

Webinar: Climate Change Mitigation: What can you do right now?

Green Transformation for All towards Carbon Neutrality

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Green Council – Seminar:

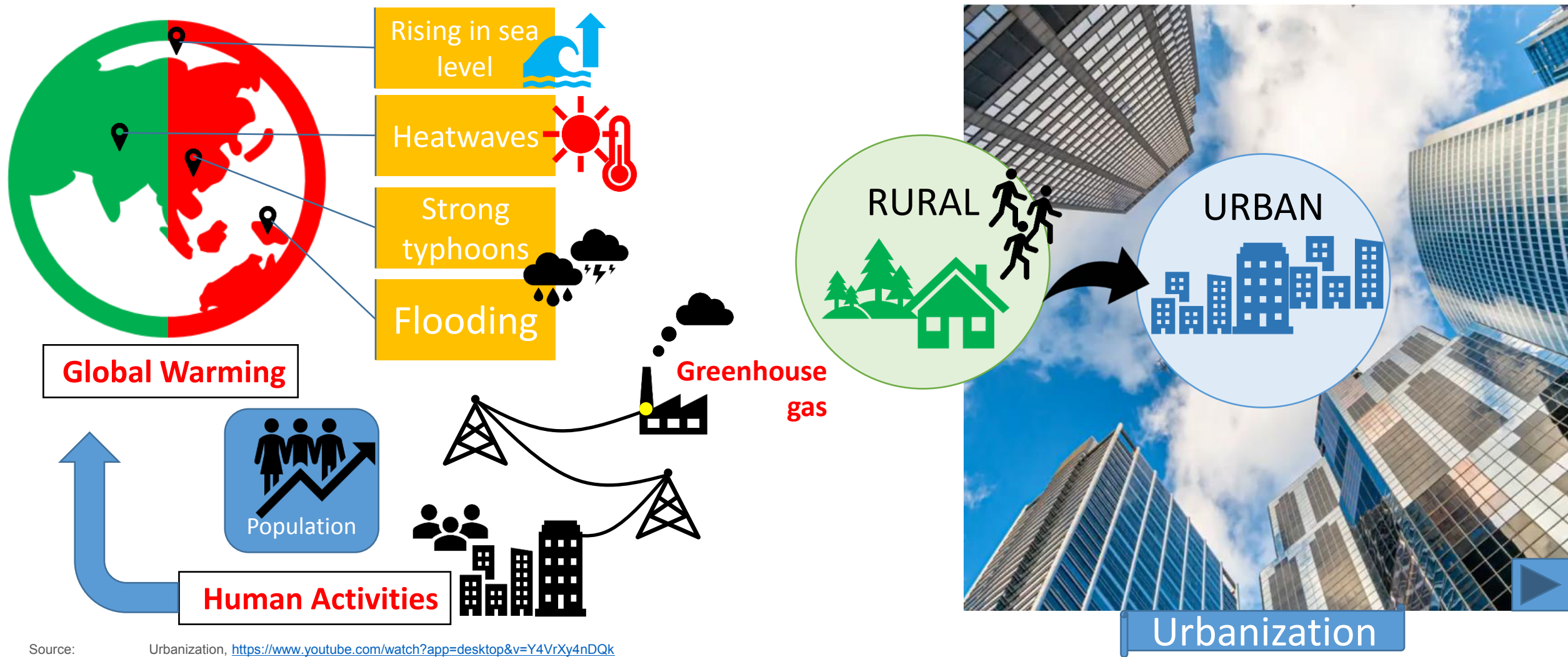
“Climate Change Mitigation: What can you do right now?”

Green Transformation for All towards Carbon Neutrality

22 February 2022

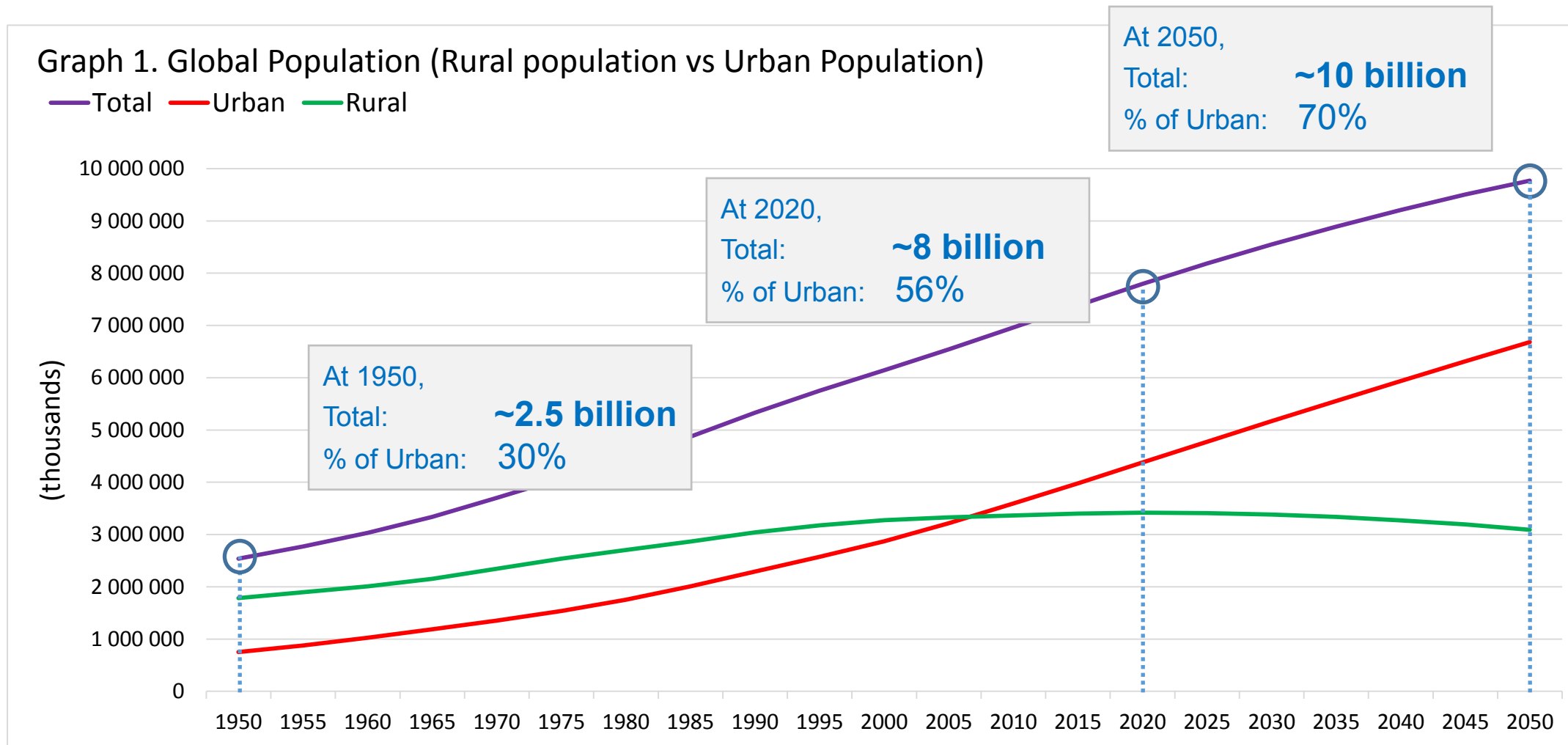
Ir Raymond KY POON, Deputy Director
The Electrical & Mechanical Services Department
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Climate Change – Urbanization



