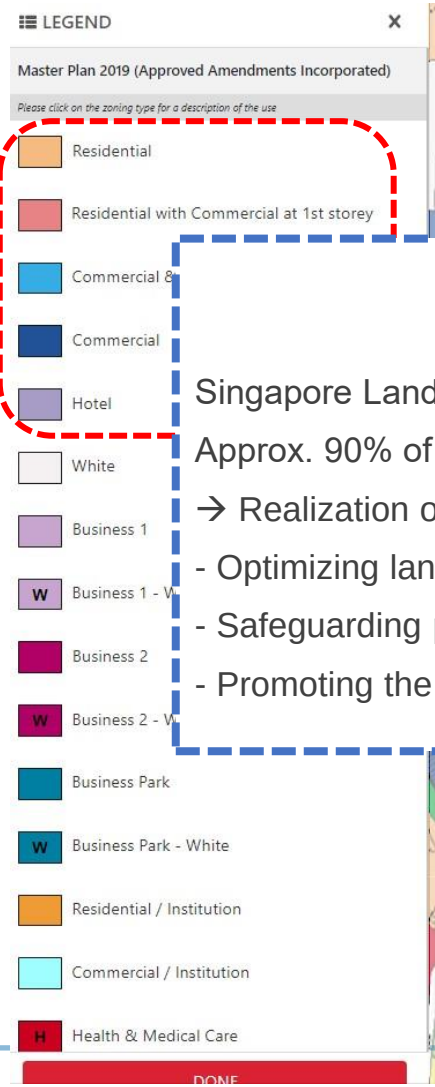
Urban Planning and Design a. Land Use Planning



3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design a. Land Use Planning



Intensification of development for higher density

Change to resi or hotel

Leasehold Approach

Singapore Land Authority's Vision is **"Limited Land, Unlimited Space"**

Approx. 90% of central area's land is owned by government

→ Realization of master planning through Government Land Sale Program (e.g., 99 years, 60 years, 30 years)

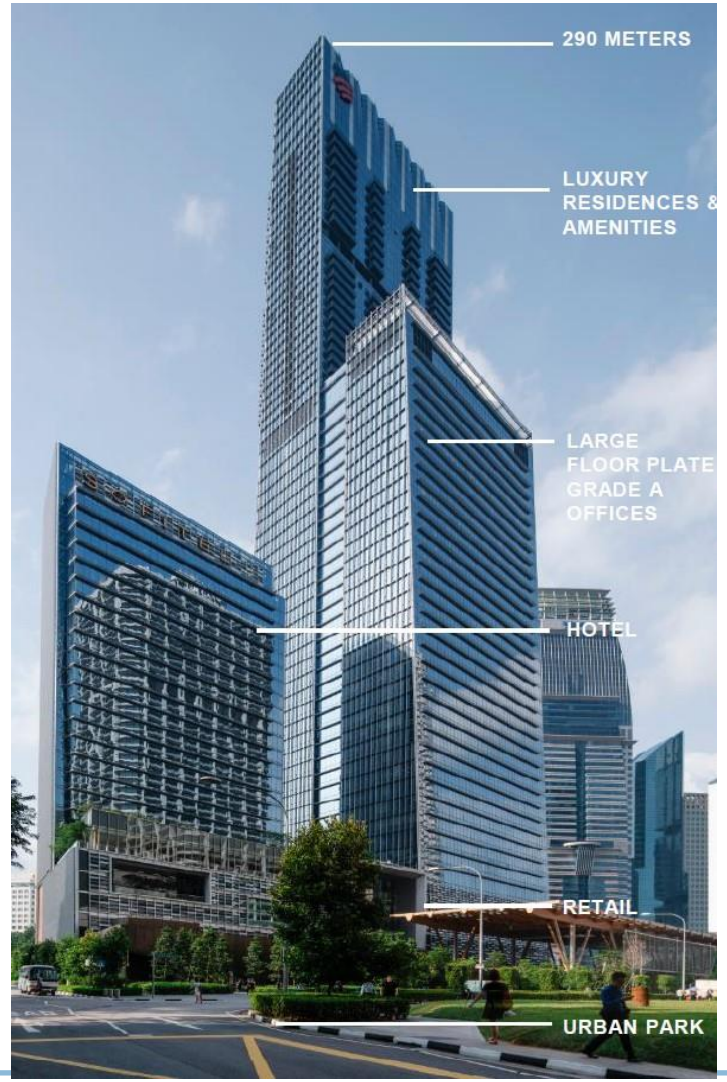
- Optimizing land and space utilization
- Safeguarding property ownership
- Promoting the use of land and space data

From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design a. Land Use Planning



Mixed-use (Office, Hotel, Residential)

Park and Landscape at 1st Storey

Example of mixed-use development through government land sale for 99-year leasehold

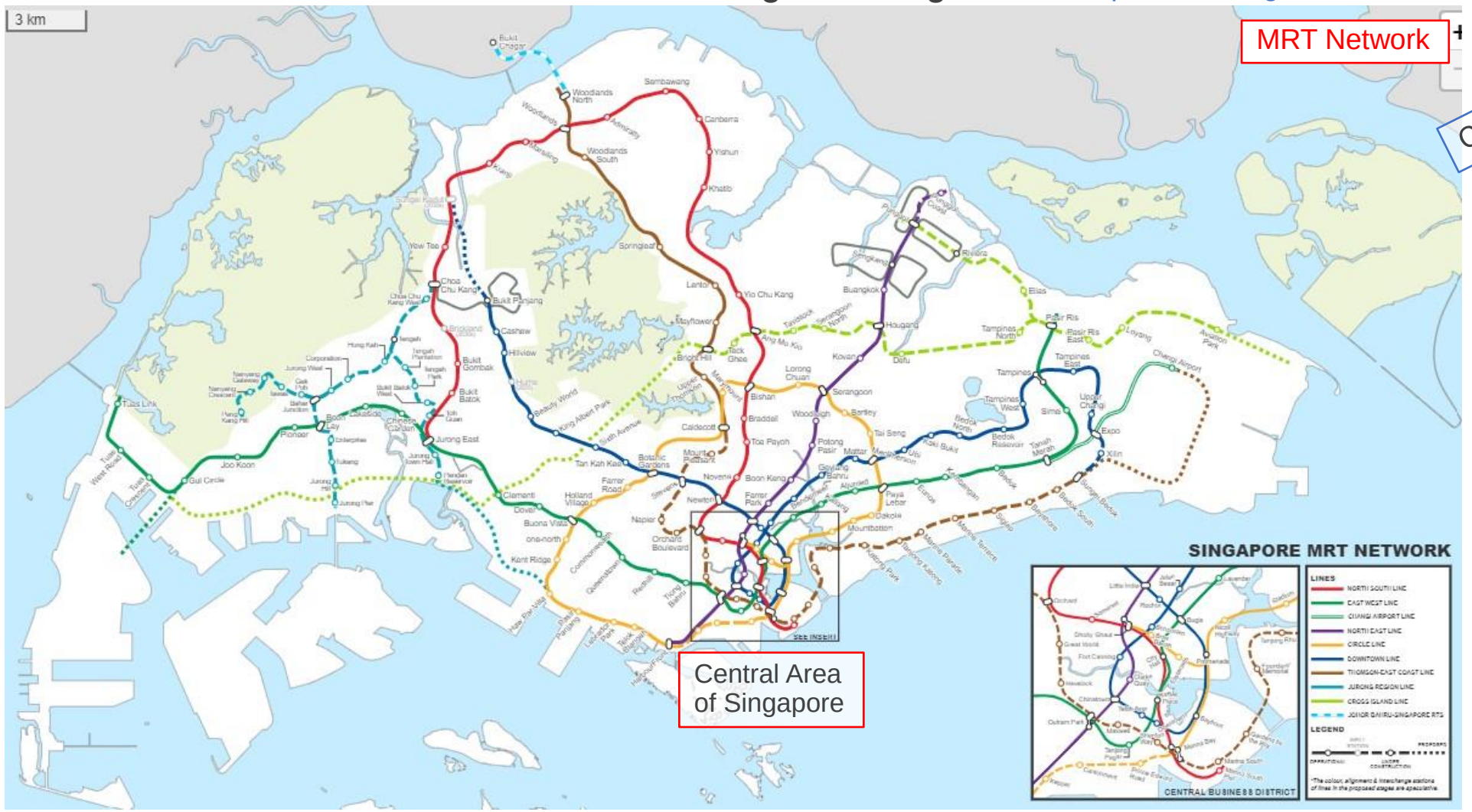
Direct connection to MRT

From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design b. Transport Planning

