

# Challenges in ready-mixed concrete industry: Put "Green" into the concrete



## Content:

1. What are the perspectives in the concrete of the stakeholders in Hong Kong?
2. Challenges in the sustainable development in Hong Kong concrete production industry
3. Think about.....

# 1. What are the perspectives in the concrete of the stakeholders in Hong Kong?



# What are the perspectives in the concrete of the stakeholders in Hong Kong ?

The people:

😊 *Welcome*

*Most magnificent buildings are constructed in concrete*



# What are the perspectives in the concrete of the stakeholders in Hong Kong ?

The people:

 *Unwelcome*

*The appearance: unity colour but unattractive*





# What are the perspectives in the concrete of the stakeholders in Hong Kong ?

Society:

 *Welcome*

*The versatility: sustains our city development*



# What are the perspectives in the concrete of the stakeholders in Hong Kong ?

Society:

 *Unwelcome*

*Concrete production is harmful for the environment*



# What are the perspectives in the concrete of the stakeholders in Hong Kong ?

Engineers:

😊 *Welcome*

*The life: one of the longevity construction materials*





# What are the perspectives in the concrete of the stakeholders in Hong Kong ?

Engineers:

 Unwelcome

*To afford stringent requirements of design, quality control measures, workmanship, and maintenance*



NINTH EDITION  
**REINFORCED  
CONCRETE DESIGN**



ABI AGHAYERE



# What are the perspectives in the concrete of the stakeholders in Hong Kong ?

Contractors:

😊 *Welcome*

*Easy-to-application, and efficient concrete products*

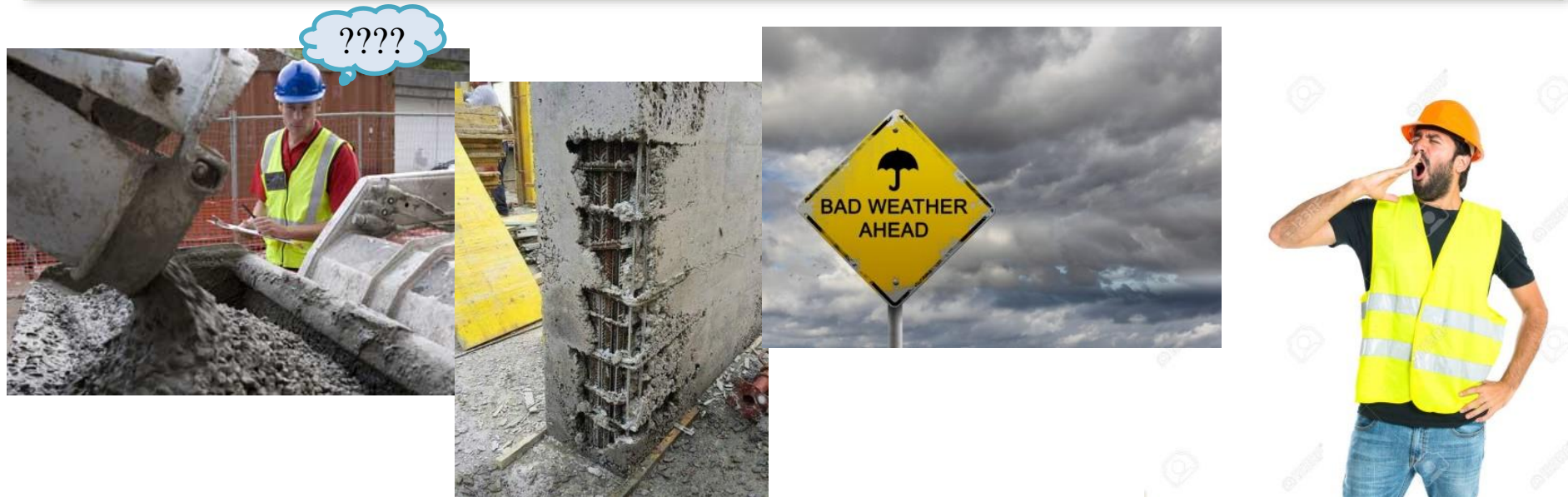


# What are the perspectives in the concrete of the stakeholders in Hong Kong ?

Contractors:

 Unwelcome

*Uncertain factors:  
the quality control on site, the workmanship,  
weather impact, and the labour efficiency*