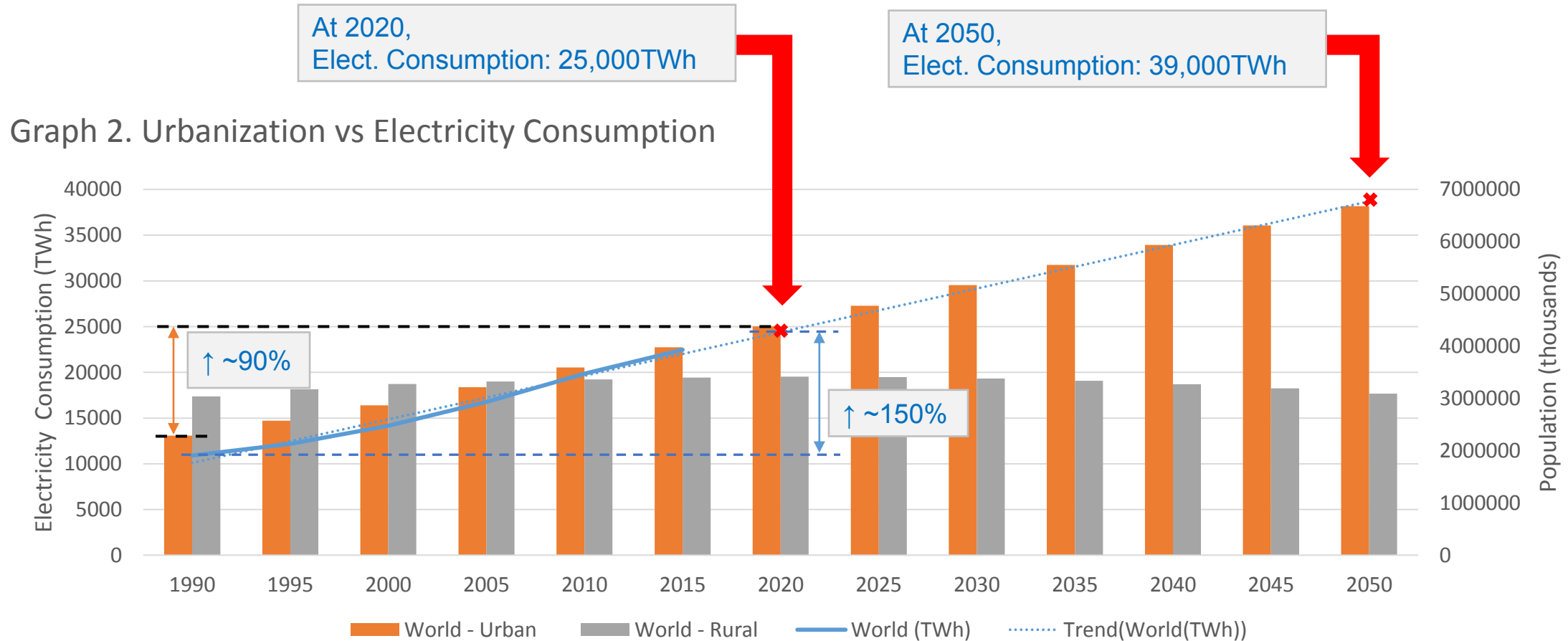
Source: Urbanization, <https://www.youtube.com/watch?app=desktop&v=Y4VrXy4nDQk>

Global Population



Source: UN (World Urbanization Prospects 2018), <https://population.un.org/wup>

Electricity Consumption vs Urban Population



Source: UN (World Urbanization Prospects 2018), <https://population.un.org/wup>
 IEA(Key World Energy Statistics 2021), <https://www.iea.org/reports/key-world-energy-statistics-2021/final-consumption>; <https://www.iea.org/reports/key-world-energy-statistics-2021/final-consumption>

Urban Areas Consume Majority Electricity



“The world’s cities occupy just 3% of the Earth’s land, but account for 60-80% of energy consumption and 75% of carbon emissions.”