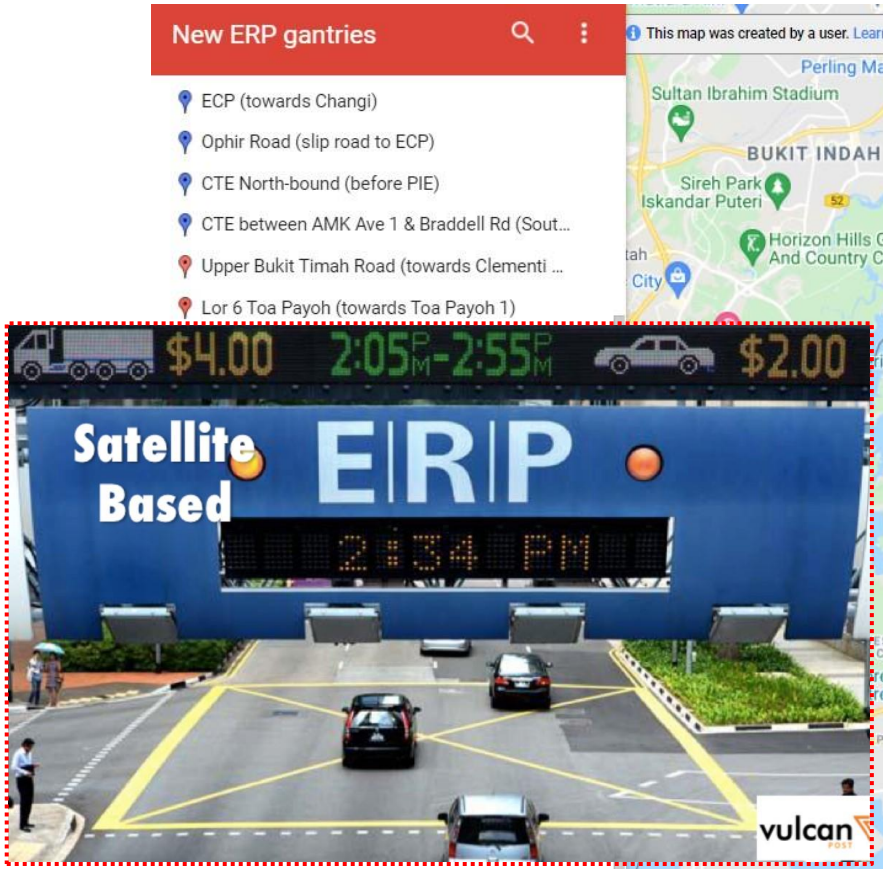


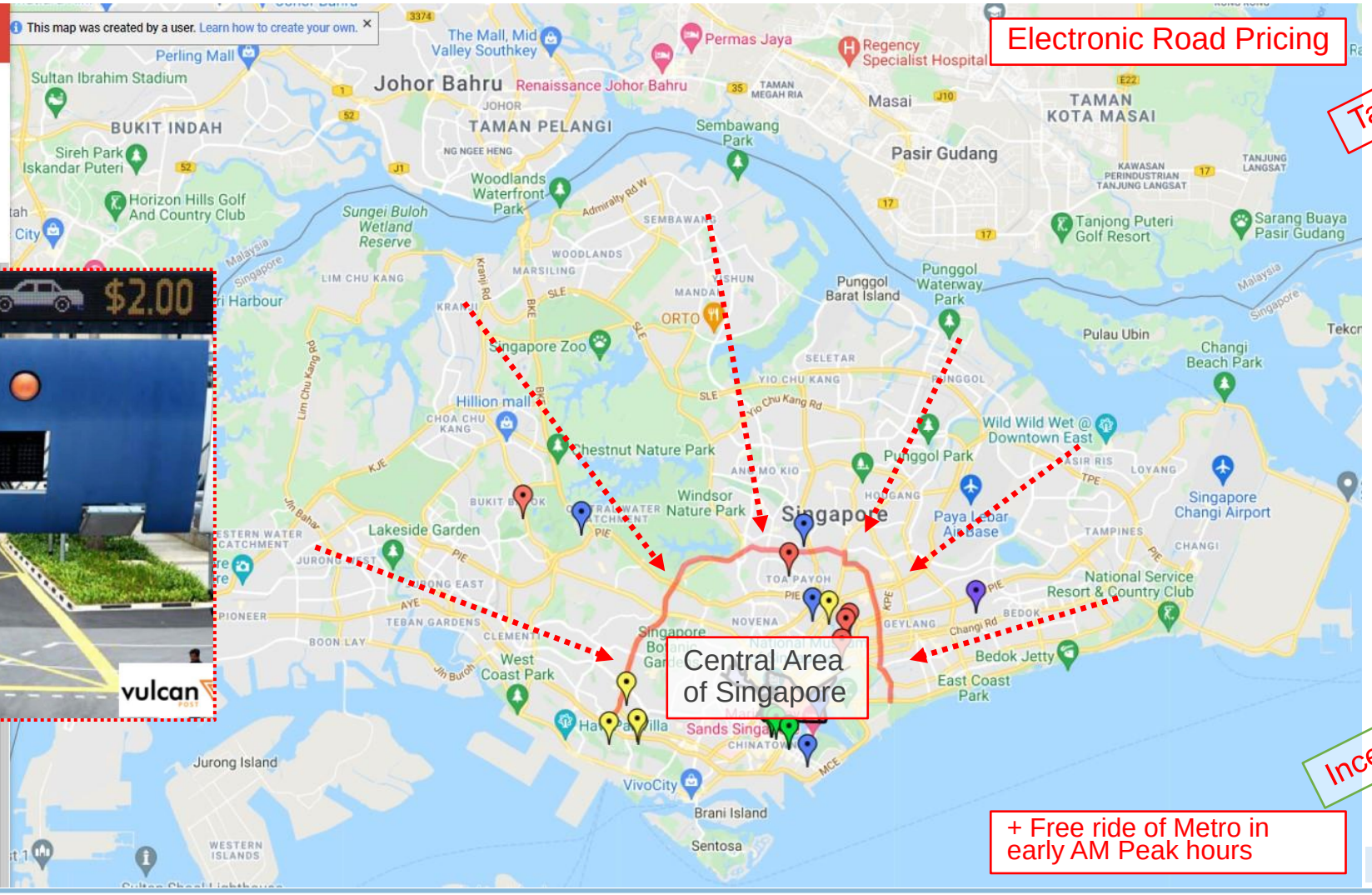
From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design b. Transport Planning





From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design b. Transport Planning

Tax scheme

COE (Certificate of Entitlement) Price

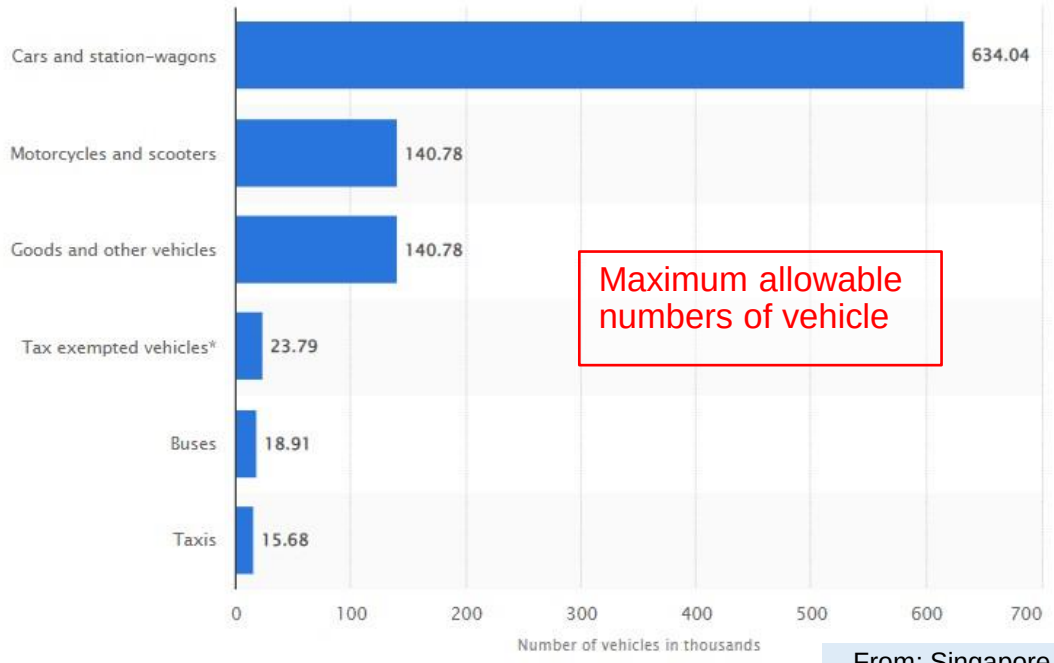
Anyone who wishes to register for a new vehicle in Singapore must first obtain a Certificate of Entitlement (COE). A COE represents a right to vehicle ownership and use of the limited road space for 10 years. Below are the latest bidding results.

Thinking of renewing your COE for your car or getting a pre-loved car? Let AA Car Evaluation Service assess its condition. Click here to find out more!

Month/Year	Cat A Car up to 1600cc & 97KW	Cat B Car above 1600cc or 97KW	Cat E Open - All Except Motorcycle	Cat C Goods Vehicle & Bus	Cat D Motorcycle	Total Bids	Quota
Jan 2022	$57,898	$82,001	$83,911	$43,001	$10,000	2,513	1,775
Jan 2022	$57,599	$77,700	[illegible]	[illegible]	$9,689	2,436	1,800
Dec 2021	$58,801	$80,989	[illegible]	[illegible]	$9,601	2,522	1,822
Dec 2021	$57,010	$80,401	[illegible]	[illegible]	$9,401	2,629	1,791
Nov 2021	$55,001	$79,601	[illegible]	$43,502	$9,381	2,477	1,798
Nov 2021	$53,709	$82,801	$88,000	$42,001	$9,381	2,646	1,791
Oct 2021	$52,709	$80,210	$85,000	$40,501	$9,310	3,784	2,371
Oct 2021	$47,001	$70,200	$72,756	$38,890	$9,052	3,515	2,373
Sep 2021	$48, 000	$68,310	$70,002	$39,000	$9,089	3,490	2,342
Sep 2021	$47,000	$62,600	$64,700	$40,001	$9,689	3,296	2,368
Aug 2021	$46,689	$61,001	$64,901	$40,010	$9,500	3,455	2,367
Aug 2021	$45,189	$56,001	$59,599	$42,589	$8,899	3,189	2,342
July 2021	$47,010	$59,501	$60,001	$39,523	$8,689	3,955	2,743
July 2021	$45, 001	$56,100	$57,700	$38,900	$8,502	3,752	2,744

If you wish to own a 2,000cc car for 10 years, you need to pay S$ 82,000 for COE (i.e., tax for personal vehicle)

Motor vehicle population in Singapore (2020)



Maximum allowable numbers of vehicle

From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design b. Transport Planning

Conversion of Surplus Car Parking Spaces

10. The table below summarises the list of developments that the two policies above apply to. The new changes that take effect 1 Feb 2019 are highlighted in bold:

Incentive scheme

	Convert Surplus Car Parking Spaces into Other Uses within Existing Developments	Compute Surplus Car and Motorcycle Parking Spaces as GFA in New Developments
Central Area	Commercial, Mixed-use, Hotel and **Residential**	Commercial, Mixed-use, Hotel and **Residential**
Within 400m of MRT, LRT Stations	**Commercial Mixed-use Hotel Business Parks**	Commercial, Mixed-use Hotel and **Business Parks**
All Other areas	Not Applicable	Commercial, Mixed-use, and Hotel

Incentive scheme With conditions

Table 1 Effective Date: 3 August 2020 to 27 November 2024

Locality	**Allowable Change-of-Use for Surplus Carparks**
Areas where CBD Incentive Scheme applies	Only non-office uses will be allowed, subject to planning evaluation and other considerations such as traffic. Examples of possible non-office uses: a. Residential b. Shops e.g. minimart, laundrette, hair salons, etc. c. Clinics d. Restaurants e. Indoor farms f. Gymnasium / Fitness centres g. Childcare centres h. Commercial schools This list is not exhaustive. Allowable uses may vary from site to site and shall not be cited as a precedent for other sites.
Rest of Central Area	Non-office uses are highly encouraged.

From: Singapore

ADB

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design b. Transport Planning

Incentive scheme

Five new areas to be 'car-lite' precincts, fewer parking lots with new standards for private developments

Published November 10, 2018
Updated November 10, 2018

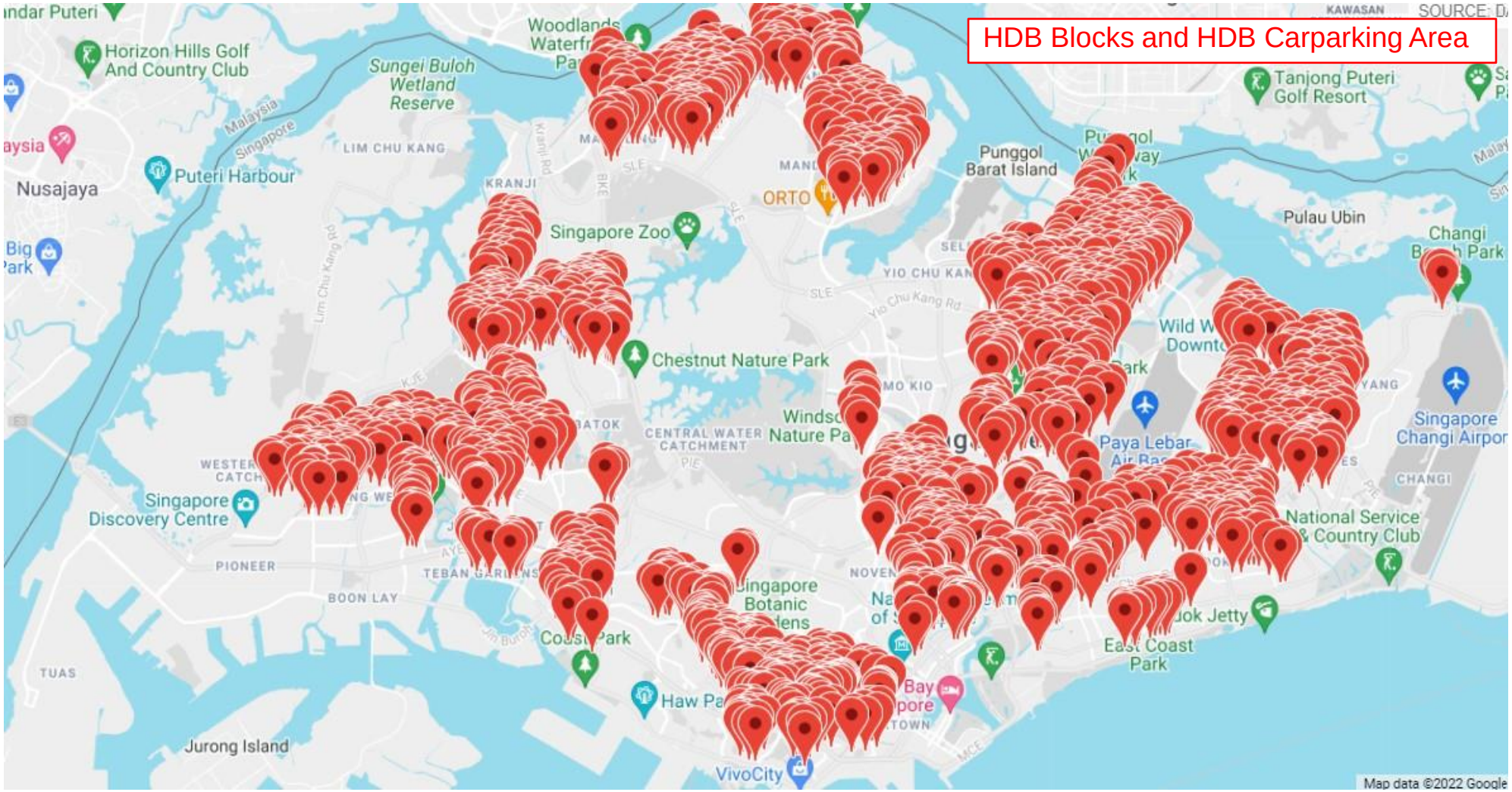
The five car-lite areas will be Marina South, Kampong Bugis, Woodlands North, Bayshore and Jurong Lake District. The authorities doing the planning will provide added support for public transport and alternative travel options in the precincts.

