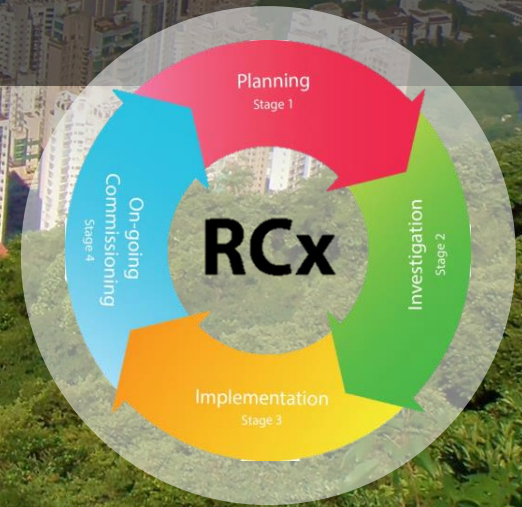


Introduction of Technical Guidelines on Retro-commissioning (RCx) in Hong Kong



28 November 2017

Building Operation

BUILDING

Systems are working

Users feels not bad

BUT.....

System are not work at
high efficiency

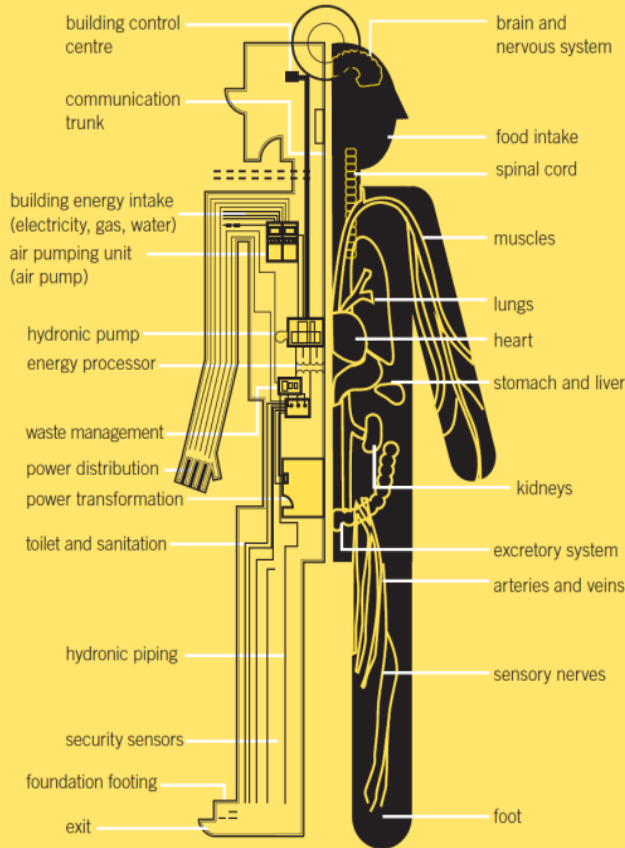
THUS.....

Waste Energy

Waste Money

.....

What can we do?



HUMAN BODY

(Sub-health)(亞健康)

We are not sick

Go to work every day

BUT.....

Just feel not right

THUS.....

Low productive

We can.....

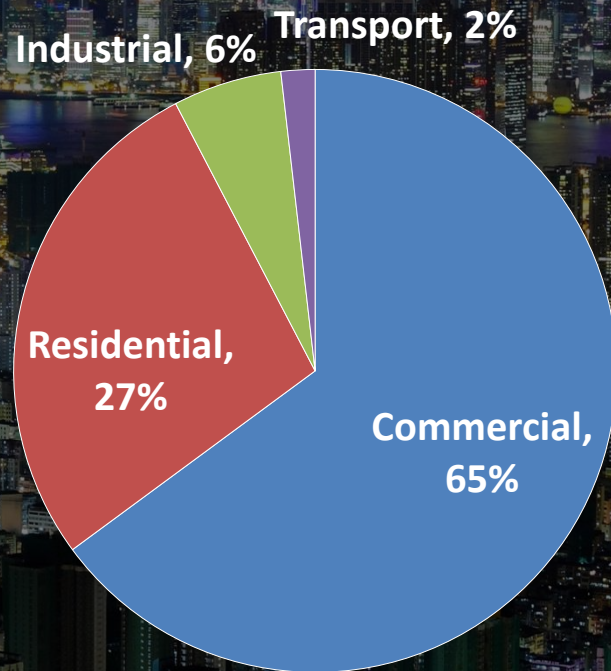
Body check, take health
advices; get healthy