# What are the perspectives in the concrete of the stakeholders in Hong Kong ?

Concrete producers:

😊 *Welcome*

*For concrete design and production:  
state-of-art technology, united design criteria,  
and performance-based oriented*

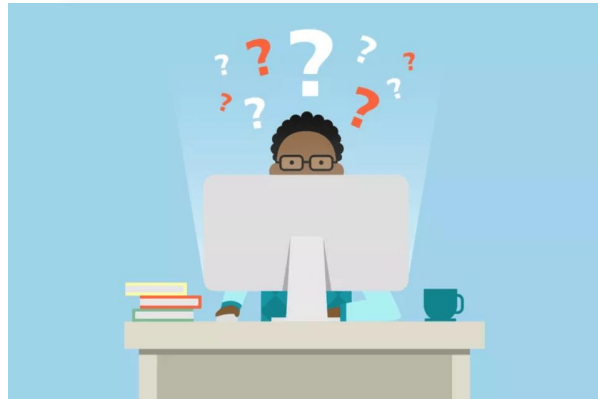


# What are the perspectives in the concrete of the stakeholders in Hong Kong ?

Concrete producers:

 *Unwelcome*

*Uncertain factors:  
design & acceptance criteria, site condition, quality  
check, and the workmanship impact*



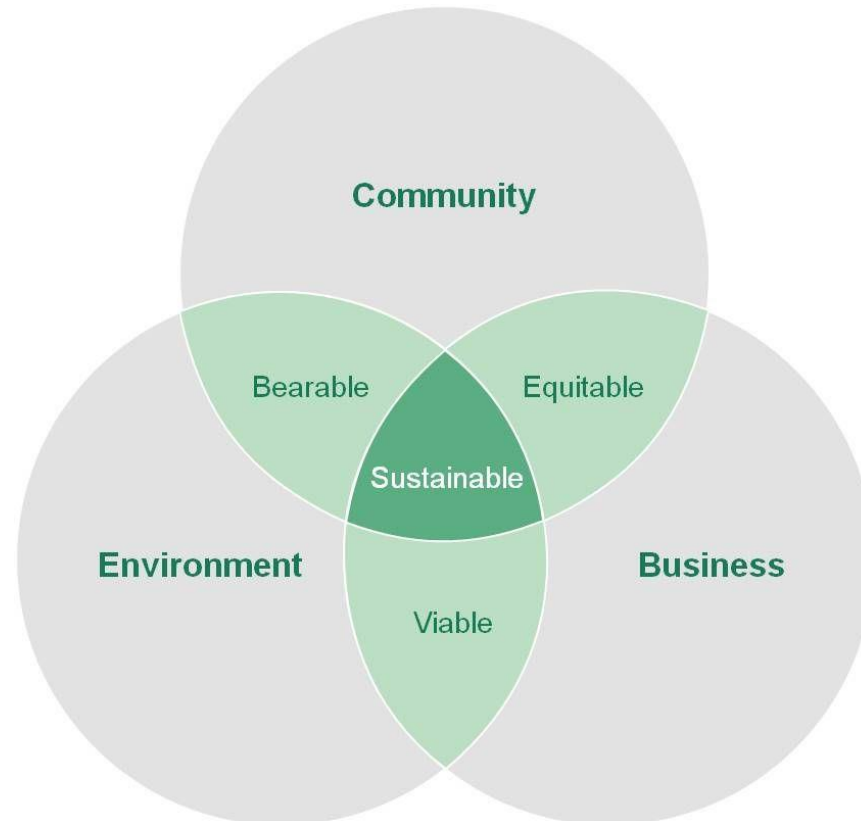
## 2. Challenges in the sustainable development in Hong Kong concrete production industry



# Challenges in the sustainable development in Hong Kong concrete production industry

*"Sustainability was defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their needs."*

*"Our common future"*, World Commission on Environment and Development (WCED), 1987.