From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design b. Transport Planning



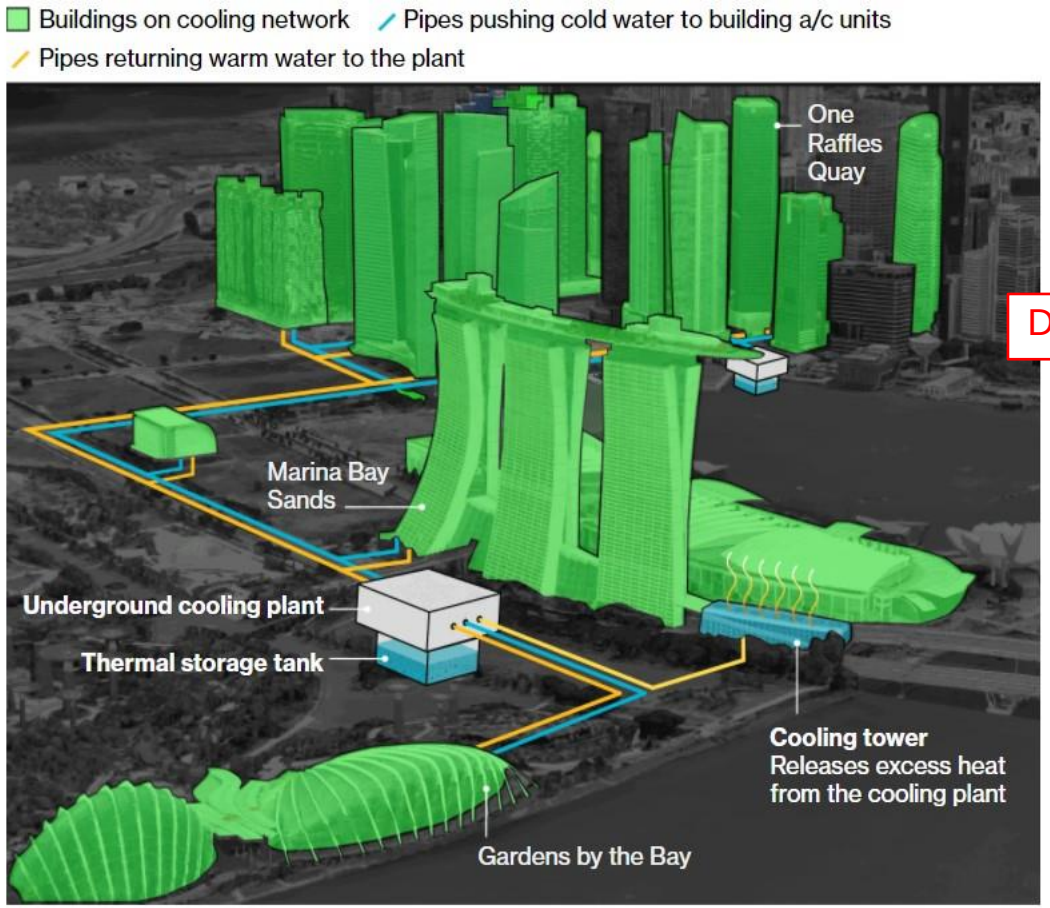
From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design c. Energy Efficiency

City's investment



Sources: SP Group, Urban Redevelopment Authority, Google Earth Studio

District Cooling System

Save more than 40% in energy for customers

An underground cooling plant. *Photographer: Wei Leng Tay/Bloomberg*

From: Singapore

3 Urban policy can contribute to the global climate change

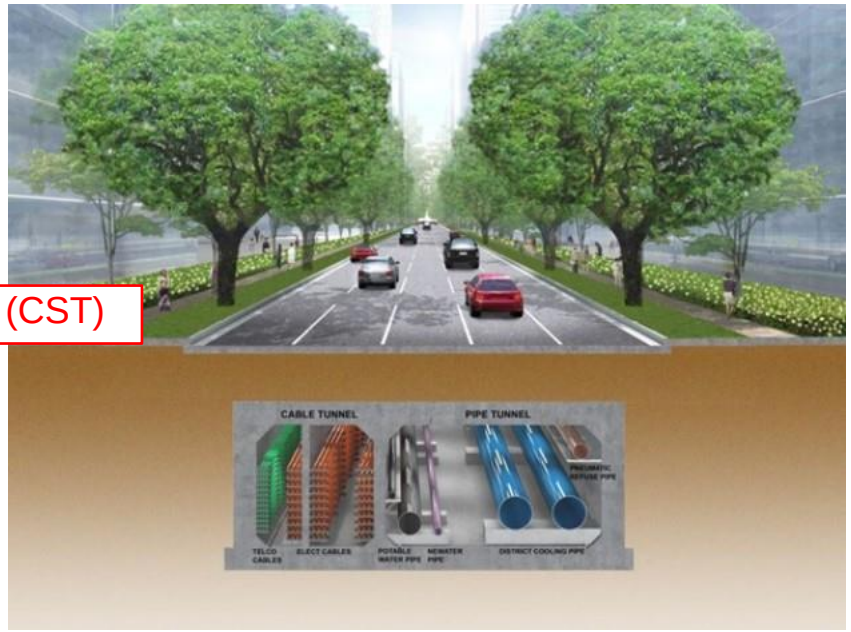
3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design c. Energy Efficiency

City's investment

District Pneumatic Refuse Conveyance System (DPRCS)
to be introduced in Marina Bay (new downtown district) & housing devt in Jurong

Common Service Tunnel (CST)



Common Service Tunnel

- Telecom cables
- Power lines
- Water and
- Pneumatic refuse collection pipes

From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design d. Building Construction

LEED and EDGE (Global)

Green Mark Buildings (Building Construction Authority)

- Energy & water efficiency
- Environmental protection
- Indoor environmental quality
- Other green and innovative features that contribute to better building performance

Incentive scheme
With conditions

Built Environment Transformation Gross Floor Area Incentive Scheme

Home > Industry Info > Sustainability > Green Mark Incentive Schemes > Built Environment Transformation Gross Floor Area Incentive Scheme

The Built Environment Transformation Gross Floor Area (BE Transformation GFA) Incentive Scheme ("Scheme") aims to encourage greater adoption of enhanced Construction Industry Transformation Map (ITM) standards in areas of digitalisation, productivity and sustainability ("ITM Outcome Requirements") in private sector developments.

Scheme Details

The Scheme was launched on 24 November 2021 for a 5-year validity period until 23 November 2026. Under the Scheme, developers/building owners can enjoy up to 3% additional GFA allowed beyond the Master Plan Gross Plot Ratio (GPR) for delivering the stipulated ITM Outcome Requirements in their building development on private sites of at least 5,000sqm GFA.

3% of GFA = 3% of building property value

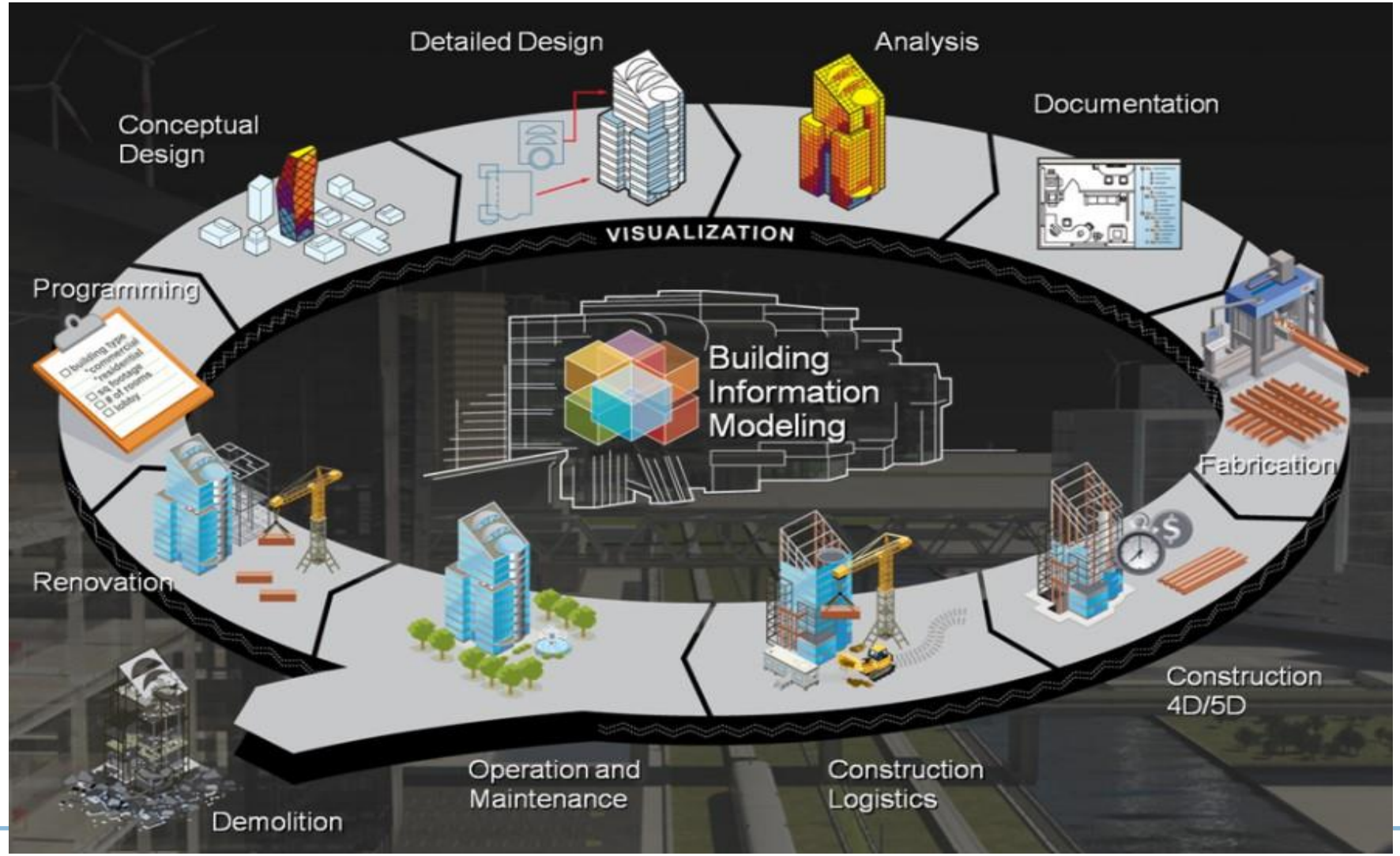
From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design d. Building Construction

