

ACT-Shop - A Retro-commissioning Scheme for Existing Buildings in Hong Kong

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Content

- Background
- Progress and findings of ACT-Shop
- Way forward



Organisers:



International Co-owners:

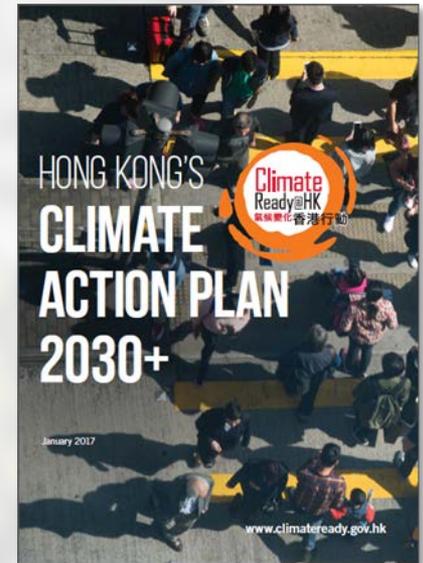


Background

A target to meet

by **2030**

26-36% absolute carbon
emission reduction



Background

Current Practice of the Industry

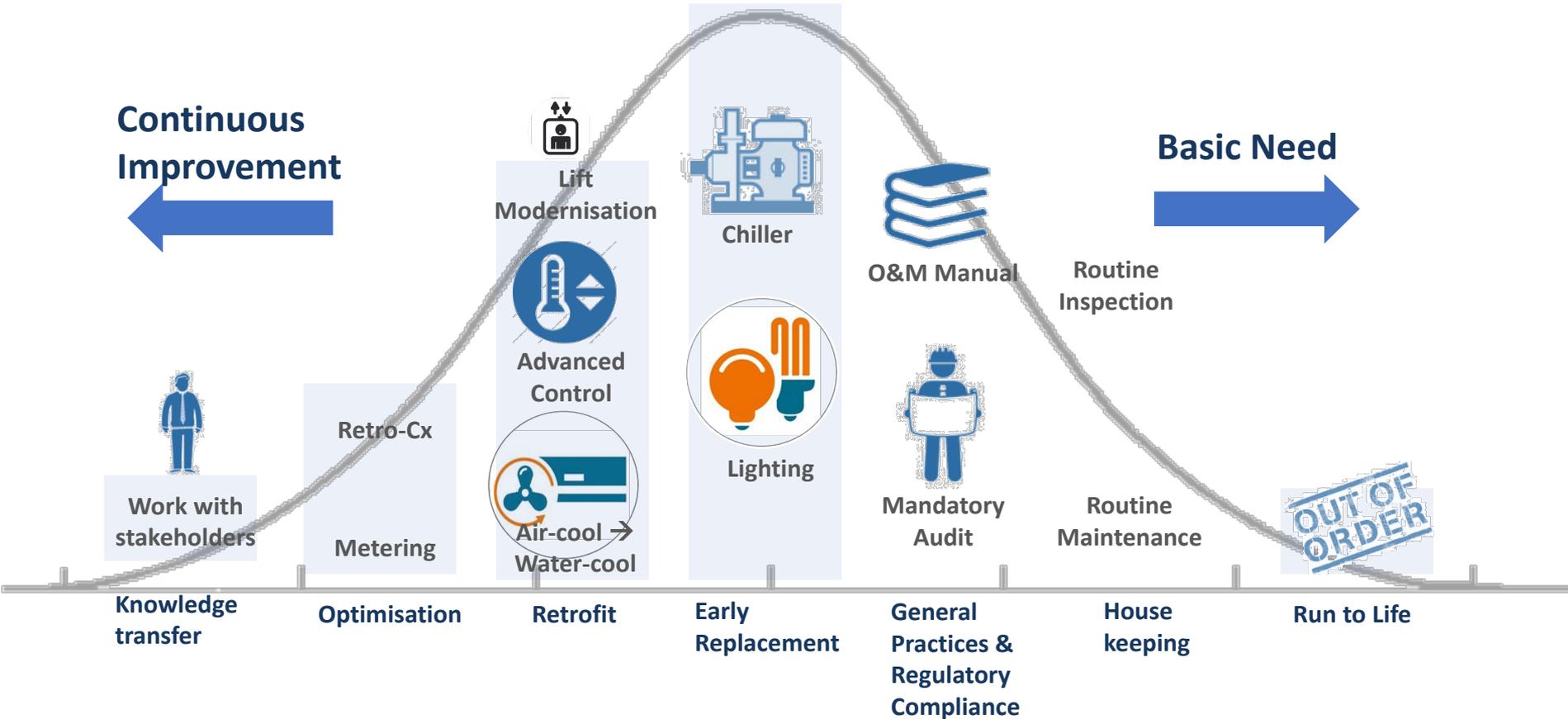
Knowledge-Based Practice

Adopt Best Practice

Maintenance Requirement

Continuous Improvement

Basic Need



Organisers:



International Co-owners:



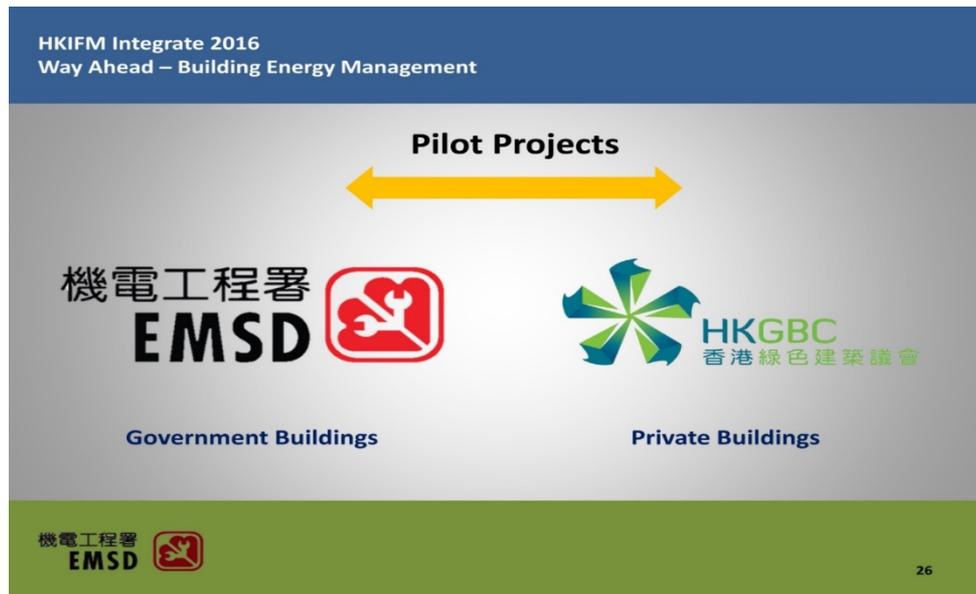
Summary of Government Initiatives

Government building stock

- ✓ Set saving target and timeline 
- ✓ Energy audits; carry out EMOs, including retrofits 
- ✓ Pilot retro-commissioning projects 
- ✓ Do green procurement 
- ✓ Out-perform BEC for new buildings 
- ✓ Showcase compliance for Green Building 

Background

A mission to drive Retro - Commissioning to private buildings



Organisers:



International Co-owners:



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 bill

Source: Technical Guidelines on Retro-commissioning (Draft) - *Electrical and Mechanical Services Department, Hong Kong 2017.*