# Challenges in the sustainable development in Hong Kong concrete production industry

## Sustainable development in ready-mixed concrete:

1) Durability concern without exorbitant strength requirement;

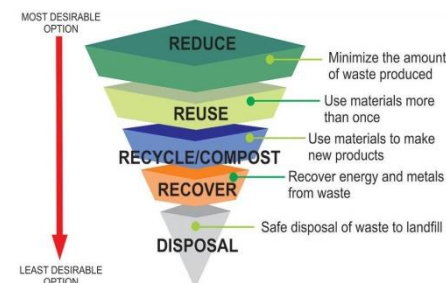
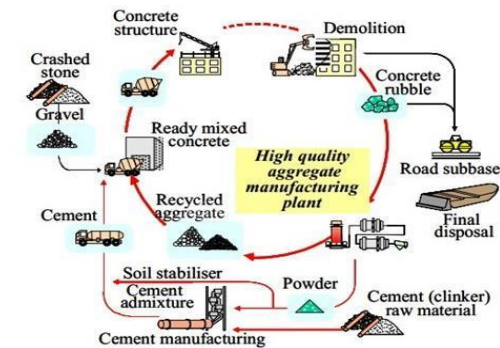
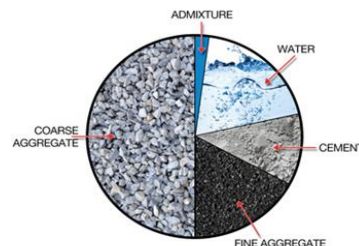
2) Reduction in embodied CO<sub>2</sub> emission;

3) Conservation of raw materials;

4) Utilization of recycled or supplementary materials;

5) Avoidance of disposal of concrete;

6) Etc...





# Challenges in the sustainable development in Hong Kong concrete production industry

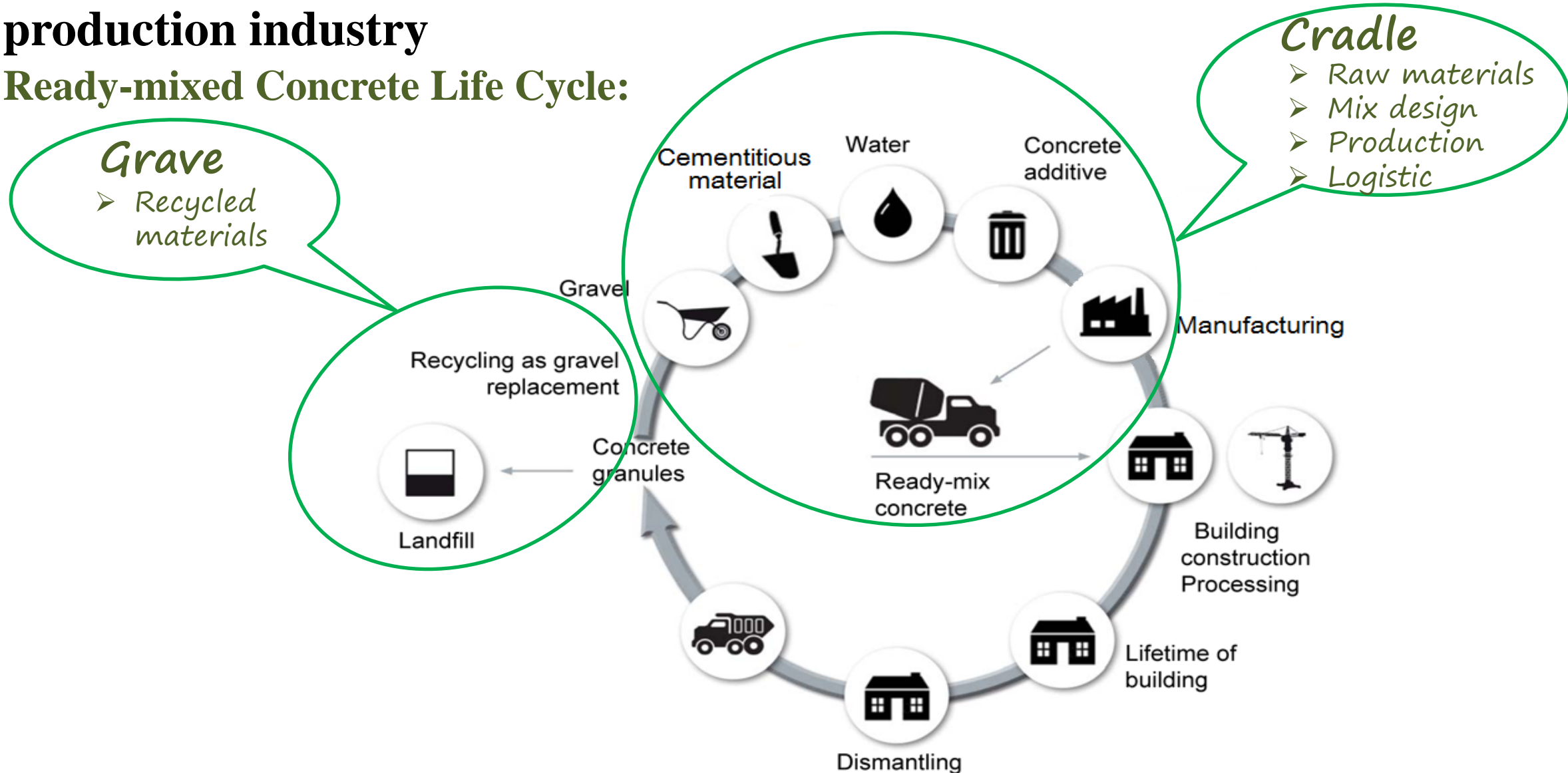
Who should care in sustainable development?