Requirement

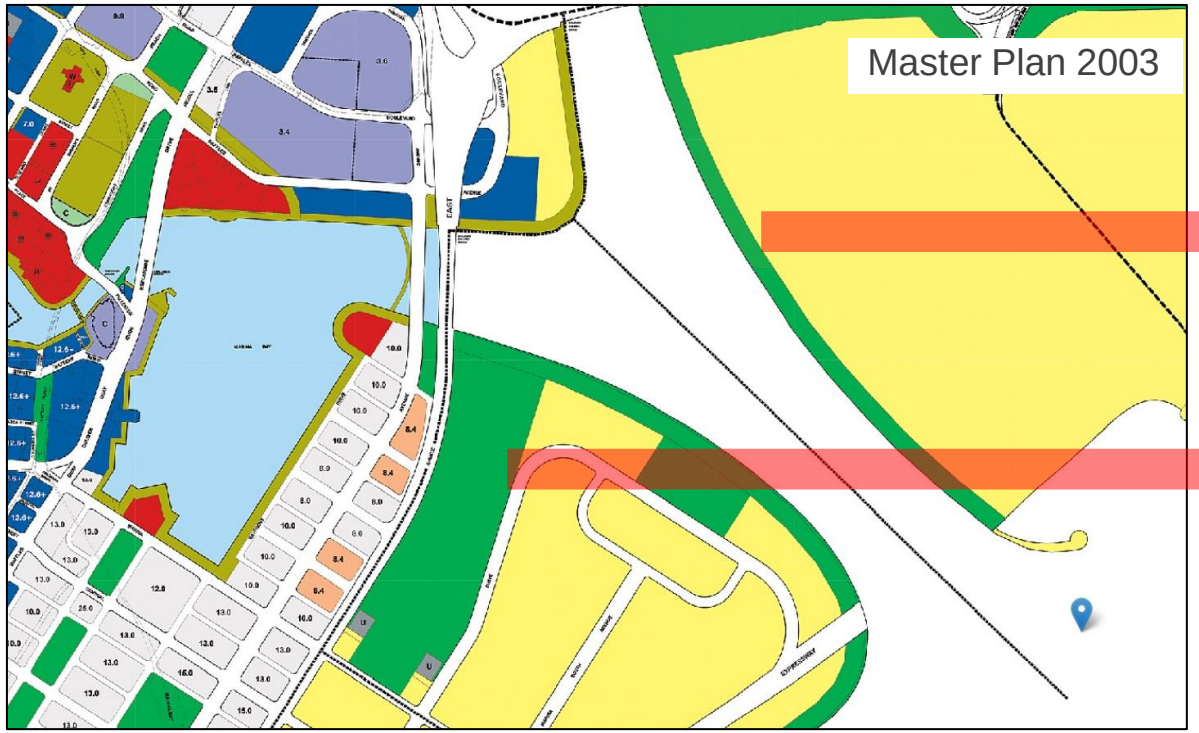


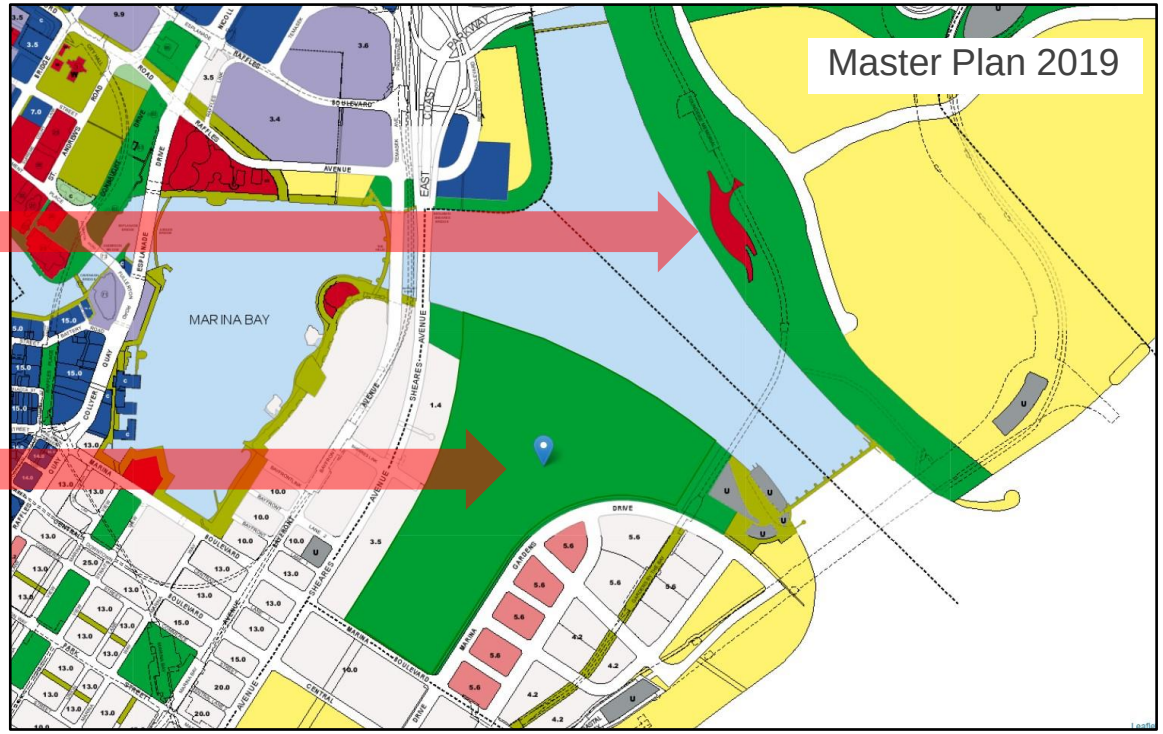
3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design e. Park Planning