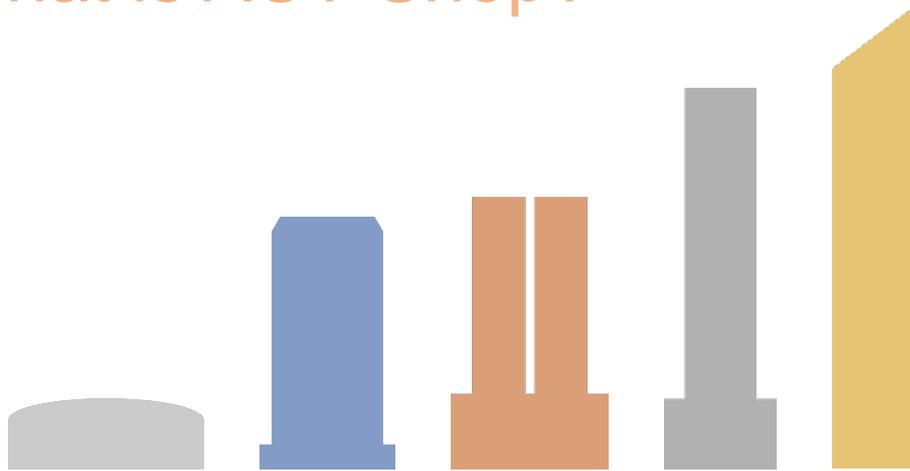
Organisers:



International Co-owners:



What is ACT-Shop?



- Knowledge-based
- Buildings as living laboratories
- HKGBC as facilitator
- Learning from peers
- Building up in-house competence

Together



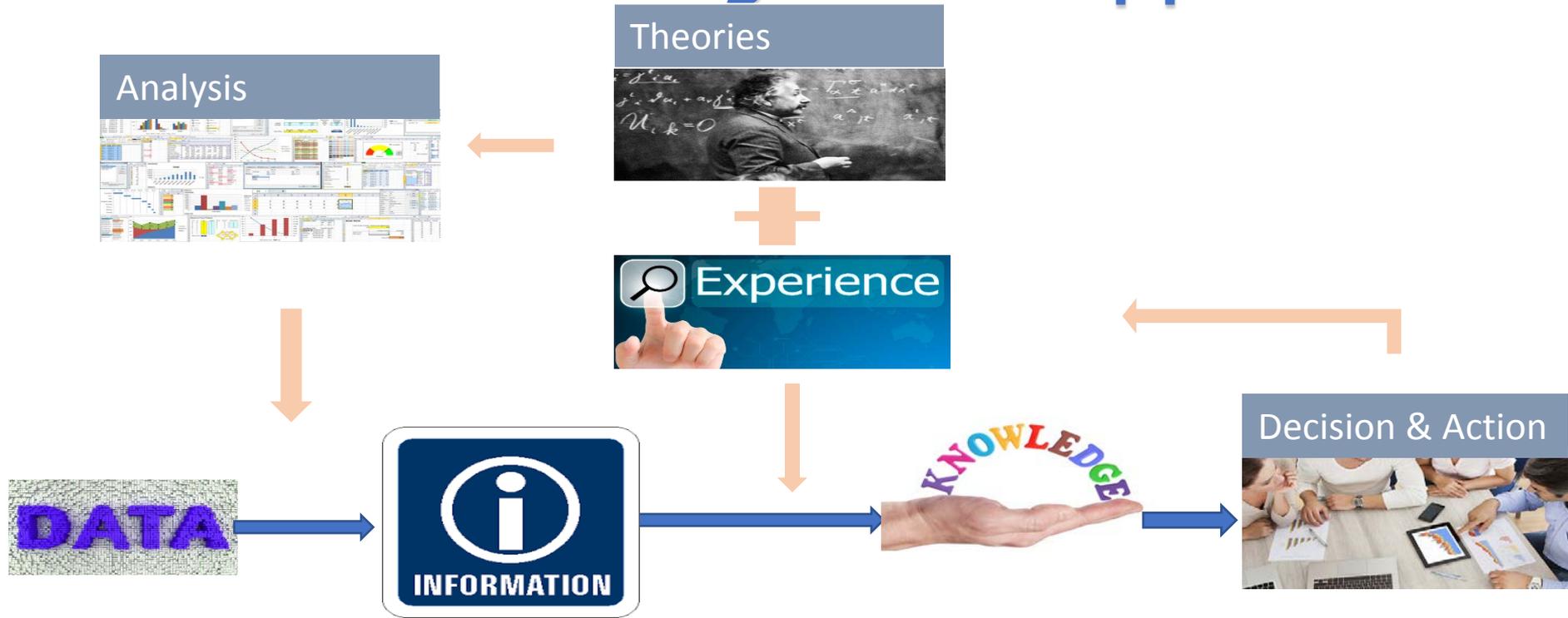
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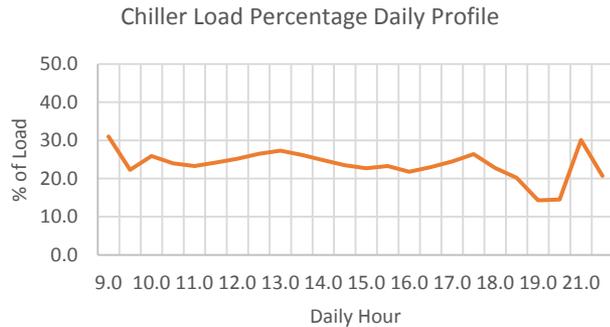