ipcc AR5 Climate Change 2014: Mitigation of Climate Change

“In 2006, urban areas accounted for 67 – 76% of energy use”

	Urban Population	Energy Use
2006	50%	~70%
2050	~70%	~90%

URBAN POPULATION SIZE AND GROWTH

1950

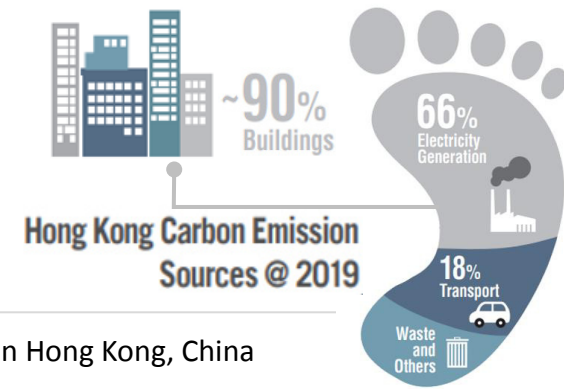
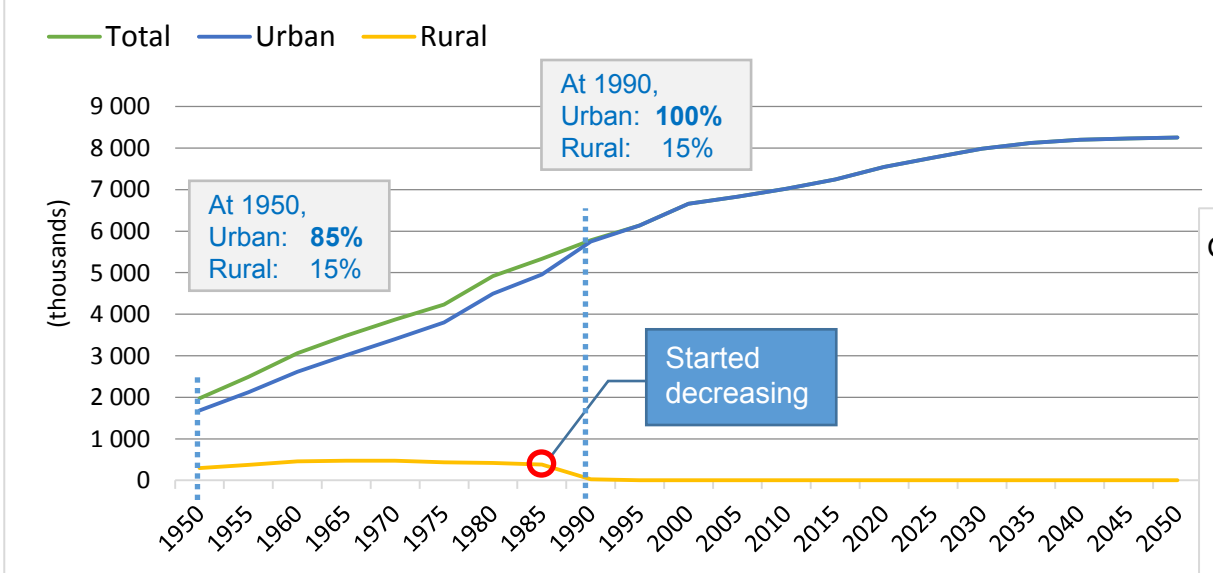


Urban population Growth from 1950 to 2020

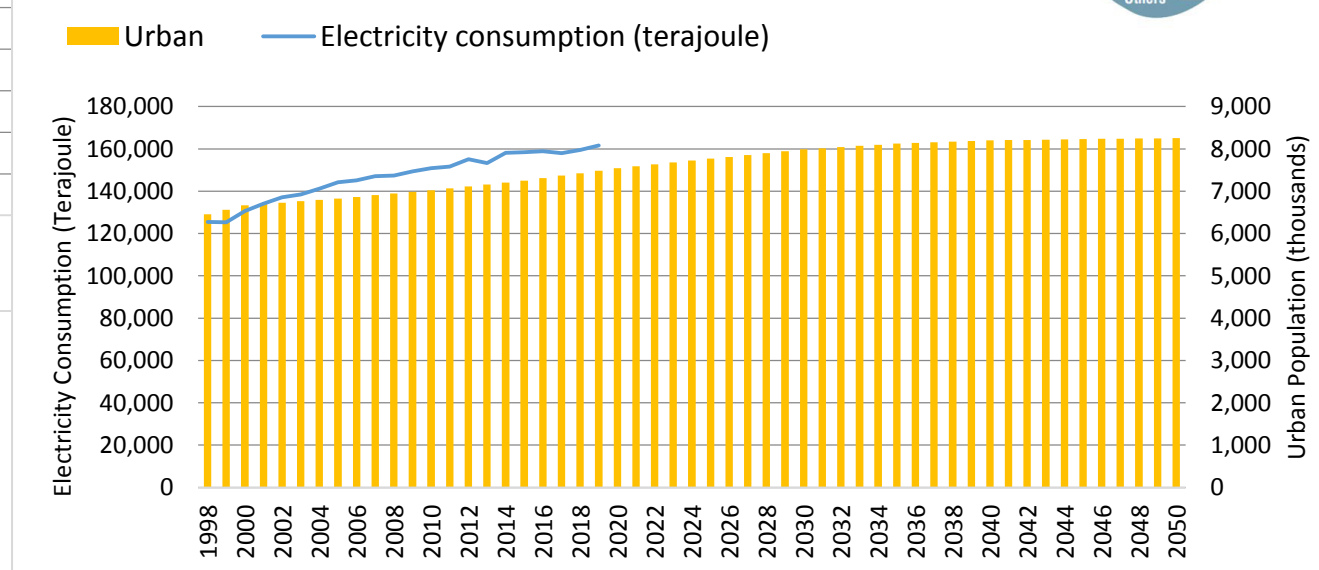
Source: UN (17 Goals to Transform Our World), <https://www.un.org/sustainabledevelopment/cities/>
 IPCC (5th AR), <https://www.ipcc.ch/report/ar5/wg3/>
 Urban Area Population, <https://vimeo.com/352639774>