- 1) *Government*
- 2) *Developer/Project owners*
- 3) *Designer/Specifiers/Consultant*
- 4) *Contractors*
- 5) *Concrete producers*
- 6) *End user, Green parties, etc...*



# Challenges in the sustainable development in Hong Kong concrete production industry

## Ready-mixed Concrete Life Cycle:



# Challenges in the sustainable development in Hong Kong concrete production industry

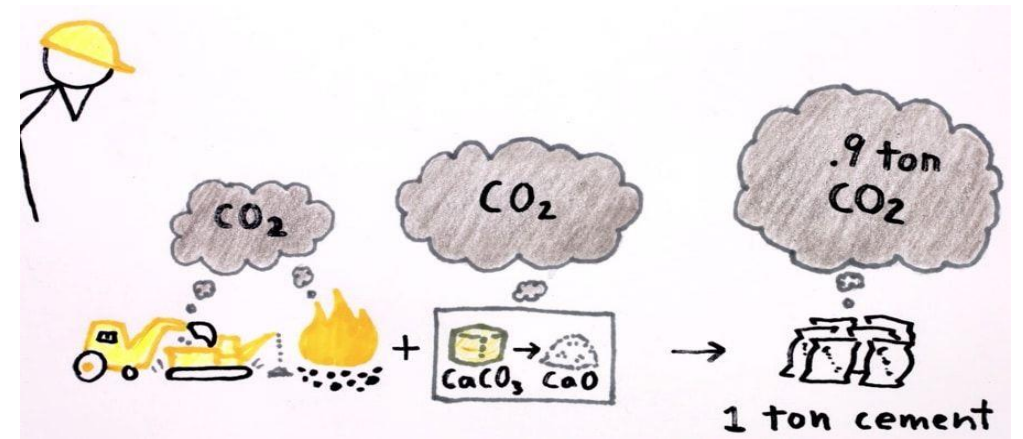
How about the concrete sustainability?