City's investment





From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design e. Park Planning

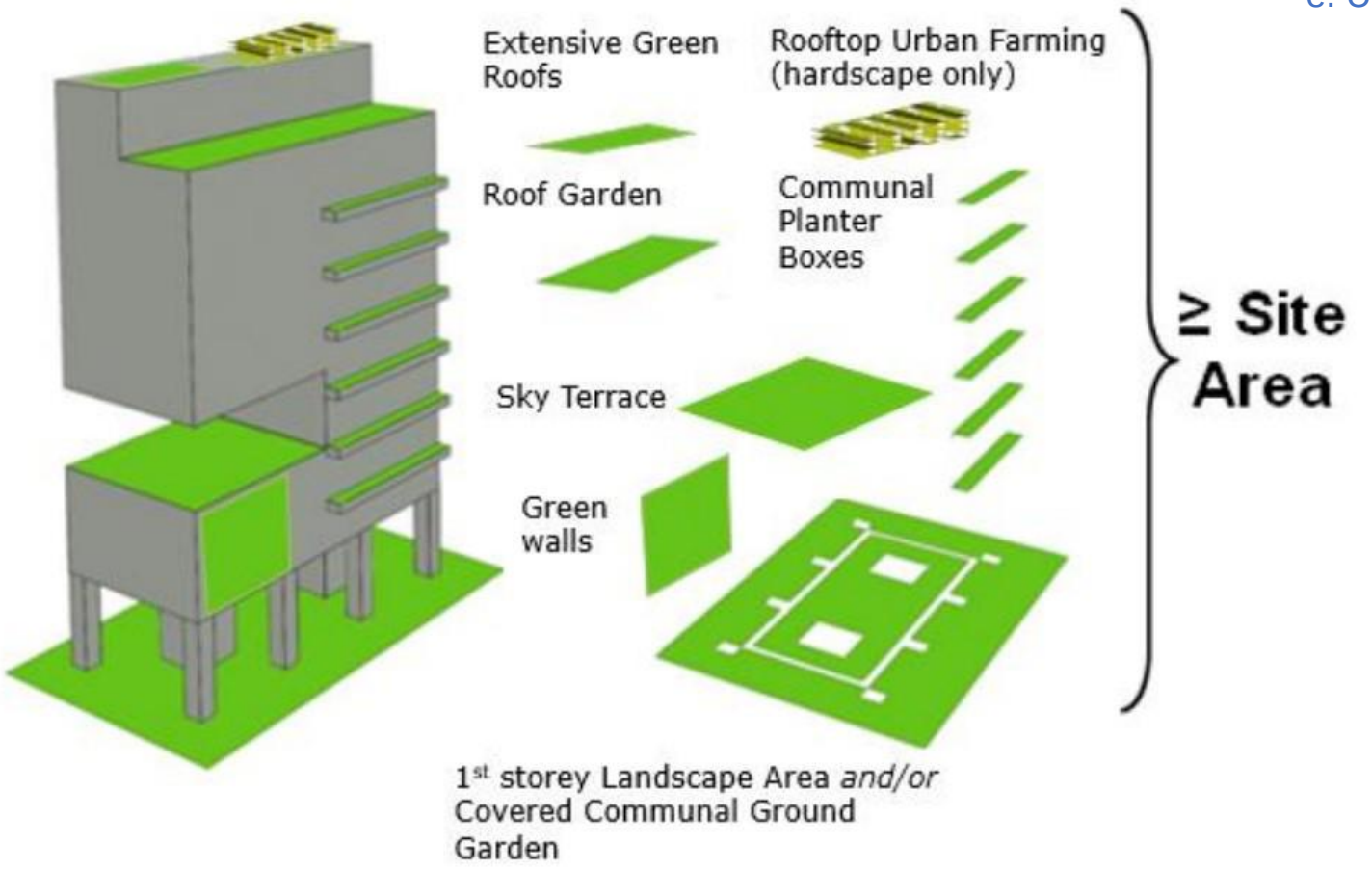
City's investment

From: Singapore

ADB

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city



Landscape Replacement Areas of Building Footprint

Urban Planning and Design

e. Urban Landscape

Requirement

From: Singapore

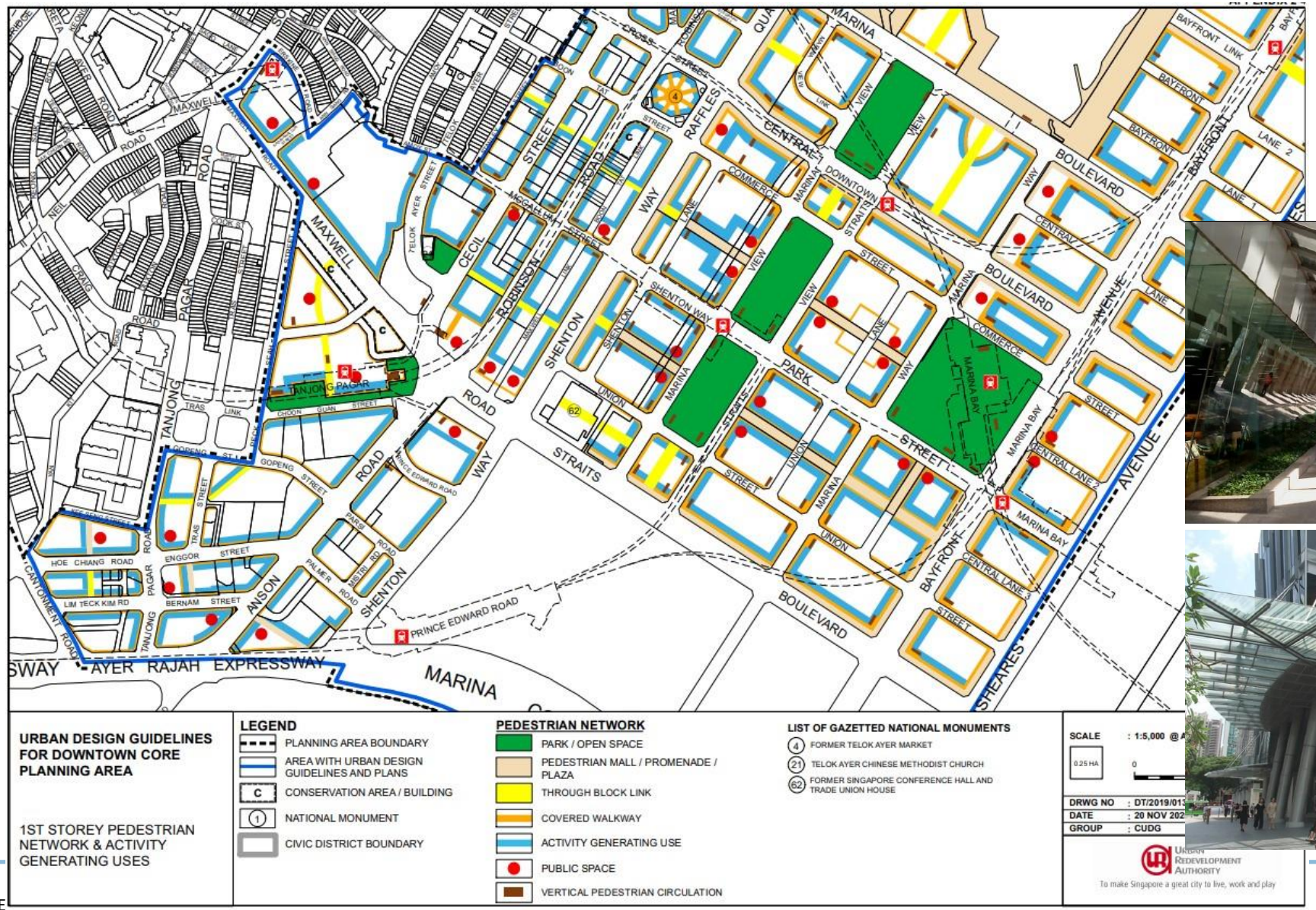
3 Urban policy can contribute to the global climate change

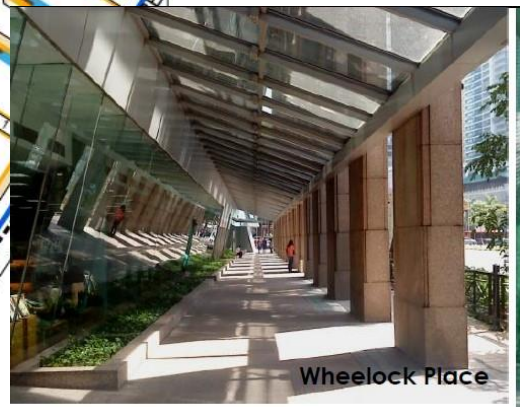
3-3. A well-designed strategic plan is necessary for a successful low carbon city

Requirement

Urban Planning and Design

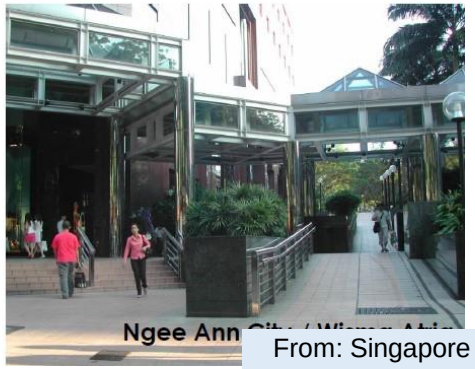
f. Walkable Cities




Wheelock Place


1 George Street


Mandarin Gallery


Ngee Ann City / Wisma Atria

From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design g. Night Lighting

Requirement

- Please indicate the energy efficiency for the proposed external lighting. Please note that you are to ensure that the energy efficiency is to be equal to or less than 5 Watts per sqm.

Light Trespass and Light Pollution

7. There is a growing concern about the excessive use of lights to illuminate the cityscape. Night lighting should thus be executed sensitively to avoid glare, light trespass and light pollution. Pedestrians, residents, drivers, and other fields of vision shall be considered to prevent light spillage and to increase the energy efficiency of the lighting.

Light Fittings and Mounting Details

8. Sufficient measures must be taken to ensure that night lighting fixtures and mounting details are fully integrated with the architecture and/or landscape design of the building and screened from view.

9. The night lighting equipment shall have necessary protective means from damage, theft and harm to the public, for those elements that are accessible to the public.

Energy-Efficient and Maintenance-Friendly

10. Light sources that have a high energy-efficiency rating, have a long operating life for easier maintenance, and are of high economical efficiency, such as compact metal halide lamps, fluorescent lamps, LEDs, or electrodeless lamps, are recommended for use.

Operation Hours and Maintenance of the Night Lighting

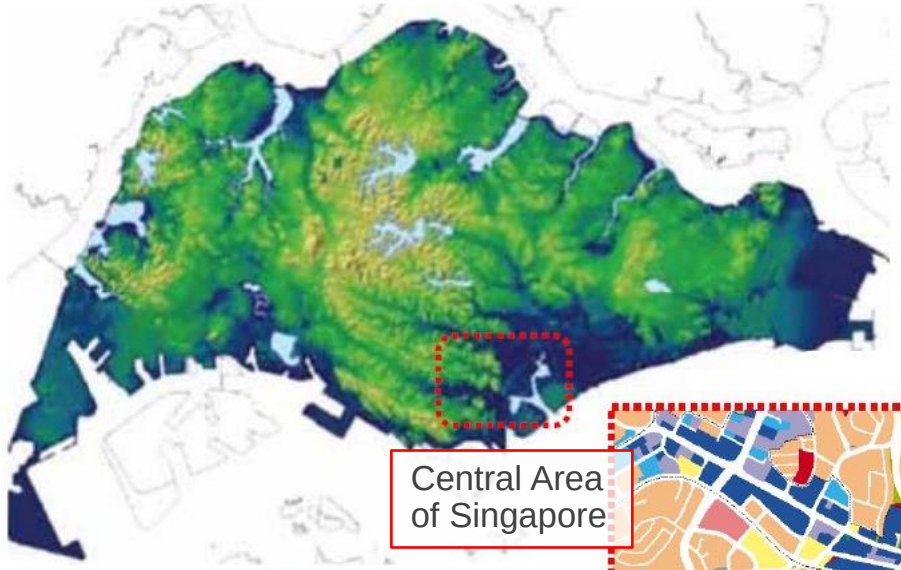
22. Building owners are required to minimally turn on the night lighting from Friday to Sunday, 7pm to 11pm, according to the approved night lighting proposal and the guidelines outlined in **Appendix 2** below this page. The lighting up of the building outside the recommended hours of Friday to Sunday, 7pm to 11pm, shall be in accordance with the approved night lighting p guidelines in this circular.

From: Singapore

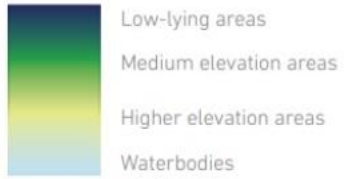
3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design h. Minimum Platform Level of Cities



Singapore Central Area's Topography



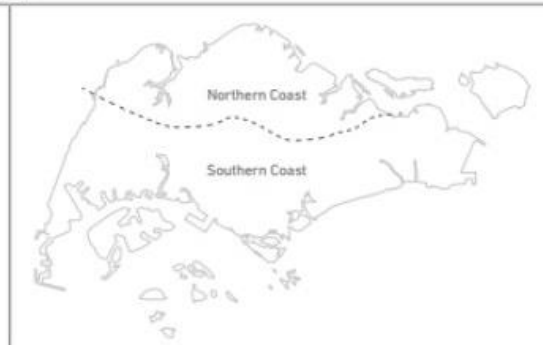
Land Use Plan

From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design — h. Minimum Platform Level of Cities

FACTOR	MINIMUM PLATFORM LEVEL REQUIREMENTS FOR:
location 	Developments in catchments discharging to the: • **Northern Coast:** 104.5 mRL • **Southern Coast:** 104.0 mRL
development typology 	• **General developments:** 300 mm above the adjacent road/ground level • **Commercial/Multi-Unit Residential developments with basements:** 600 mm above the adjacent road/ground level • **Special facilities and developments with linkages to special underground facilities:** 1 m above the adjacent road/ground level
flood history 	**Areas with Flood History** • **General developments:** 600 mm above the highest recorded flood level • **Commercial/Multi-Unit Residential developments with basements:** 600 mm above the highest recorded flood level • **Special facilities and developments with linkages to special underground facilities:** 1 m above the highest recorded flood level

MINIMUM CREST LEVELS

Requirement

Entrance to Metro

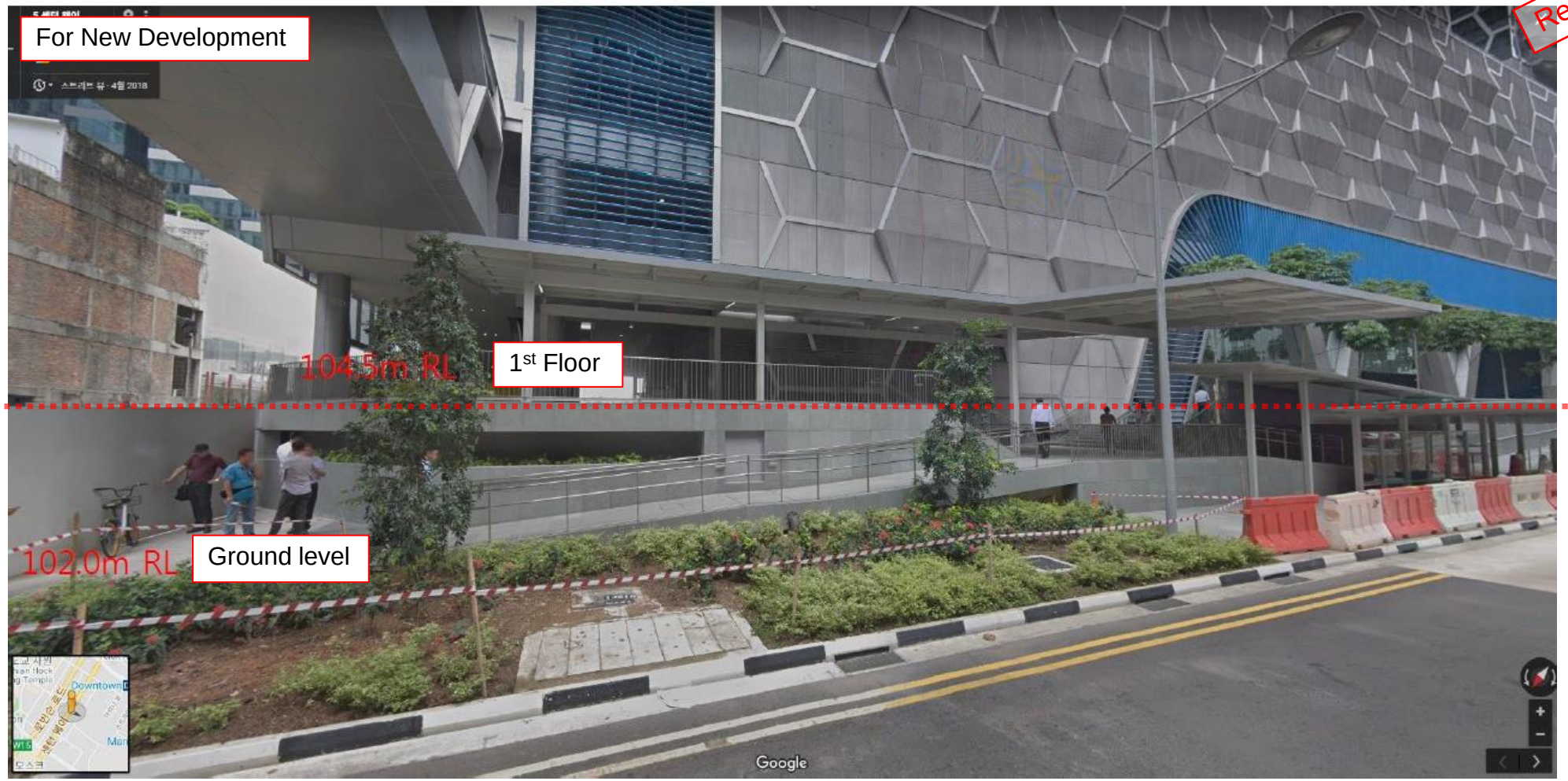
Development connected to underground pedestrian path

