From Green Building to Green Community

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Introduction

Global Warming
- Ramanathan’s warning 1985

Sustainable Development
- UN (1987)

Green Buildings
- 1980s

Zero Carbon Building
- 2000s

Carbon Neutral City
- Masdar initiative 2005

Green Community
- Yiu and Campos (2014)
IPCC 2014 & COP21 2015

- It is not about how to prevent drastic change of climate,
- But it is now about how to mitigate!
- It is time to take immediate and effective actions!!

http://www.ipcc.ch/

Paris Agreement on "nationally determined contributions" (NDCs)
Four Generations of Building Intelligence

Automated Building Model [1980s]

Responsive Building Model [1990s]

Effective Building Model [2000s]

Green Learning Model [since 2006]

building automation

responsiveness to the environmental changes

communication and integration systems

enable occupants to work more efficiently

Green and learning skills of a building

25 yrs
Zero Carbon Building HK

- CIC has built the first Zero Carbon Building in Hong Kong in 2012 (Kowloon Bay);
- GFA: 14,700sm
- Site Areas: 1,400sm
- Height: 2 storey
- Use: Exhibition and Education Centre.

GHG emission reduction by on-site renewable energy: 8,250 tonnes (over 50 years)
• photovoltaic panels
• biodiesel generation system
• large scale use of biodiesel made from waste cooking oil
• greenery coverage > 60% of the site
• Building Management System with smart control
ZCB = Zero Energy Only

– Offset of operating energy consumed from the grid by on-site renewable energy generation with grid-feed-in; or
– Does NOT offset embodied energy of its construction process and major structural materials.
UAE – Carbon Neutral City

- the Masdar initiative - a carbon-neutral, car-free, 1,482 acre sustainable city powered by the sun, in United Arab Emirates
Traditional City Model

Rely on a lot of Resources Inputs and Disposition of Outputs
Carbon Footprints

- The **Carbon Footprint** (per capita carbon dioxide emission intensity) of HK: 5.5 tonnes/person/year

http://www.economicshelp.org/blog/6131/economics/list-of-co2-emissions-per-capita/
**Ecological Footprint**

- WWF-Hong Kong’s “Hong Kong Ecological Footprint Report 2014”:
- "Hong Kong people are living beyond the Earth’s limits. **3.1 Earths are needed** if everyone lived the lifestyle of Hong Kong people."

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<th>Biocapacity</th>
<th>Ecological footprint 2008</th>
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<tbody>
<tr>
<td>Hong Kong</td>
<td>0.01 global ha per person</td>
<td>5.4 global ha per person</td>
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Solid Waste

- Daily Solid Waste (2014 HK) is 14859 tons;
- Daily Domestic Waste is 6418 tons (43%);

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<tr>
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<th>2014</th>
<th>Taiwan</th>
<th>South Korea</th>
<th>Hong Kong</th>
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<td>Dom Waste P.C.</td>
<td>1kg</td>
<td>0.95kg</td>
<td>1.36kg</td>
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**Figure 2** Daily domestic waste generation rates per capita compared.
How to be Zero Waste?

FIGURE 4  Waste disposal rates in Hong Kong, Taipei City and South Korea (per capita)

- **Taipei City**
- **Hong Kong**
- **South Korea**

- **Volume-based waste fee system was implemented in 2000**
- **Volume-based waste fee system was implemented in 1995**

kg/day


(Household and small business waste) (Household garbage)
Traditional City Model

Rely on a lot of Resources Inputs and Disposition of Outputs
4-Zero Concept of a Green Community

5-level, 5-zeros sustainability model

A Green Community Experiment

Reduce Inputs
- Solar Energy
- Collect Rain Water
- Reduce Pollution At Source
- Education & Training
- Information & Measurements Competitions and Awards
- Empowerment & Cooperation
- Residents’ Participations

Reuse
- Energy Saving
- Food Self Sufficiency
- Cleansing Liquid
- Reduce Waste from Source
- Recycling

Recycle
- Fertilizers
- Collect Kitchen Wastes
- Reduce Wastes

Green scape
- Farming

Sharing Economy

Empowerment & Cooperation
Green Community can share space on Green Corners.
Green Community can farm

Aquaponics
Green Community can have Landscape

- 43% landscape area (3 ha)
- No. of trees = 479 (absorb 11,017t CO2/yr)
- Vertical green walls
Green Community can absorb more waste for reuse

It saves 29,232 litres of Cleansing Liquid

Cleansing Common Areas by ECO Enzyme
Green Community Can Share

Community

It saves 914 books and 167 items in 2014

Reuse

Sharing: Books, Toys, Sports Equipment, Furniture, Baby Stuffs, Musical Instruments, Electrical Appliances
Green Community has better economies of scale in recycling
Green Community can enforce Producer Responsibility

- Carbon Powder Cartridges
- Construction Materials
Green Community can install Solar Panels in common area
Green Community can save energy in Common Area

2004-2014 Electricity Consumption of Common Area

From 2004 to 2013, it saves **9,011,934 Kwh electricity (7,570t CO2)**

It saves **47.5 % electricity consumption**
Energy Saving

- LED
- Transformer
- Lift Control System
Reduce 15% Solid Wastes in 2015Q1
Green Community can have Smart Grids

- Smart grids allow selling electricity by users to the electricity grid of the district.
- Offsetting GHG becomes possible.
Green Community can preserve Ecological and Heritage Values

- Merge with Green belts and country parks
- Biodiversity, including 60 species of birds, insects, endangered toad and vulnerable frog
- Old Valuable Trees, Hundred Years Old Heritage

紅嘴藍鵲 (Blue Magpie), Urocissa erythrorhyncha
HKAEE Award 2015 for the 1st Green Community

物業管理 (住宅)
Property Management (Residential)

金獎 Gold Award

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What’s Next: A Green City
The End

comments are welcome.

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