Electricity consumption in Hong Kong

Buildings consume over

> 90%

Electricity use in HK



The Buildings Energy Efficiency Ordinance (BEEO)

- Central Building Services Installations (CBSIs) in new prescribed buildings shall comply with the Building Energy Code (BEC)
- Major retrofitting works (MRW) for CBSIs in existing prescribed buildings shall comply with BEC
- Energy Audit every 10 yrs (Commercial building / commercial portion)

《建築物能源效益條例》
於**2012年9月21日**起全面實施
The Buildings Energy Efficiency Ordinance
comes into full operation on **21 September 2012**

空調裝置
Air-conditioning installation

照明裝置
Lighting installation

升降機及自動梯裝置
Lift & escalator installation

電力裝置
Electrical installation

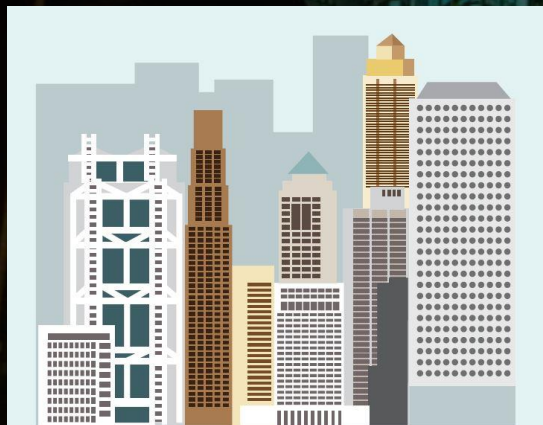
Energy Audit Form
能源審核表格

- 新字號建築項目符合建築物能源效益守則。
- 商業大廈業主須每十年進行一次能源審核。
- 有關詳情，請參閱機電工程署網頁：
<http://www.emsd.gov.hk>

- Building services installations should comply with the Building Energy Code.
- Owners of commercial buildings should undergo energy audits once every 10 years.
- For details, please visit EMSD's webpage:
<http://www.emsd.gov.hk>

機電工程署
EMSD

Age over 25



Buildings with age over 25

> 60%

in existing private buildings

Building's Energy Preference

Building Operation

Buildings often get out of tune...

- Changes induced by addition, alterations and improvement works
- Drift off / override of system control set points
 - Drop in accuracy of sensors
 - Operation error

Time

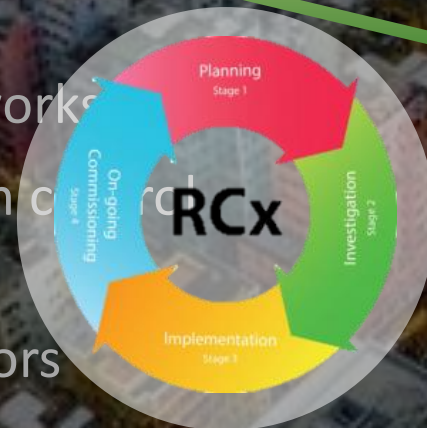
Buildings lose their efficiency as a result ...

Building's Energy Preference

Building Operation

Buildings often get out of tune...

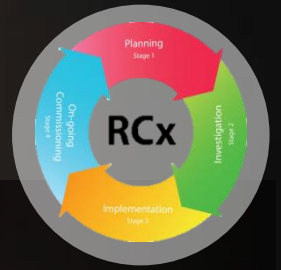
- Changes induced by addition, alterations and improvement work
- Drift off / override of system controls and set points
 - Drop in accuracy of sensors
 - Operation error



Time

... energy efficiency back to design/better

What is Retro-commissioning ?