Knowledge based approach

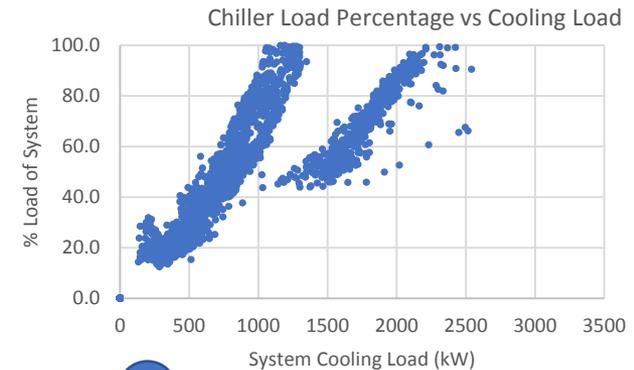


Knowledge based approach

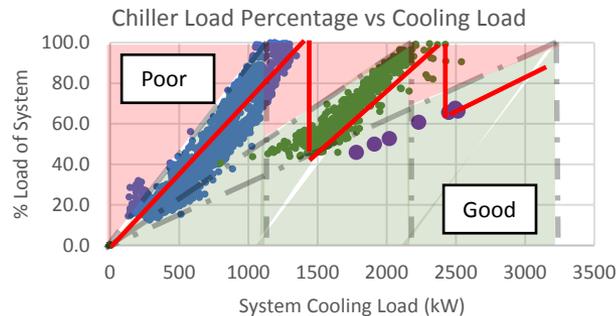
How good? How bad?