Hong Kong Situation

Graph 3. Population in Hong Kong, China

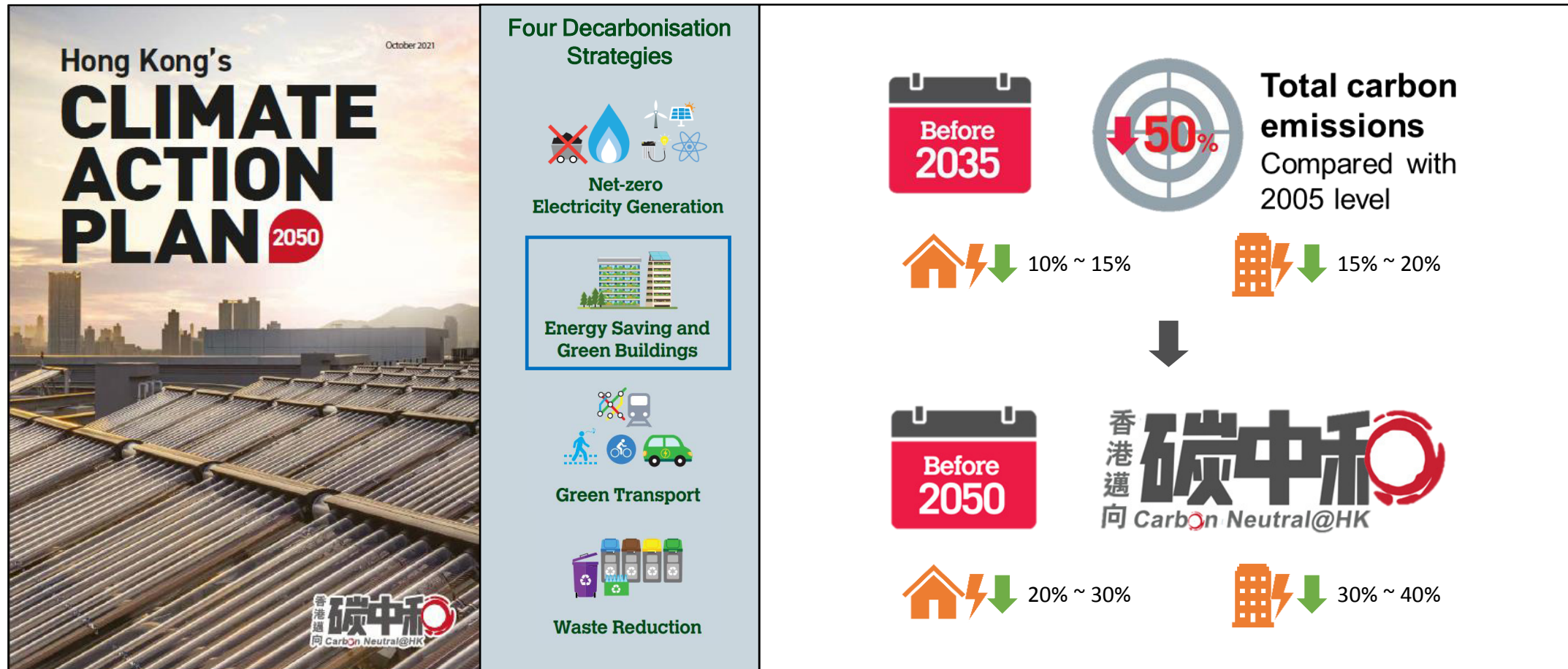


Graph 4. Electricity Consumption vs Urban Population in Hong Kong, China



Source: UN (World Urbanization Prospects 2018), <https://population.un.org/wup>
Energy End Use Data, EMSD

Hong Kong's Climate Action Plan 2050



Buildings Energy Efficiency Ordinance

2012

Enacted
Buildings Energy
Efficiency Ordinance
BEC & EAC 2012



2015

BEC & EAC
2015 update



2018

BEC & EAC
2018 update



2021

BEC & EAC
2021 update



--- > 2050

On-going improvement
(BEC review by
3-year interval)

Compare to
BEC 2015

~15% improvement
Estimated annual energy saving around
4.7B to 5.3B kWh by 2035

Mandatory Energy Efficiency Labelling Scheme

ENERGY LABEL 能源標籤	
more efficient 效益較高	Grade 1 級
1	
2	
3	
4	
5	
less efficient 效益較低	
Annual Energy Consumption (kWh/Cooling) 每年耗電量 (千瓦小時/製冷) Based on 1000 hours of operation 以每年使用1000小時計算	620
Cooling Capacity (kW) 製冷量 (千瓦)	6.03
Refrigerant 製冷劑	R410A
Room Air Conditioner 空調機	
Brand 品牌	ABC 某某牌
Model 型號	HK1234
Reference Number / Year 參考編號 / 年份	U2-C123456 / 2020
Information Provider 資料提供者	XYZ 某某某
機電工程署 EMSD	

MEELS Energy Coverage in Residential Sector

~80% (11 products (upon Commencement of Phase 4))



~50% (8 products (in first 3 Phases))