*Carbon emission issue :*



*Cement → main ingredient in concrete*

&

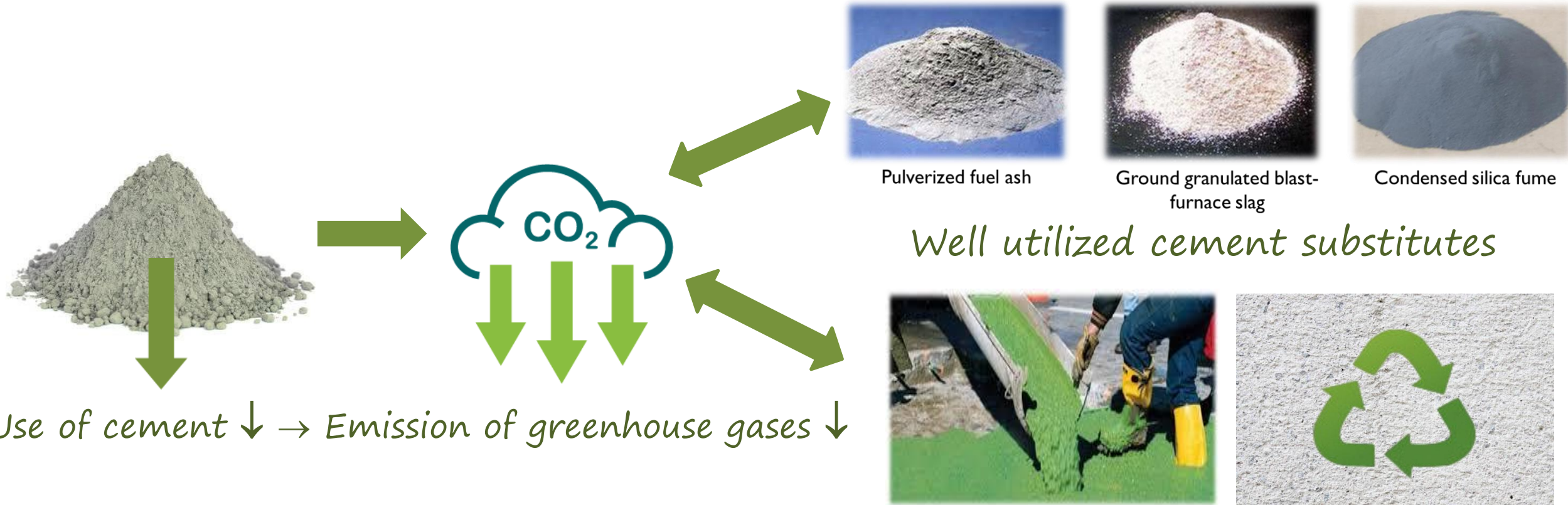


*Cement industry → the major CO2 contributing factor in concrete constituents*

# Challenges in the sustainable development in Hong Kong concrete production industry

How about the concrete sustainability?

Recommendation for the reduction of carbon emission :



# Challenges in the sustainable development in Hong Kong concrete production industry

How about the concrete sustainability?

The challenging in use of cement substitutes → Pulverized Fuel Ash (PFA):

- A by-product from coal burning power plant; however,

Coal-firing ↓ → PFA supply ↓

- supplied from local suppliers, and import from mainland as well as other countries

- 25-35% PFA content for normal applications (in COP, CEDD & HKHA requirement)



Coal



PFA



HKE - Lamma  
Power Station



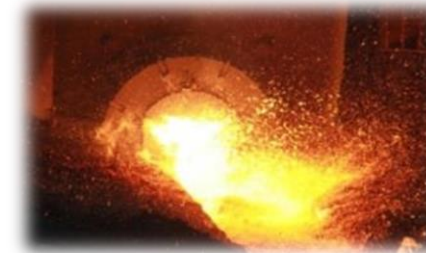
CLP - Castle Peak  
Power Station

# Challenges in the sustainable development in Hong Kong concrete production industry

## How about the concrete sustainability?

The challenging in use of cement substitutes → Ground Granulated Blast-furnace Slag (GGBS):

- By product of steel industry: from the blast furnace or iron/steel mill



Blast furnace



Iron/Steel mill

- supplied from local supplier, and import from mainland as well as other overseas countries
- 35-75% GGBS content for normal applications (in COP & CEDD requirement); only allow 35% for precast concrete façade (in HKHA requirement)



GGBS plant (mainland)

# Challenges in the sustainable development in Hong Kong concrete production industry

How about the concrete sustainability?

The challenging in use of cement substitutes → Condensed Silica Fume (CSF):

➤ From the carbothermic reduction of high-purity quartz in electric arc furnace



Silicon production plant

➤ Majorly import from mainland or other overseas countries, without local source

➤ Use in high performance or high strength concrete



➤ 5-10% CSF replacement for high performance or high strength concrete (in CEDD requirement)

# Challenges in the sustainable development in Hong Kong concrete production industry

How about the concrete sustainability?

*The challenging in use of cement substitutes → Other issue:*

- *Limitation for the storage (silo) of cement substitutes in typical concrete plants*



- *Approval for erecting additional silo: achieving respective regulations from BD, EPD, and Lands Department*





# Challenges in the sustainable development in Hong Kong concrete production industry

**How about the concrete sustainability?**

*Issue of limitation of the raw materials for concrete production, e.g.*



*Natural coarse & fine aggregates*

# Challenges in the sustainable development in Hong Kong concrete production industry

**How about the concrete sustainability?**

*Recommendation for the well-used of recycled/processed materials for concrete production, e.g.*