From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design h. Minimum Platform Level of Cities



From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

Urban Planning and Design h. Minimum Platform Level of Cities

Flood Barrier

From: Singapore

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

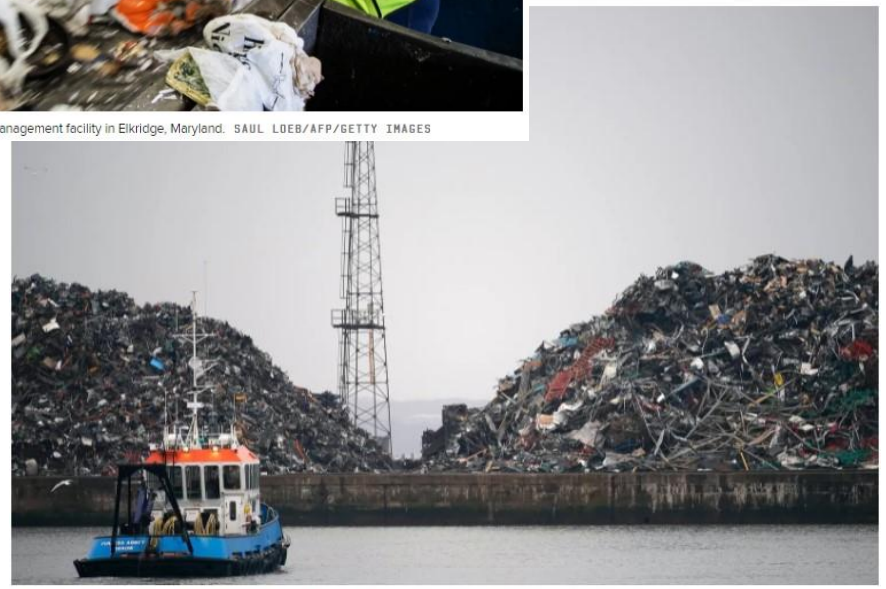
Recycling and Upcycling

a. Recycling

Recycled materials being stacked at a facility in C

A worker sorts through plastic bottles at a waste facility in Vietnam. NHAC NGUYEN/AFP/GETTY IMAGES

Workers sort recycling material at a waste management facility in Elkridge, Maryland. SAUL LOEB/AFP/GETTY IMAGES

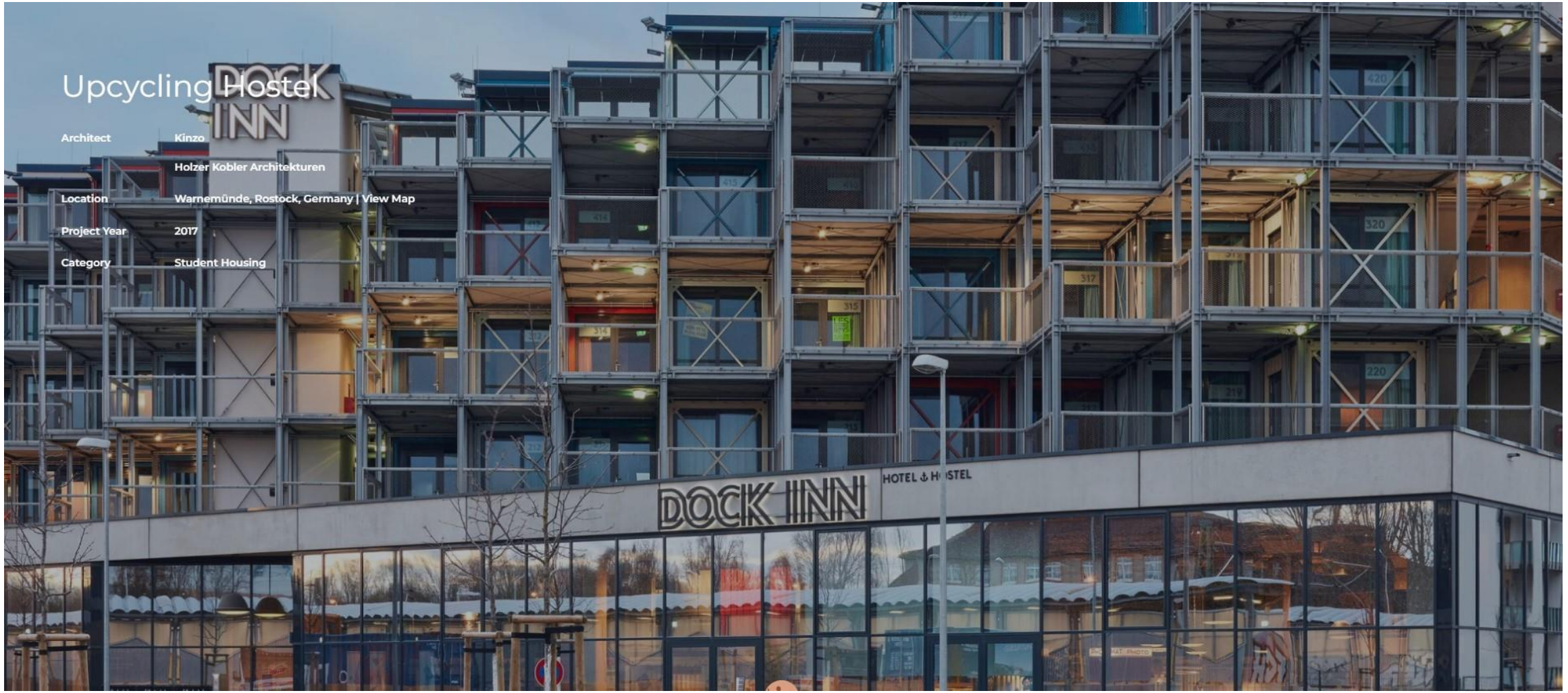


Scrap metal at a dock in Liverpool, England, waiting to be exported. CHRISTOPHER FURLONG/GETTY IMAGES

3 Urban policy can contribute to the global climate change

3-3. A well-designed strategic plan is necessary for a successful low carbon city