2021 2nd Upgrading of Standards

2023 Phase 4

Target Commencement in Q2 2023



Additional ~160 million kWh / year

2015 1st
Upgrading of Standards

2019 Phase 3

2011
Phase 2

2009 - Phase 1

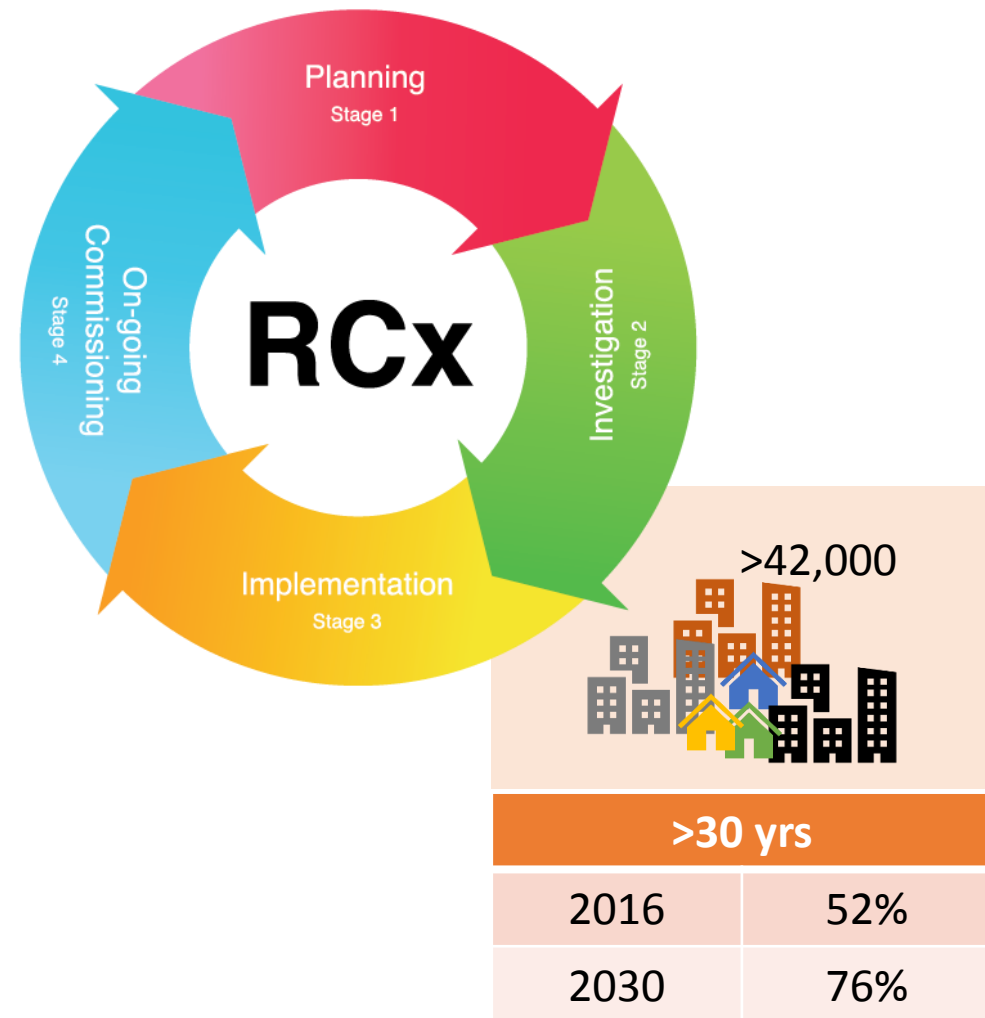
Total 625 million kWh / year



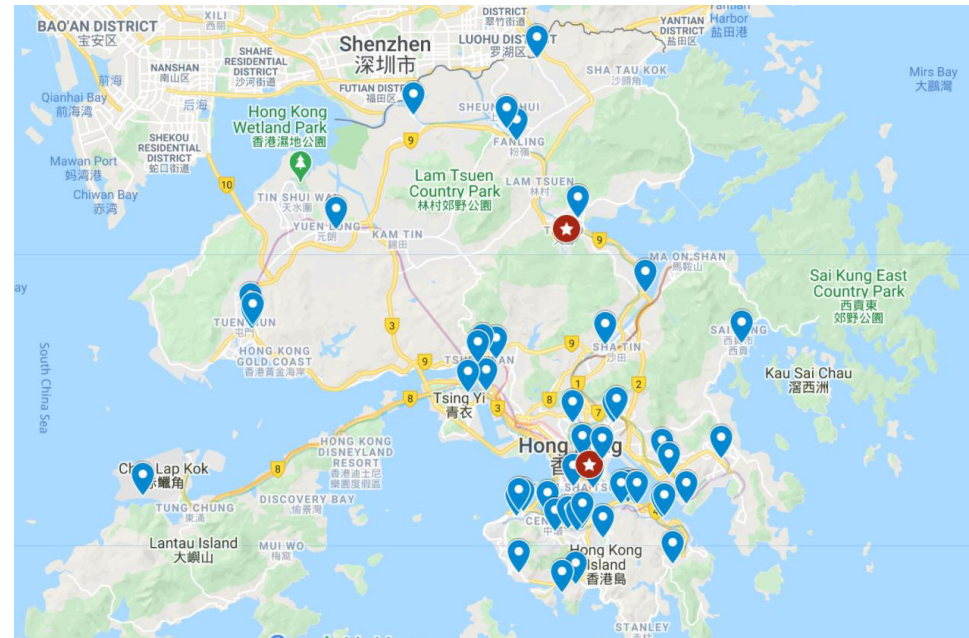
Government's Green Energy Target



Retro-commissioning (RCx)