*Recycled aggregates*



*Recycled glass*



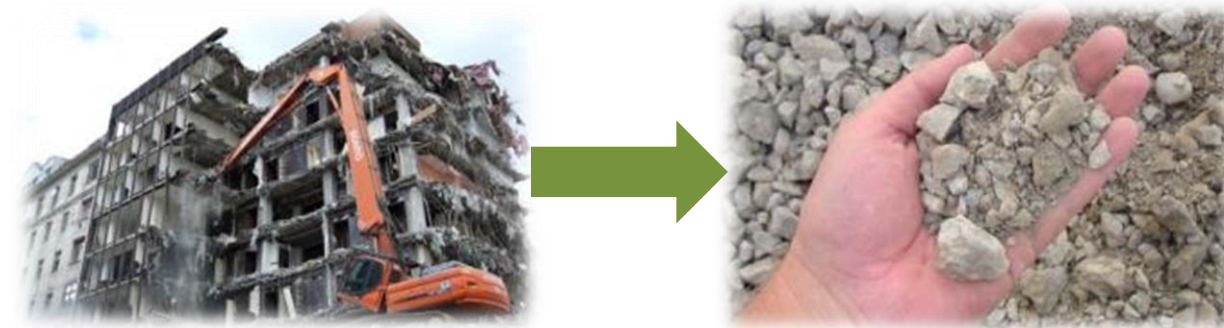
*Manufactured sand(Processed)*

# Challenges in the sustainable development in Hong Kong concrete production industry

## How about the concrete sustainability?

*The challenging for the use of recycled materials for concrete production → Recycled aggregates:*

- *Retrieved from construction and demolition (C&D) waste → building demolition or crushing old concrete, however*
- ❖ *Hesitate its quality, especially engineer*
- ❖ *Lack of supply*
- ❖ *Lack of temptation to user*





# Challenges in the sustainable development in Hong Kong concrete production industry

## How about the concrete sustainability?

The challenging for the use of recycled materials for concrete production →  
Recycled glass:

- Obtained from glass recycling industry, however
- ❖ Costly in collecting, transportation, manufacturing
- ❖ Lack of the related local processing manufacturer
- ❖ Few amount is suitable to be used in concrete manufacturing



Glass from  
domestic waste



Recycled glass



Glass crushing



Cementitious product



# Challenges in the sustainable development in Hong Kong concrete production industry

## How about the concrete sustainability?

*The challenging for the use of processed materials for concrete production → Manufactured sand:*

- *It is obtained from the further processing of crushed rock fines, however*
- ❖ *Higher water absorption rate compared with River Sand*
- ❖ *Currently limited supply in local market (Demand and supply)*
- ❖ *Deep-rooted custom in using river sand*



River Sand



VS

M Sand



# Challenges in the sustainable development in Hong Kong concrete production industry

How about the concrete sustainability?

*Any other challenges:*



*Landfill issue → limited space for landfill in Hong Kong*

# Challenges in the sustainable development in Hong Kong concrete production industry

How about the concrete sustainability?

Recommendation for landfill in Hong Kong → Reuse of concrete



Fresh Concrete → Aggregates can be retrieved by concrete reclaimer or filter - press



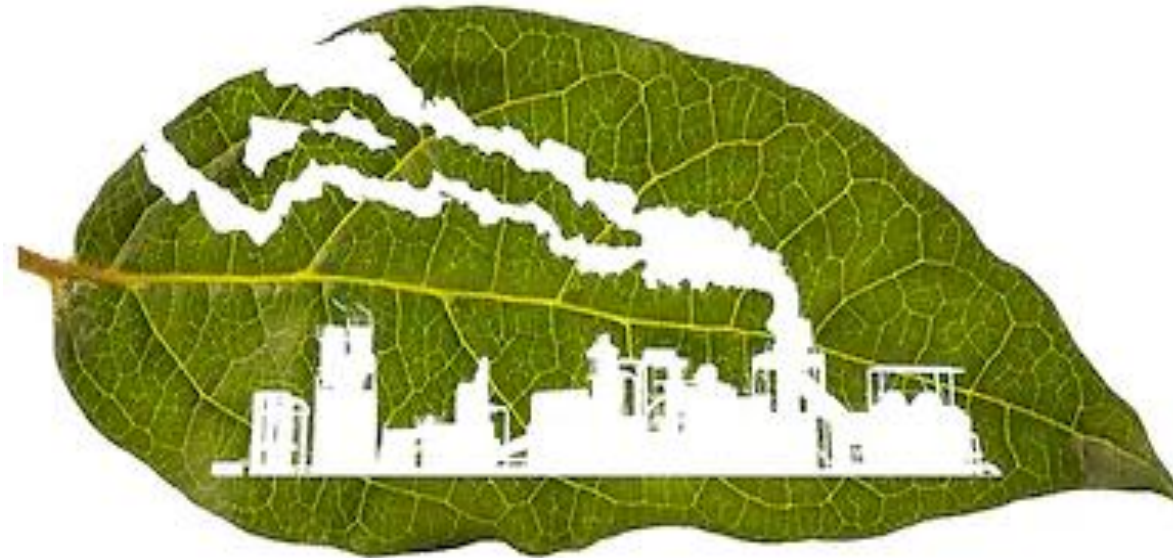
Hardened Concrete → Crushed and sized to become recycled aggregates