- A cost-effective systematic process to periodically check an existing building's performance.
- The process identifies operational improvements that can effectively save energy and thus lower energy bills and improve indoor environment
- “Retro-commissioning” covers the scope of “existing building commissioning”, “re-commissioning” and “continuous commissioning”.

Why is retro-commissioning important?



- Buildings frequently undergo operational and occupancy changes that challenge the mechanical, electrical and control systems, hindering optimal performance.
- In today's complex buildings, systems are highly interactive, with sophisticated controls that can create a trickle-down effect on building operations

Retro-commissioning is not common in Hong Kong



Building owners
not familiar



Value not fully
Demonstrated



Insufficient
local guidelines



Limited
experienced
staff and
service providers



Lack of
building
information

4 Work stages of RCx

Sample Technical Approach of RCx

Forms or checklist for RCx



Environment Bureau
The Government of the Hong Kong Special Administrative Region

Home Sitemap Print Share

機電工程署
EMSD

Climate Ready HK
全民節能 慳神有計
Energy Saving For All

ns, Awards, Exhibition, Energy Saving, Renewable, Data & Retro-commissioning, Resources & Publications

RETRO-COMMISSIONING

Search: TG RCx HK

QR Code

Electrical (EL)



RCx

2017

EMSD

Direct Benefits of RCx

Energy Savings / Electricity Bill



Indirect Benefits of RCx

Improve building performance



Improve occupant comfort and productivity



Improve system reliability



Improve building systems efficiency and extended equipment life



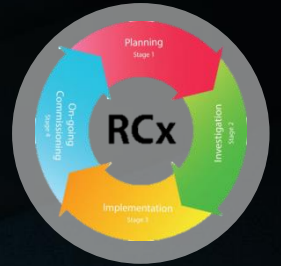
Provide appropriate training to O&M staff



No or Low cost - short payback



RCx Framework



Stage 1: Planning

Stage 2: Investigation

Stage 3: Implementation

Stage 4: On-going Commissioning

How to start?

Venues

Considerations

- Building portfolio
- Annual electricity consumption?
- Accessibility?
- System complexity?



How to start?

People

Considerations

- Operators / technicians
- Engineers
- Maintenance contractors
- Equipment/ System Suppliers
- Services Providers?



How to start?

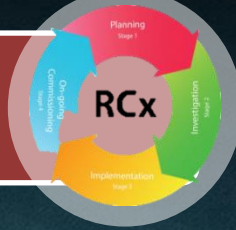
Investment & Return

Considerations

- Venues (accessibility?)
- People (internal-staff/ external?)
- Together with retrofit?
- Phasing?
- Environmental concerns?



Stage 1: Planning

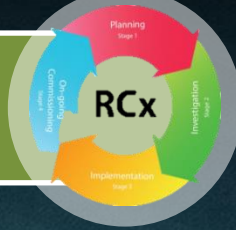


Example:

- Gather information from stakeholders, documentation (eg. drawings, manuals)
- Arrange meeting and interview
- Conduct walk-through Inspection
- Develop RCx plan for agreement with stakeholders
- Forms template developed in TG to facilitate the users to carry out RCx