200 major government buildings is under RCx as the Government's lead example

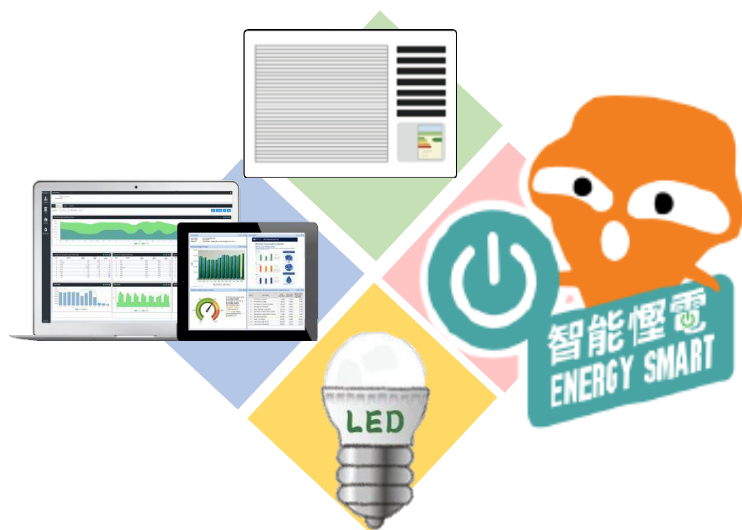


Large commercial buildings can conduct regular commissioning of air-conditioning systems and major building services installations



Community Engagement

Green School 2.0 – Energy Smart



Beneficiary: 300 Schools

Green Welfare NGOs



Beneficiary: 300 Welfare NGO Premises

Solar Harvest

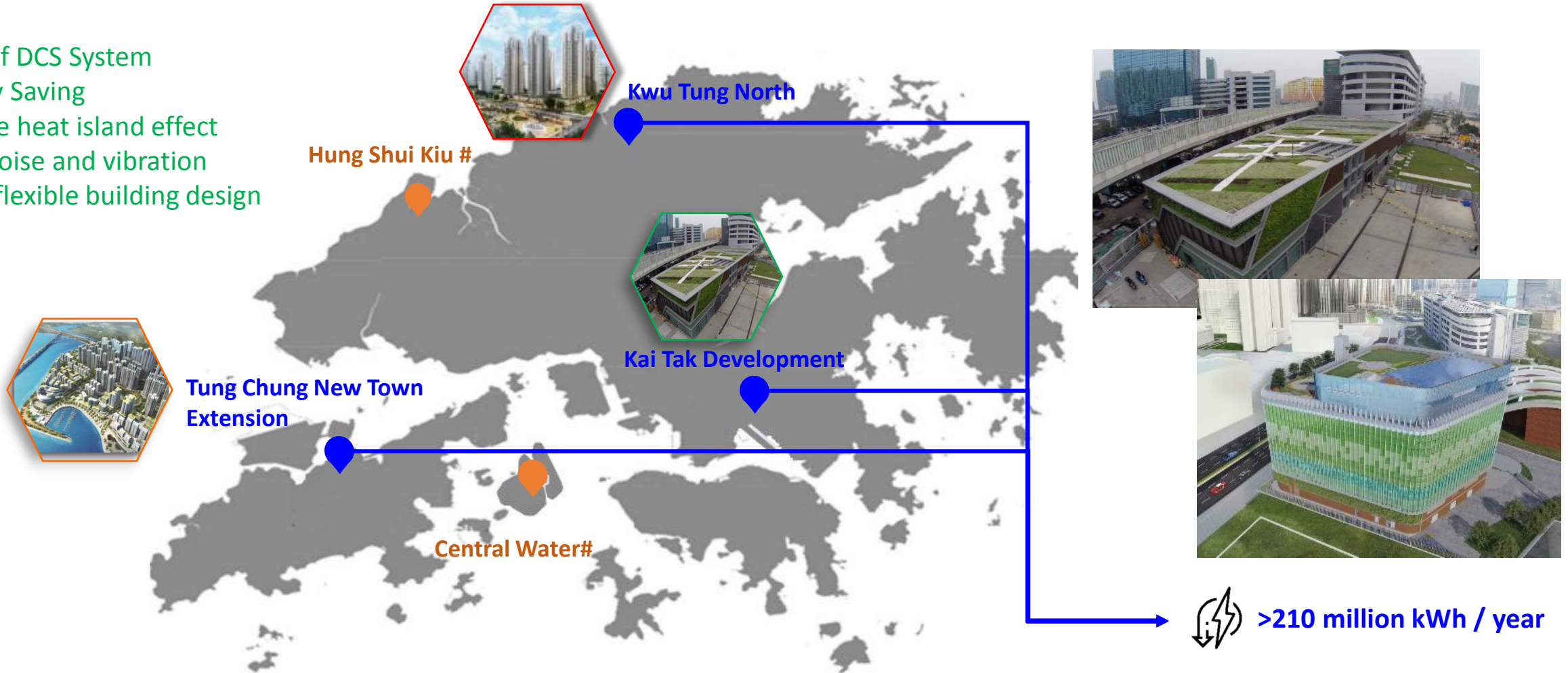


Beneficiary: 600 Schools/ Welfare NGO Premises

DCS Kai Tak and New Development Areas

Benefits of DCS System

- Energy Saving
- Reduce heat island effect
- Zero noise and vibration
- More flexible building design