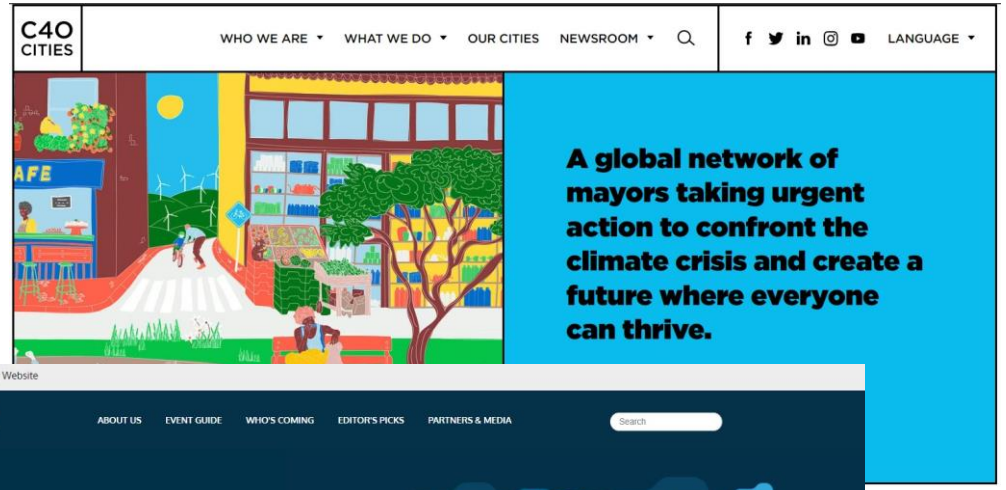
Recycling and Upcycling b. Upcycling

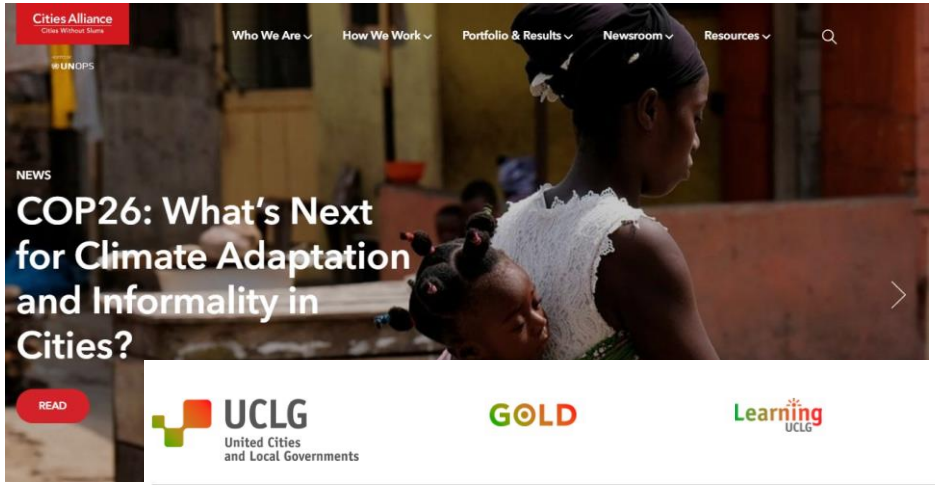


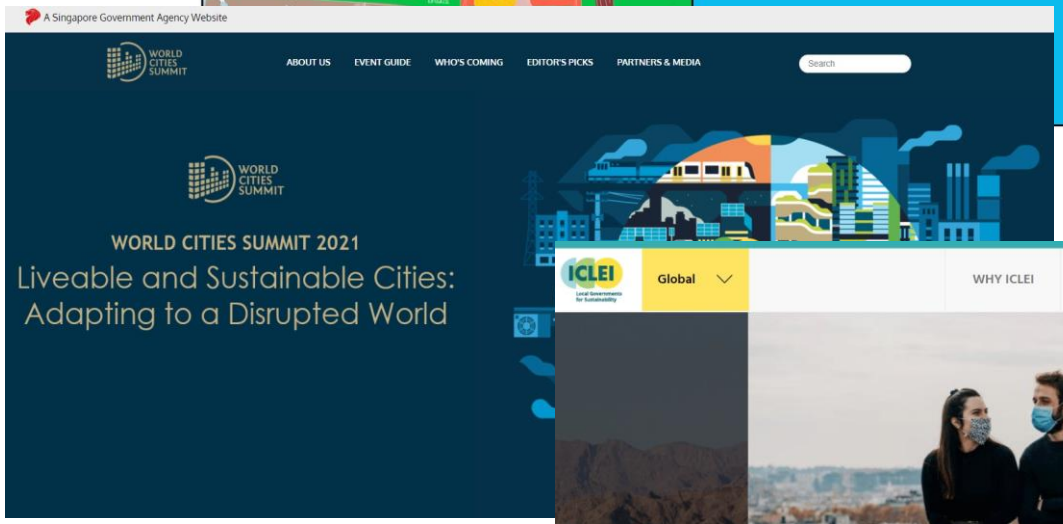
ADB

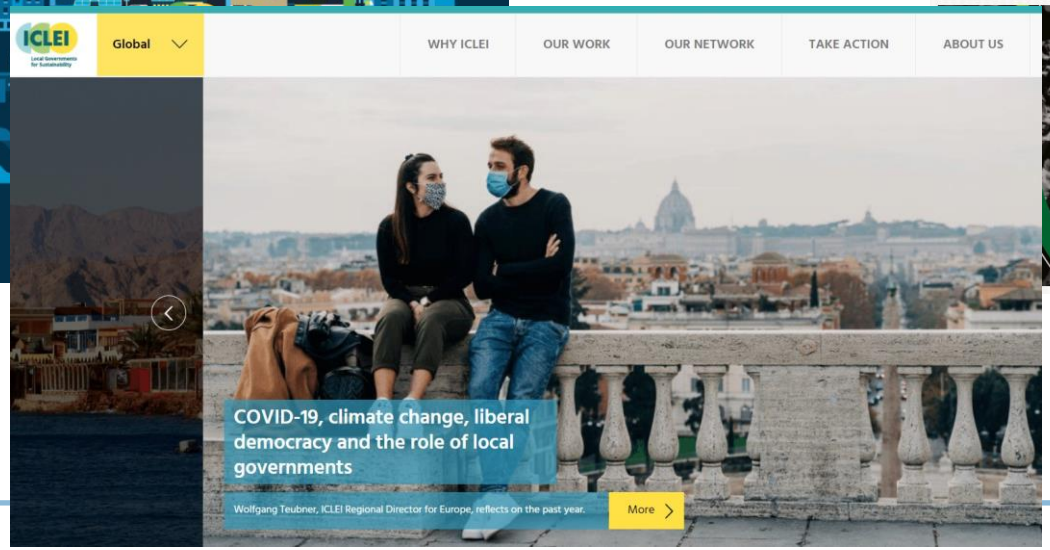
3 Urban policy can contribute to the global climate change

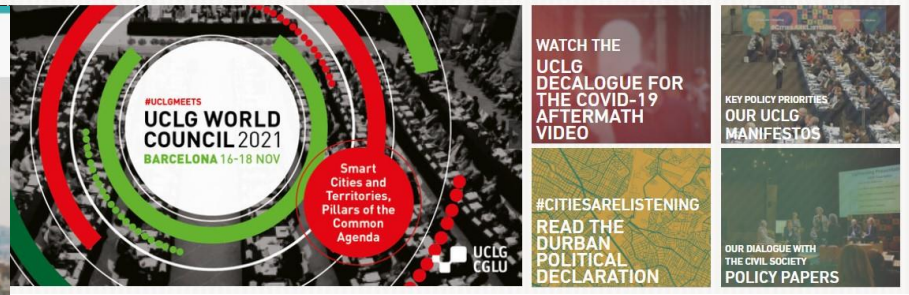
3-4. Collaboration of Cities for Climate Changes











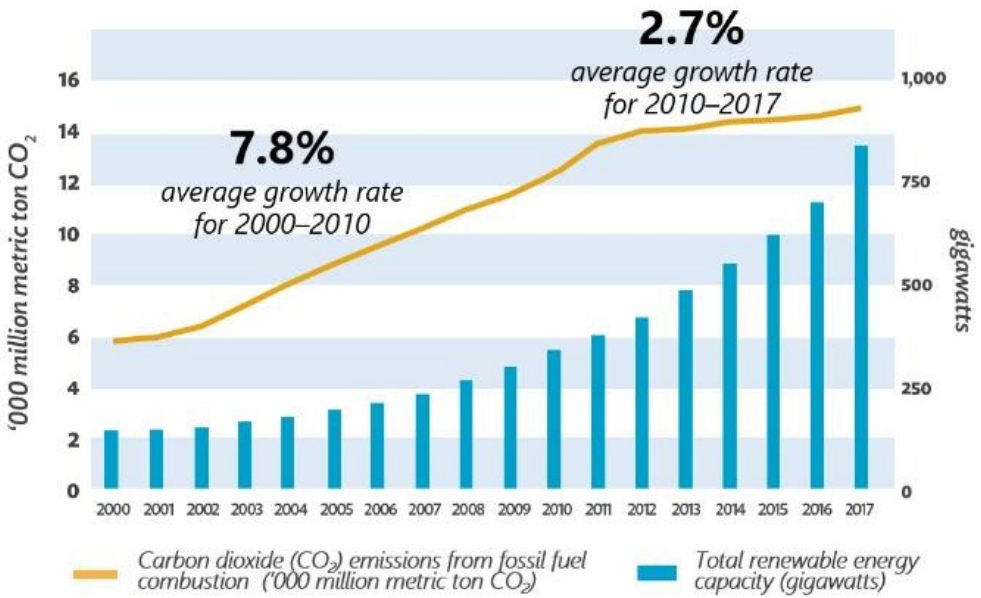
3 Urban policy can contribute to the global climate change

3-5. The battle against climate change will be won or lost in Asia and Pacific for Carbon Neutrality by 2050

3 Urban policy can contribute to the global climate change

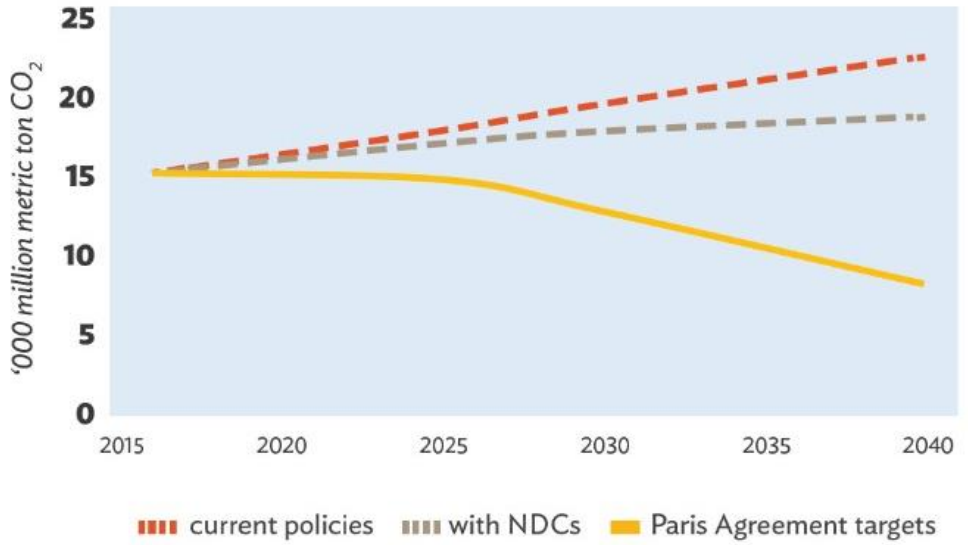
3-5. The battle against climate change will be won or lost in Asia and Pacific for Carbon Neutrality by 2050

Carbon dioxide emissions from fossil fuel combustion and total renewable energy capacities in ADB DMCs



The Emissions Gap in Asia and the Pacific

Outlook vs. Paris Agreement Target



* CO_2 emissions from fossil fuel combustion for Asia and the Pacific for scenarios (Current Policies, New Policies, and Sustainable Development) in World Energy Outlook 2018

CO_2 emissions from Asia and the Pacific are rising, but the region has also made strides in investing in renewable energy

Despite investments in clean energy, the current commitments in NDCs will not take us to the temperature goals of the Paris Agreement.

- Global Carbon Project. Global Carbon Atlas. http://www.globalcarbonatlas.org
- International Renewable Energy Agency. Renewable Electricity Capacity and Generation Statistics. http://resourceirena.irena.org/gateway/dashboard/?topic=&subtopic=

- International Energy Agency. *World Energy Outlook* . Paris.

3 Urban policy can contribute to the global climate change

3-5. The battle against climate change will be won or lost in Asia and Pacific for Carbon Neutrality by 2050

Asia Pacific Can Still Be Carbon-Neutral by 2050, but Much Needs to Be Done

03:39 pm | 14 July 2021

SHARE

Reaching carbon neutrality will require major changes in the energy sector including avoiding fossil fuels and deploying renewable energy, including wind power. Photo credit: ADB

ADB Raises 2019–2030 Climate Finance Ambition to $100 Billion

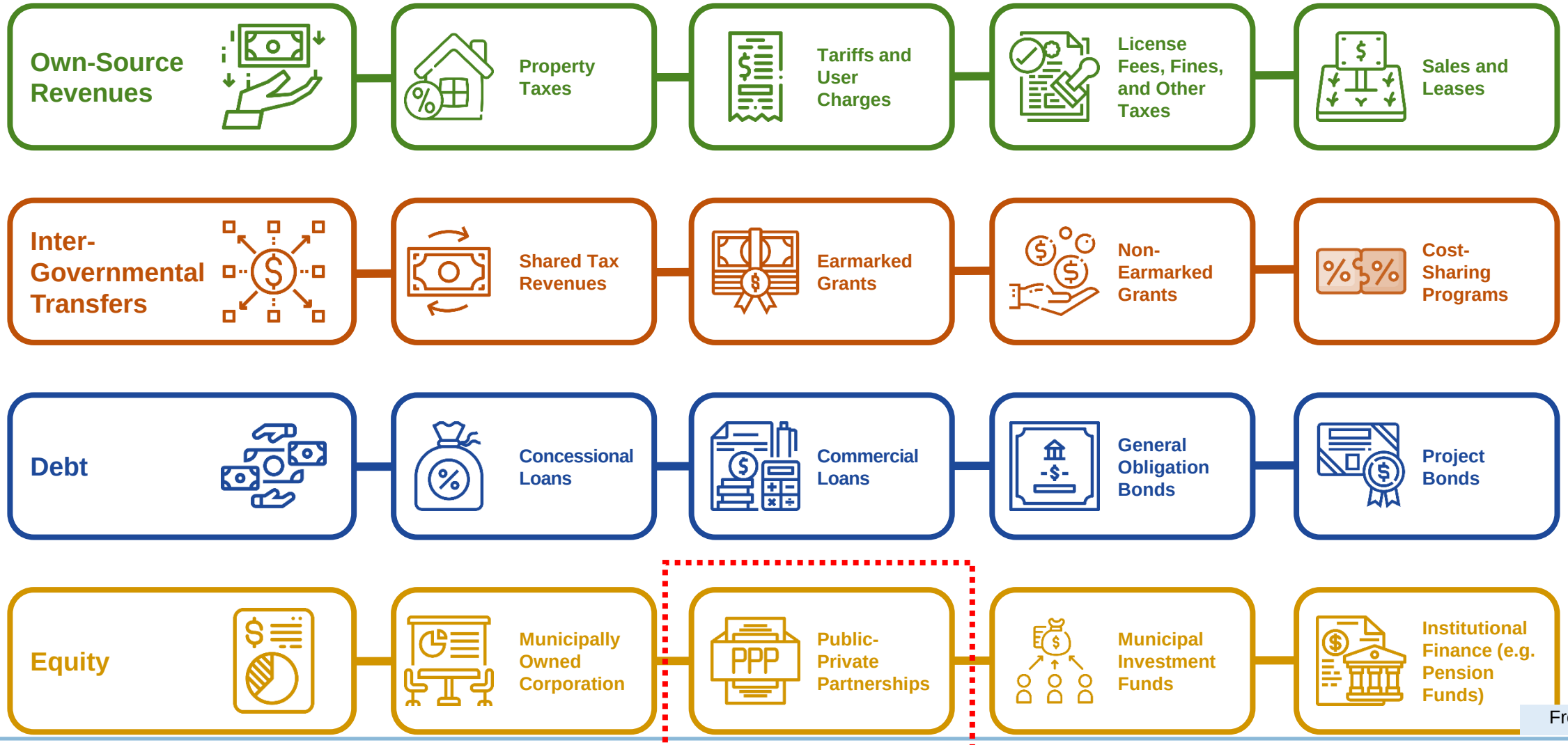
The expanded climate finance ambition is a key element of ADB's efforts to support its developing member countries (DMCs). Facing the interconnected challenges of the COVID-19 pandemic and the climate crisis, many DMCs are taking bold action to promote a green, resilient, and inclusive recovery.