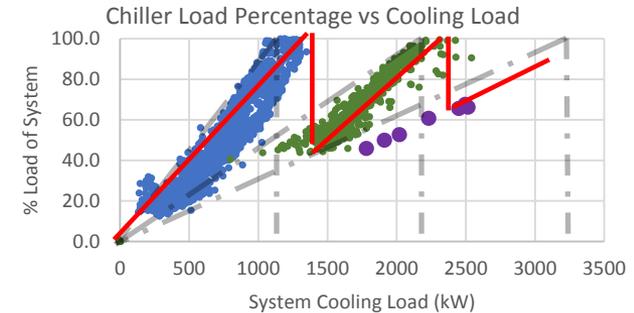
1 Daily Profile from Logsheet / BMS



2 Plotting parameters against demand and weather condition



4 Identify "Good" and "Poor" Area



3 Draw Design Curve & Customisation Curve



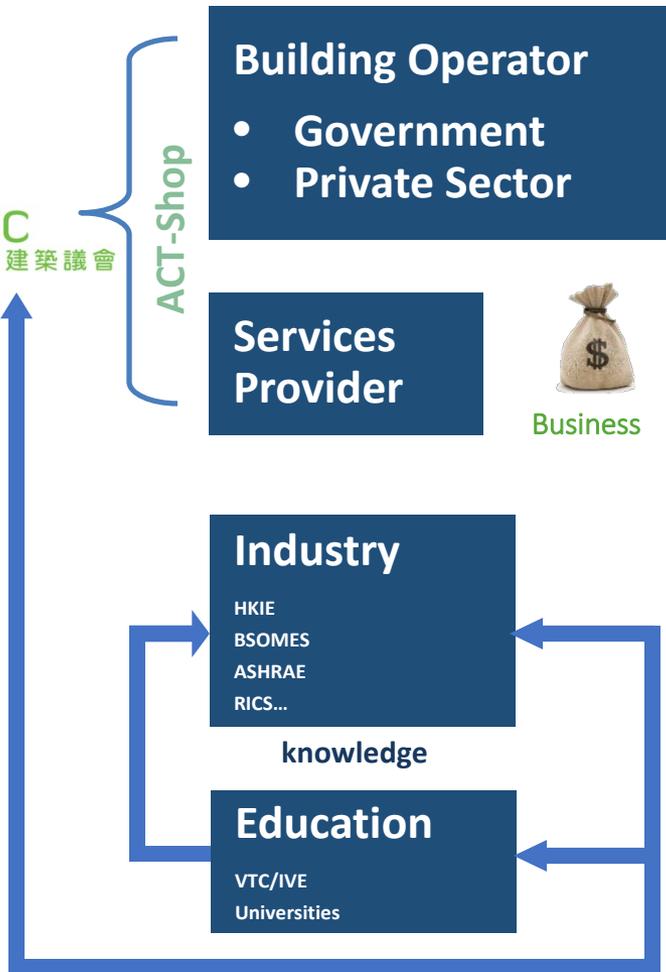
Organisers:



International Co-owners:



Establish a Knowledge Sharing Platform



Saving



In-house Competence



e-O&M Manual



Business

Develop & drive the products / services markets

- Detailed databank
- Develop competence within the industry
- Standardise energy analysing method / format
- Raise next energy audit standard
- Robust benchmarking system



Beyond Standard



Organisers:



International Co-owners:



Objectives of ACT-Shop



- Actively supporting HK gov's Climate Ready@HK
- Building up the competence for the industry on retro-commissioning through
 - developing the data/knowledge base
 - developing a systematic approach for retro-commissioning
 - demonstrating the value of retro-commissioning
 - transferring the knowledge and skills to the industry
 - establishing a practical operation & management system
- Promoting the adoption of best practices to the industry



Organisers:



International Co-owners:



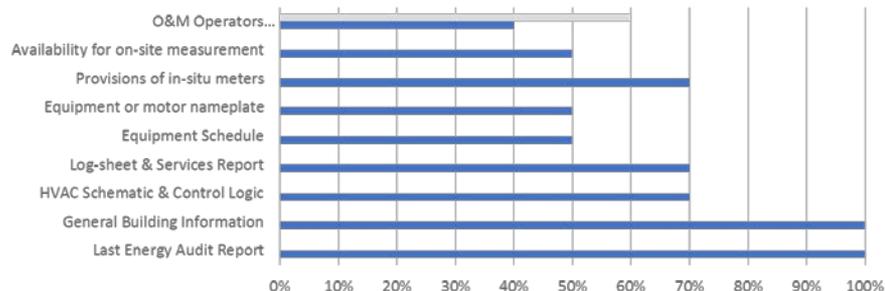
Progress and finding of ACT-Shop

Different types of building, system design , age..