# Challenges in the sustainable development in Hong Kong concrete production industry

How about the concrete sustainability?

*Any other challenges:*



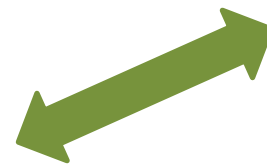
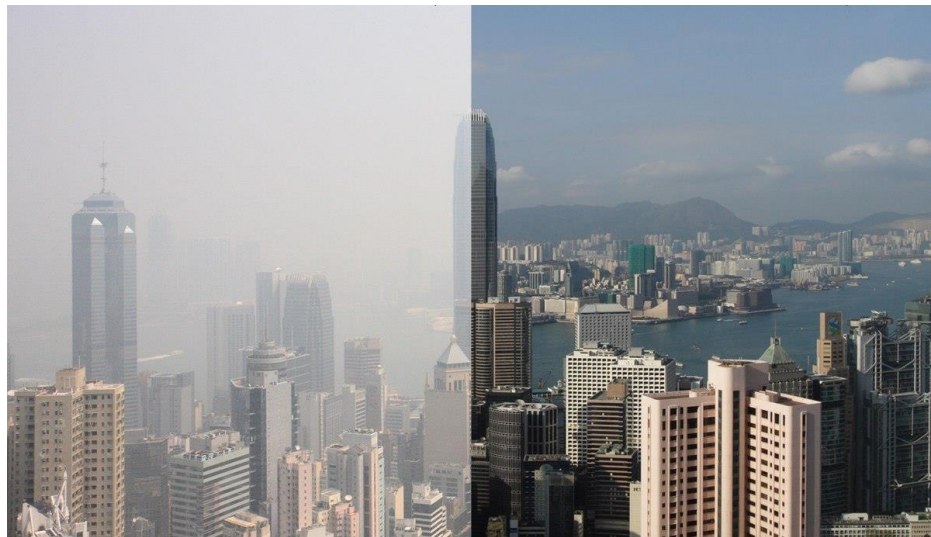
*Plant operation → Environmental protection*



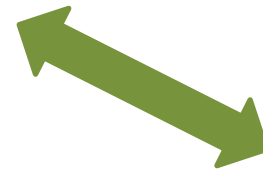
# Challenges in the sustainable development in Hong Kong concrete production industry

How about the concrete sustainability?