From: ADB

4 Finance for Climate Change

4. Climate change will require investment in not only new but to make the existing resilient urban infrastructure

Exemplary Source of Municipal Finance

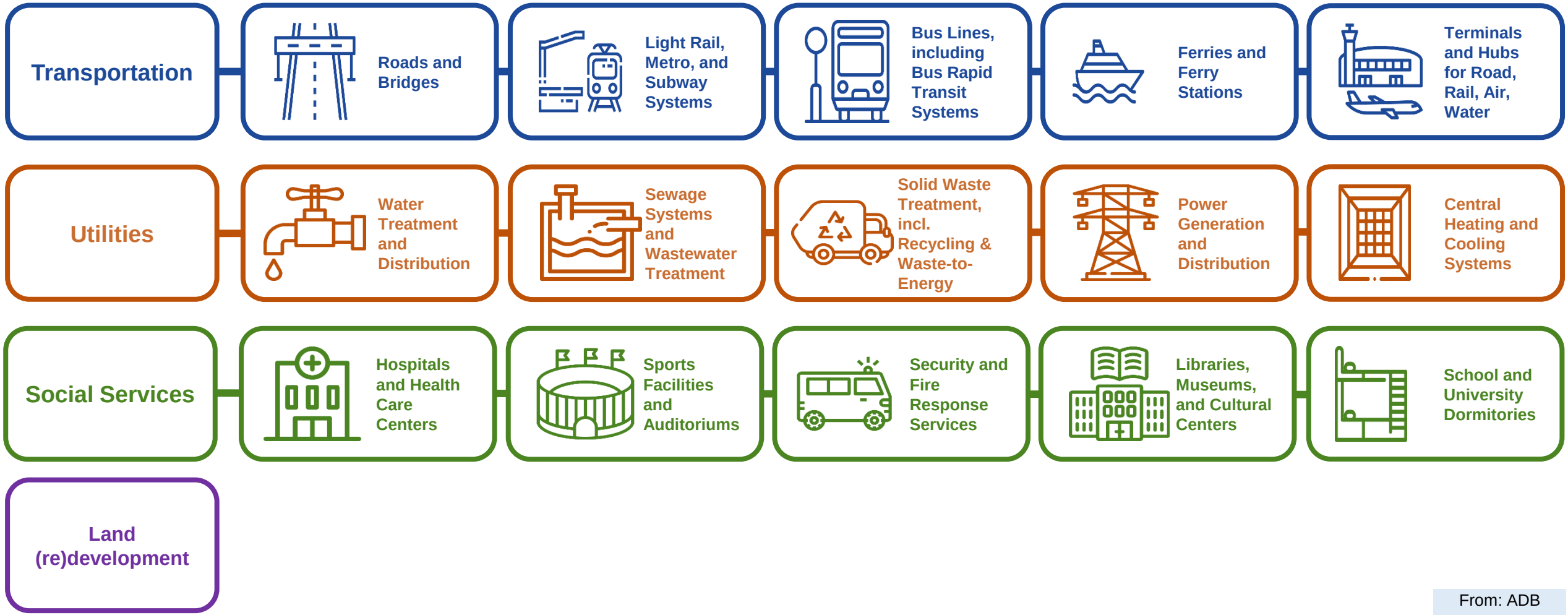


From: ADB

4 Finance for Climate Change

4. Climate change will require investment in not only new but to make the existing resilient urban infrastructure

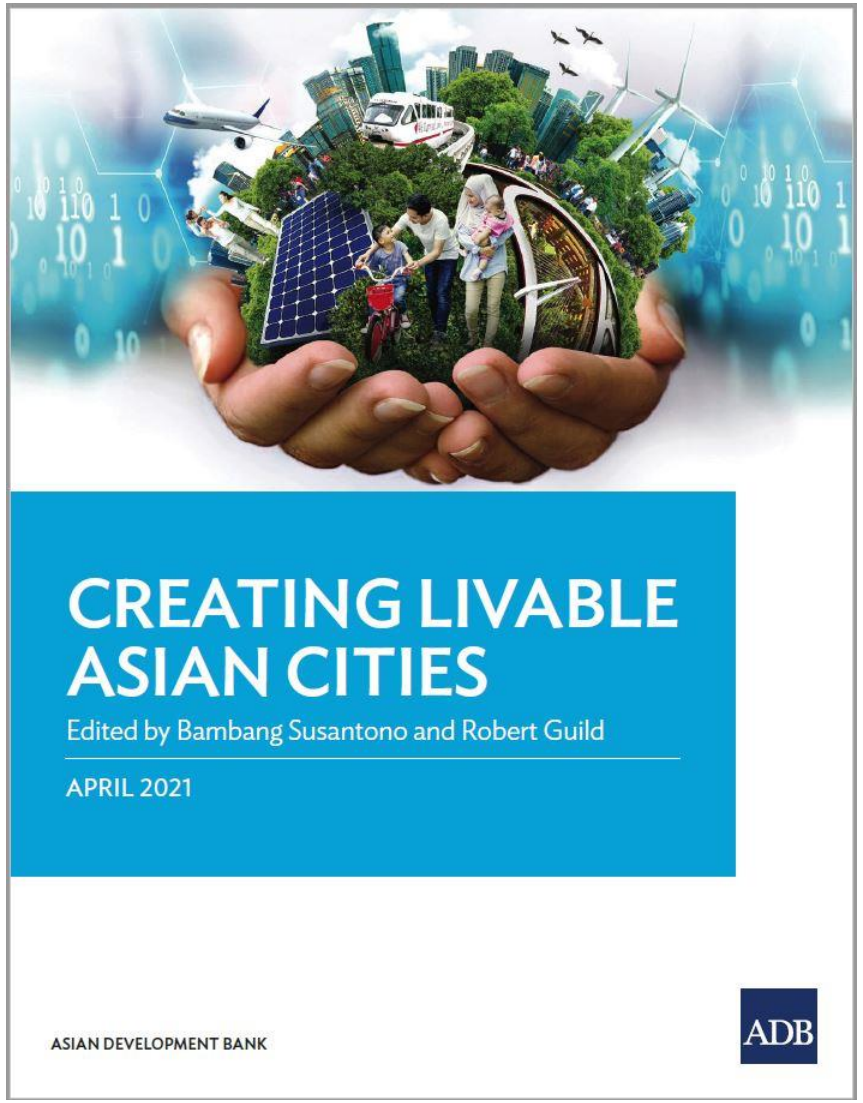
City-Level Public-Private Partnership Areas



From: ADB

4 Finance for Climate Change

4. Climate change will require investment in not only new but to make the existing resilient urban infrastructure



[Creating Livable Asian Cities | Asian Development Bank (adb.org)]

From: ADB

References

1. Accelerating Urbanization Explained: The Role of Information (adb.org)
2. Pancakes to Pyramids, World Bank (World Bank Document)
3. 56 U. S. Energy Information Administration / Monthly Energy Review December 2021 (Microsoft Word - MER_S2 (eia.gov))
4. Regional fact sheet – urban areas (IPCC) (PowerPoint Presentation (ipcc.ch))
5. IPCC: Climate change is widespread, rapid, and intensifying | Airclim
6. jj47o6q08hx61.png (1920×1080) (redd.it)
7. New Studies Measure the True Cost of Sprawl, and It's More Than You Think (treehugger.com)
8. Inequalities exacerbate climate impacts on poor and vulnerable people – new UN report | News | Eco-Business | Asia Pacific
9. 1-6.jpg (901×314) (egyptianstreets.com)
10. Belebte Straßenszenen von Menschen, die die Straße an der Orchard Road, Singapur, überqueren Stockfotografie - Alamy
11. Where is the world's most walkable city? | Cities | The Guardian
12. File:Before and After of Bishan Park.jpg - Wikimedia Commons
13. untitled (bca.gov.sg)
14. 8 Sustainably Designed and Architecturally Significant Buildings in Singapore - Interior Design
15. The Daily Life of Building Information Modeling (BIM) - Buildipedia
16. zero-energy building | Materials, Technology, & Features | Britannica
17. Desert Urbanism: An architectural blueprint for a warming planet? | Insights | Sidewalk Labs
18. NRDC: The Cost of Climate Change, report (pdf)
19. Economic cost of climate crisis in developing world to far exceed aid pledged by richer nations, says UN report | The Independent
20. Singapore's Integrated Land Use Planning Experience - ppt download (slideplayer.com)
21. Clarification on Conversion of Surplus Car Parking Spaces (ura.gov.sg)
22. Expansion of Policies On Surplus Car Park Conversion and Computation of Surplus Parking Spaces as Gross Floor Area (GFA) (ura.gov.sg)
23. Five new areas to be 'car-lite' precincts, fewer parking lots with new standards for private developments (todayonline.com)
24. HDB Carpark Information-Data.gov.sg
25. COE Prices and Bidding Results - AA Singapore
26. Singapore Finds a Way to Make Air-Conditioners Greener – Bloomberg
27. Marina Bay: A Vision and the Backbone (ura.gov.sg)
28. Slide 1 (ctc-n.org)
29. 4AB724932E824FDF9EF21277C4DEACFE.ashx (ura.gov.sg)
30. 15 Beautiful Photos of Singapore at Night (theculturetrip.com)
31. Night Lighting Master Plan of Developments in the Central Business District (CBD), Marina Centre and Marina Bay (ura.gov.sg)
32. Creating Livable Asian Cities | Asian Development Bank (adb.org)
33. *201811-CIOC-IFC-Analysis.pdf
34. Urban Financing Partnership Facility | Asian Development Bank (adb.org)
35. Recycling Saves Energy Poster 11 x 17 (nc.gov)
36. Upcycling Hostel | Kinzo | Archello
37. Sustainable Urban Energy Planning.pdf (unhabitat.org)
38. The World's Recycling Is in Chaos. Here's What Has to Happen | WIRED
39. Upcycled buildings: sustainability on a grand scale (designbuild-network.com)

ADB

Feb 2022

Hong Soo Lee (hslee@adb.org)