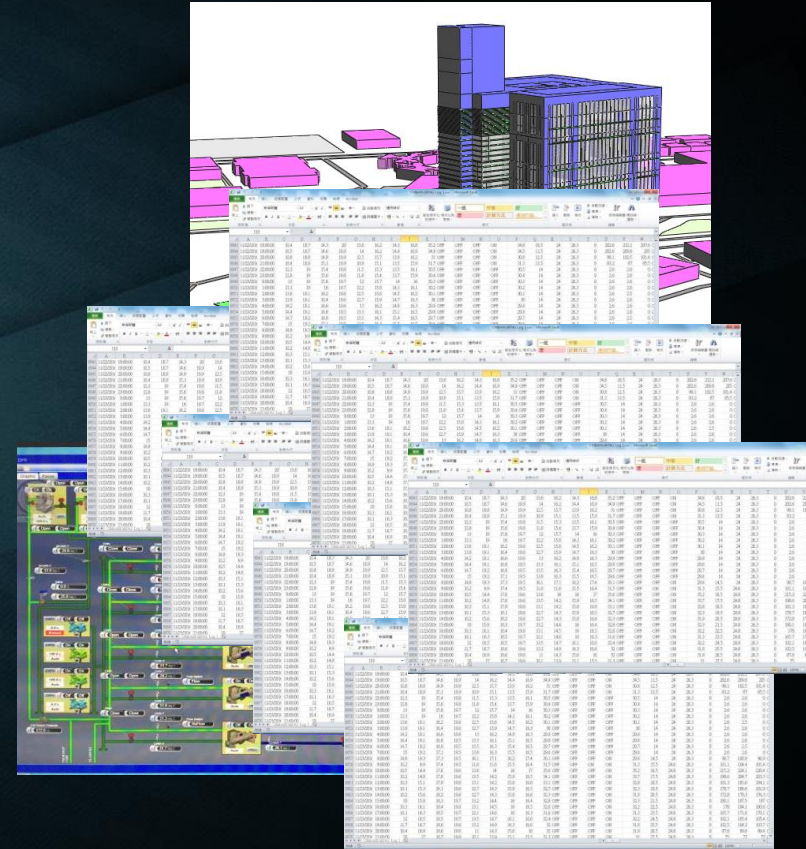


Stage 2: Investigation



- Conduct site survey and identify current facilities requirement
- Perform system adjustments and quick fix
- Conduct data logging and trending
- Short term diagnostic, monitoring and functional test plans

Example:

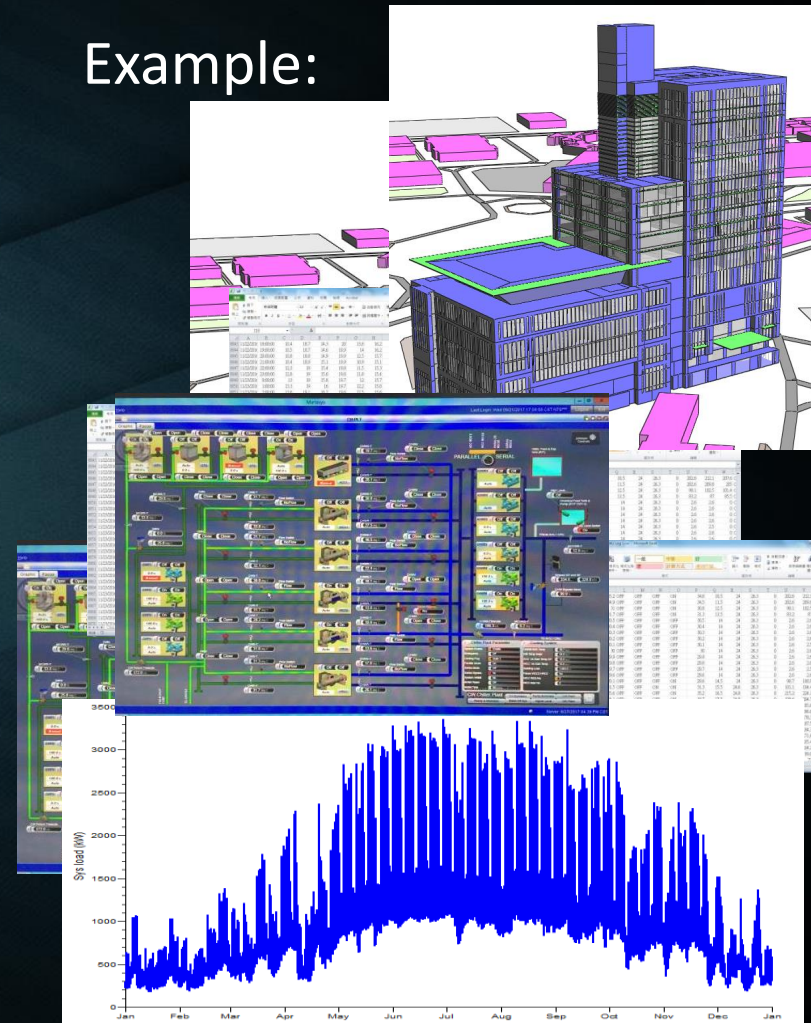


Stage 2: Investigation

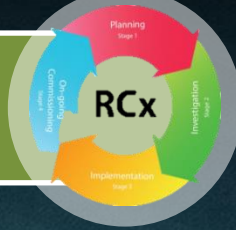


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Example:



Stage 2: Investigation



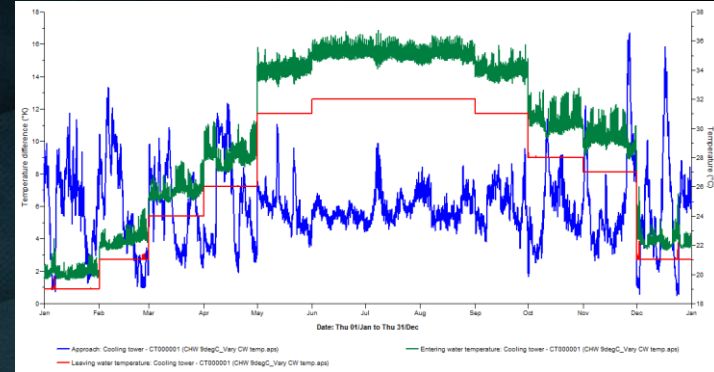
Con't

- Identify potential energy saving measures and improvements

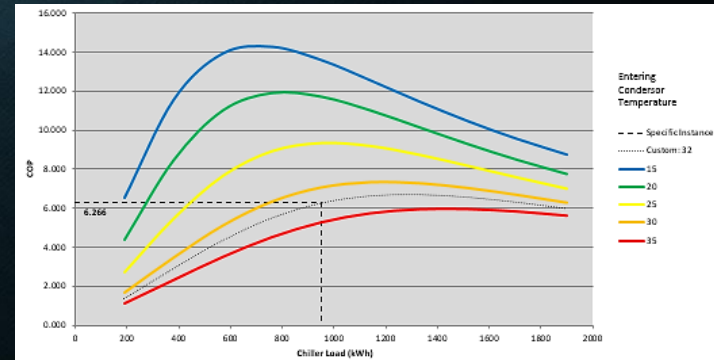
Energy Saving Opportunities (ESO)

- Forms templates are developed in TG(RCx)
- Investigation Report

Example: chiller sequencing

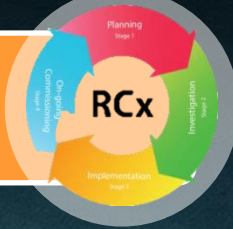


Cooling tower temperature reset analysis



Analysis COP in different conditions

Stage 3: Implementation

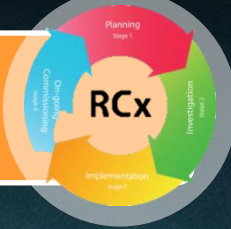


Example: chiller sequencing

- Implementation of selected energy saving opportunities
 - Proposed by RCx team and agreed by Stakeholder
 - Suit budget, minimize disturbance to users
- Performing verification
 - Effectiveness of the implemented items
- Develop a RCx Final Report
- Training for O&M Staff (maintain the RCx benefits)