DCS in planning stage

Business-as-UNusual

Incremental Change



Evolution in material change of tableware

Disruptive Change



Edible tableware to minimize the chance in disposal of tableware

Innovation – [住] Building

Trend in Hong Kong Data Centres

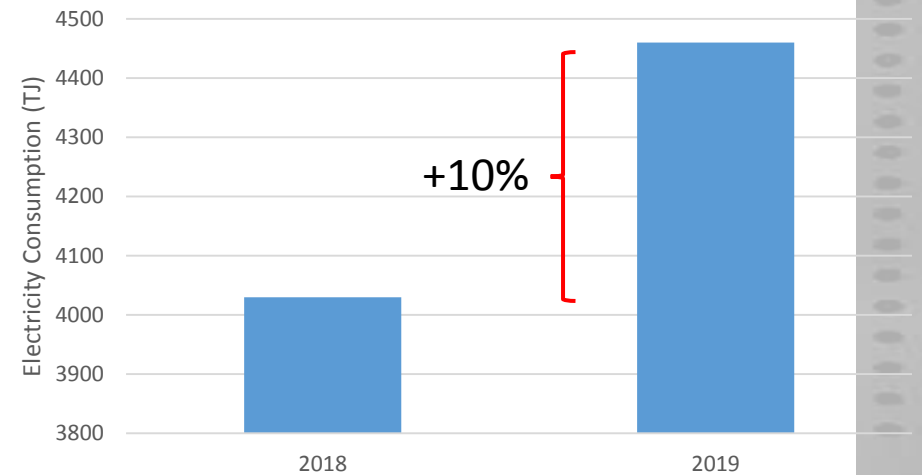
Table 36
商業類別電力使用按組別劃分
Electricity Consumption in Commercial Sector
單位 Unit: 太焦耳 Terajoules

Year	食肆 Restaurant	零售 Retail	辦公室 Office	住宿 Accommodation	醫療 Human Health	教育 Education	數據中心 Data Centre	其他商業 Other Commercial	總計 Total
2009	12,990	15,960	11,788	-	-	-	-	55,991	96,728
2010	14,372	15,711	12,195	-	-	-	-	55,616	97,894
2011	11,901	16,339	21,344	-	-	-	-	50,321	99,905
2012	12,280	16,442	20,880	4,950	3,321	3,164	-	41,317	102,353
2013	12,378	16,435	19,959	5,401	3,317	3,102	-	41,630	102,227
2014	12,373	16,742	19,669	5,589	3,412	3,144	-	42,555	103,923
2015	12,379	16,826	18,769	5,799	3,489	3,158	-	44,233	104,881
2016	12,414	16,306	17,923	5,796	3,537	3,198	-	45,178	104,898
2017	12,550	16,473	17,224	5,748	3,600	3,242	-	45,921	104,758
2018	12,941	16,537	16,811	6,045	3,673	3,283	4,030	43,062	106,382
2019	11,287	15,923	16,361	5,828	3,768	3,299	4,446	47,190	108,102

	數據中心 Data Centre
2018	4,030 TJ (2.5%)
2019	4,446 TJ (2.8%)

Note: Percentage of Hong Kong Total Electricity Consumption in 2018 and 2019

Electricity Consumption in Data Centre Sector

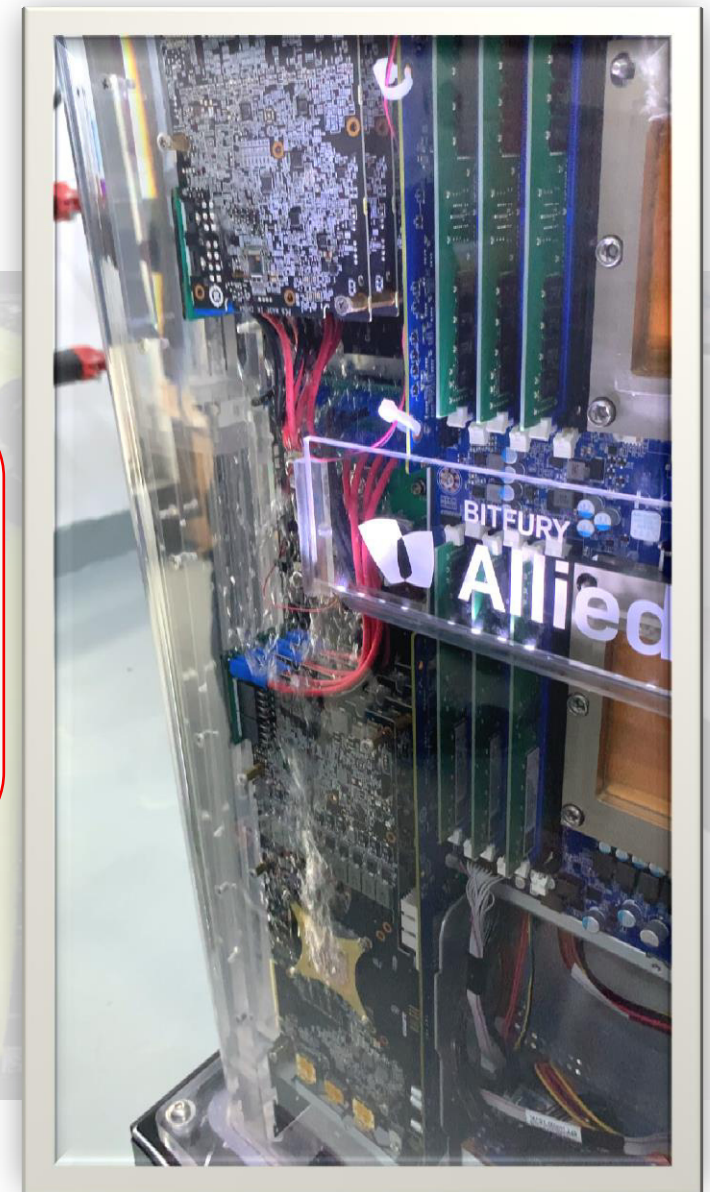


Source: Hong Kong Energy End-use Data 2021

Innovation – [住] Building

Immersion Cooling

The screenshot shows the E&M InnoPortal website interface. A search bar at the top contains the text 'Immersion Cooling'. Below the search bar, a grid of search results is displayed. The first result, 'Immersion Cooling', is highlighted with a red dashed box and a red callout bubble. This result includes a diagram showing 'OEM SERVERS' connected to a 'Cooling Tower' via a 'Water Circuit'. Other search results include '4D Immersive CAVE', 'Universal IoT (Internet of Things) Gateway Solutions', 'Passive LED Power Supply', and 'Wearable Power Assist Suit'. The website header includes navigation links like 'I&T Solution', 'I&T Wish', 'Trial Project', 'Strategic Partner', and 'Exhibition'.