*Plant operation → Environmental protection:*



*Dust collector*



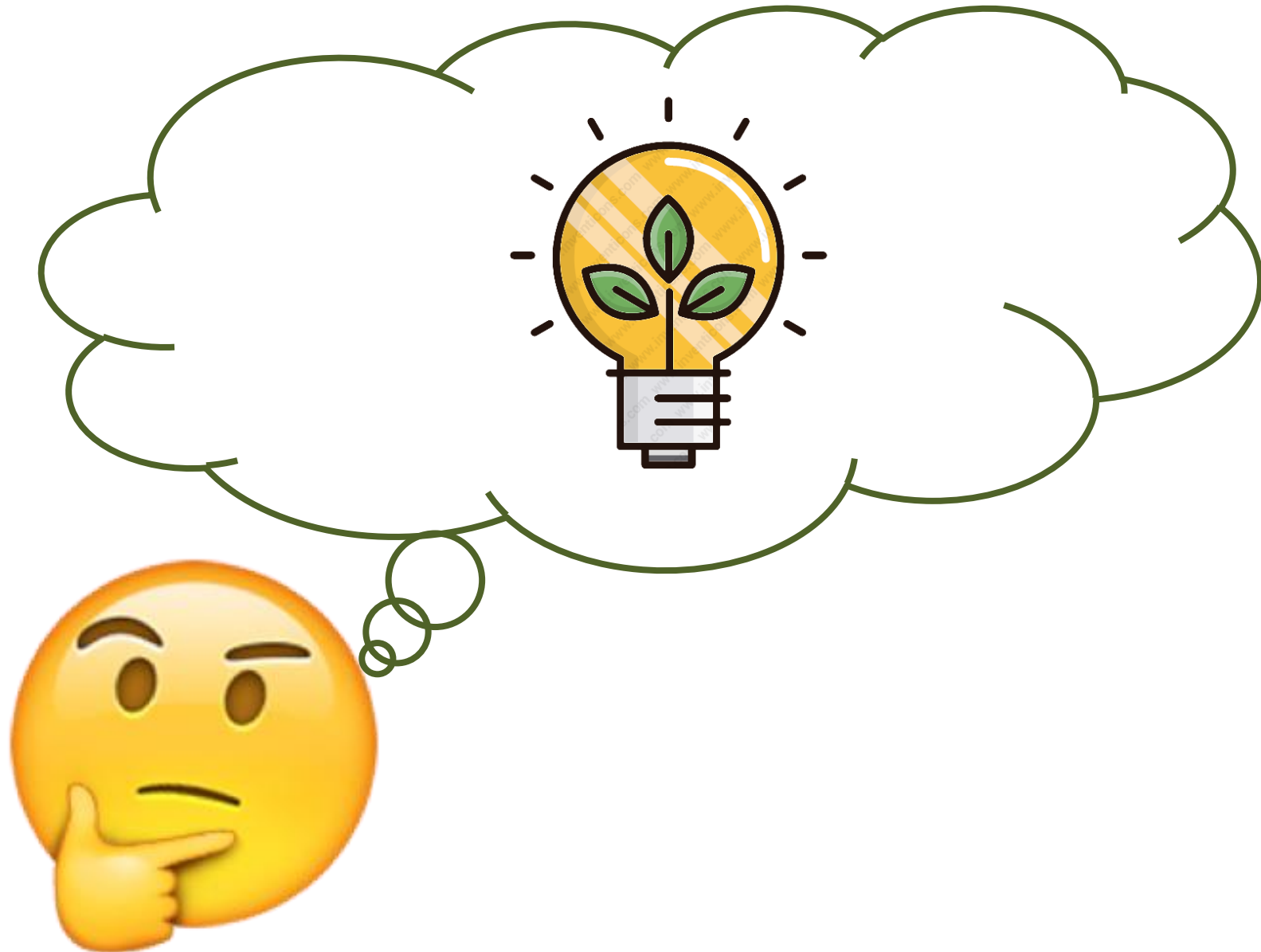
*Open area dust control*

*Air Impact → Dust Control*

### 3. Think about.....



HONG KONG  
CONSTRUCTION  
MATERIALS  
ASSOCIATION LIMITED



Think about.....



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CONSTRUCTION  
MATERIALS  
ASSOCIATION LIMITED

*Concrete is*



*Or*



**Think about.....**



**HONG KONG  
CONSTRUCTION  
MATERIALS  
ASSOCIATION LIMITED**



*Innovative technology*

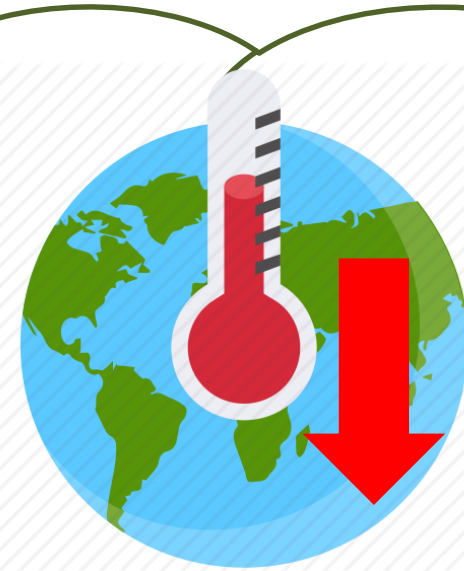
*then*



**Think about.....**



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ASSOCIATION LIMITED**



*Eco-friendly material*

*hence*



**Think about.....**



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*Sustain the development in the future*



**Think about.....**



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*The way depends on*



*our communication, cooperation, and consensus*

**Think about.....**



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*to benefit our world !!!*





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*Thank you*