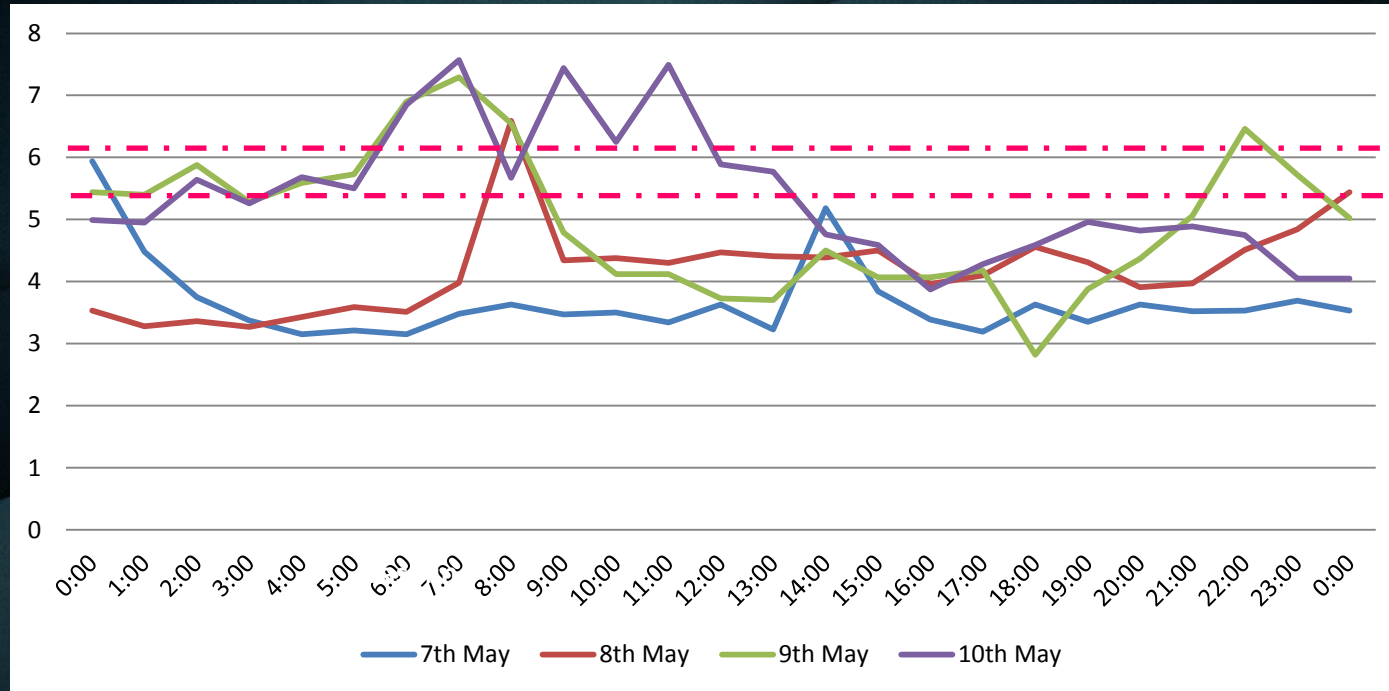
Stage 3: Implementation



Measurement & Verification (M&V)

Actual measured data during the chillers sequencing trials

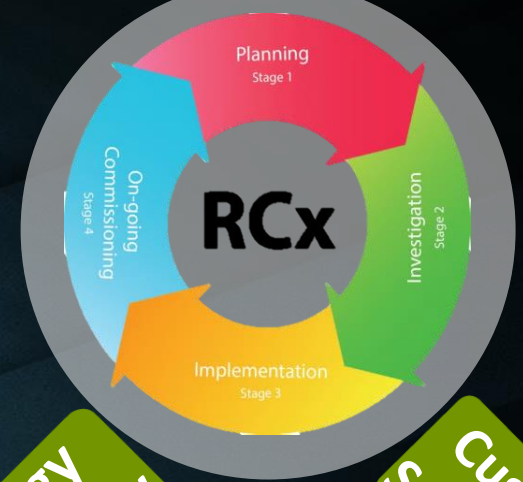
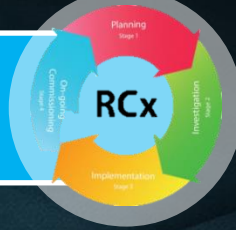
COP



3 days average COP improvement (by measurement)