Source: EMSD InnoPortal, <https://inno.emsd.gov.hk/en/home/index.html>
https://scontent-hkt1-1.xx.fbcdn.net/v/t1.6435-9/fr/cp0/e15/q65/67978066_1092965600903542_7481906941724196864_n.jpg?nc_cat=110&ccb=1-5&nc_sid=8024bb&nc_ohc=PsaCHDGGDU4AX8h9Pfh&nc_ht=scontent-hkt1-1.xx&oh=00_AT9t7YUmMQWsDPWP-SOwdwqZtLMKLL_tQHUCUsDjs6oow&oe=622BFDC

Innovation – [住] Building

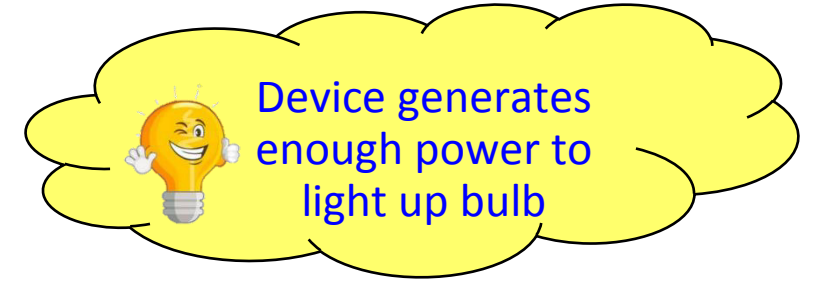
Energy Harvest in Buildings



Source: Stockholm Skyscraper's Façade Uses Piezoelectric Technology To Convert Motion into Electricity, <https://www.evolo.us/stockholm-skyscraper%e2%80%99s-facade-uses-piezoelectric-technology-to-convert-motion-into-electricity/>
Vimeo, Belatchw Skyscraper 1min, <https://vimeo.com/99334486>

Innovation – [行] Transportation

Generation of electrical energy from sound energy



Noise to Electricity Converter Invented by a group of Grade 11 students from the Philippine



Source: Goodnewsnetwork, <https://www.goodnewsnetwork.org/high-schoolers-make-device-that-generates-electricity-from-sound/>
Youtube, <https://www.youtube.com/watch?v=jkX8Q-aQu0M>

Innovation – [衣] Clothing

Solar Clothes



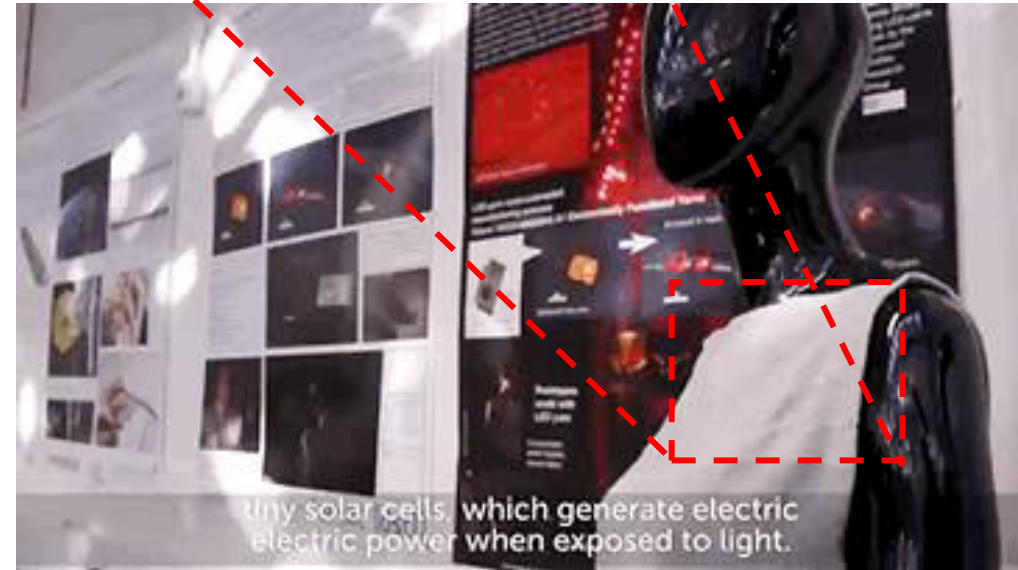
5x5 cm of miniaturized solar cells can generate up to 80mW

especially the heart rate variability
skin temperature, blood sugar.



tiny solar cells, which generate electric electric power when exposed to light.

2,000 miniaturized solar cells generate enough power to charge up a smartphone



tiny solar cells, which generate electric electric power when exposed to light.

Miniaturized solar cells are embedded into yarn by Nottingham Trent University

Source: Tech Xplore, <https://techxplore.com/news/2018-12-flea-sized-solar-panels-embedded-mobile.html>

Innovation – [食] Food

Innovative smart refrigerator

Refrigerator
without door¹



Refrigerator
with door²



Smart Refrigerator



Source: WWF-HK (Missing the doors), https://wwfhk.awsassets.panda.org/downloads/wwf_missing_the_door_report_eng_15sep.pdf

Joint Participation and Collaboration

‘Be open to ideas that seem wild’ to fight climate change. We must have some “Business-as-Unusual” ideas in combating climate change effectively.

Bill Gates



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“Our planet is under pressure and technology must be part of the solution. We must harness technology for good – for nature, for people, and for our planet.”

Dr. Grethel Aguilar
IUCN Acting Director General

Thank you.