Approx. 15%

Stage 4: On-going Commissioning

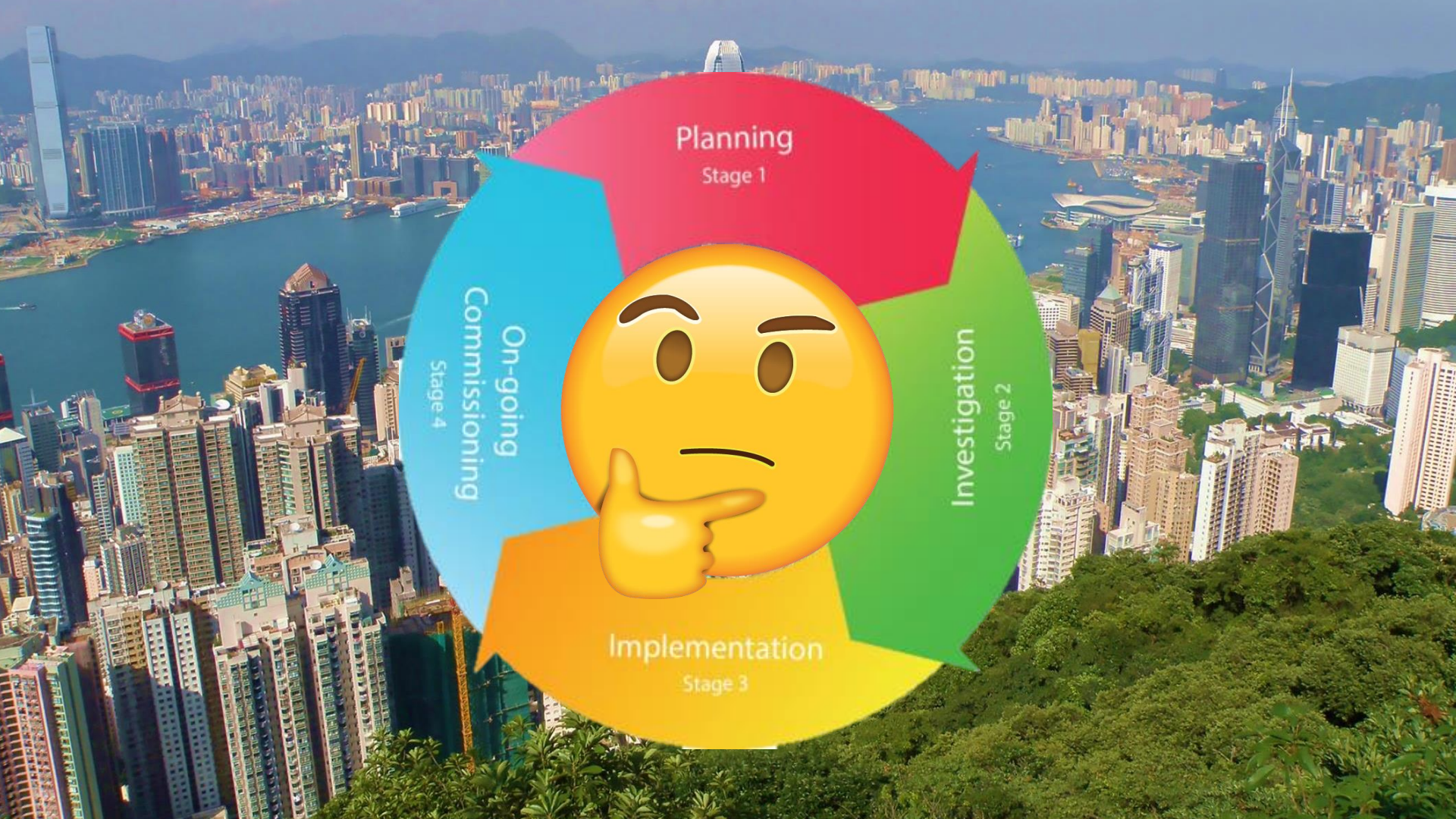


- To ensure “high” energy performance maintained after RCx
- To develop a ongoing commissioning plan
- Key indicators such as
Electricity Bill, satisfaction levels of occupants, etc...
- To arrange training for O&M staffs
- Continuous monitoring – review and update

Energy Efficiency

Customer Satisfactory





Planning

Stage 1

Investigation
Stage 2

Implementation

Stage 3

On-going
Commissioning
Stage 4





**THANK
YOU**