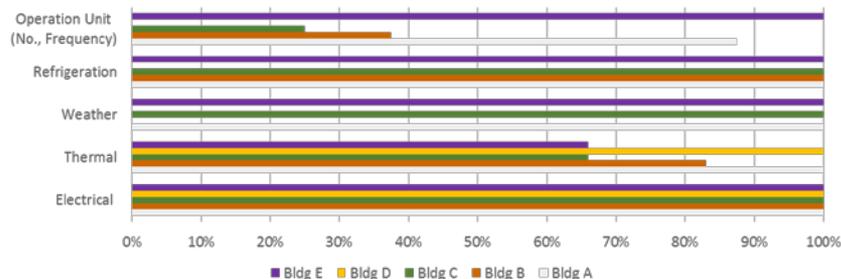
	Bldg A	Bldg B	Bldg C	Bldg D	Bldg E
Type	Composite	Hotel	Composite (Podium+ Towers)	Composite (Office +Education)	Office (Industrial Building Renovation)
Age (Yrs)	25	41	24	20	20
IFA (sqm)	~20,000	~36,000	~150,000	~4,500	~45,000
Chiller	4x320TR Water-Cooled (new)	4x180TR Water-cooled 4x190TR Air-cooled (new)	7x1000TR Water-cooled • 2x400TR Water-cooled(Night)	1x150TR Air-cooled 1x150TR Air-cooled (new)	4x400TR Air-cooled
Cooling Tower	4	4	6+2	N/A	N/A
Control	Differential Pressure Bypass	Differential Pressure Bypass	Differential Pressure Bypass	Differential Pressure Bypass	Differential Pressure Bypass
Pumps	4+1	Water-cooled: 4 Air-cooled: 4+1	7+2 4+2 (Office Tower)	2+1	4+1
Features	Variable Speed Chiller	140TR Heat Pump for hot water	Heat Exchanger for high rise office tower	natural ventilation allowed	Fresh air treated by FCU

Availability of data/information is limited

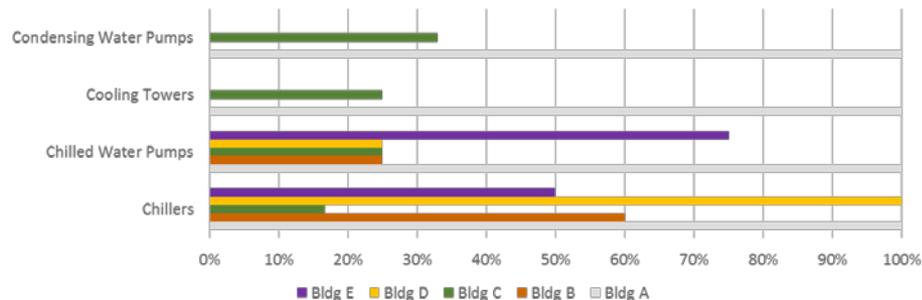
Degree of Completion in Requested Information



% Data Availability



% Performance Data Availability



First Batch - Saving Summary

Suggested Re-tuning Work	Bldg A	Bldg B	Bldg C	Bldg D	Bldg E
Internal Floor Area (m ²)	36,218	4,485	150,000	45,000	20,349
<u>Chillers</u>					
Change chiller sequencing to achieve higher overall COP	5-6% <1 year		3-5% 3-5 year		3-5% <1 year
Increase chilled water supply temperature	1-3% <1 year		1-3% <1 year		1-3% <1 year
Max. demand shedding	0-1% <1 year	1-3% <1 year	0-1% <1 year	1-2% <1 year	0-1% <1 year
<u>Pumps (chilled water flow)</u>					
Increase bypass valve differential pressure setting			1-3% <1 year	1-3% <1 year	1-3% <1 year
Reduce system differential pressure setting	1-3% <1 year	3-5% 1-3 year	3-5% 1-3 year	3-5% 1-3 year	1-3% <1 year
Install VSD on the existing chilled water pumps	N/A	3-5% 3-5 year	3-5% 3-5 year		N/A
<u>Cooling towers</u>					
Cooling tower optimization	N/A	N/A	1-3% <1 year	N/A	1-3% <1 year



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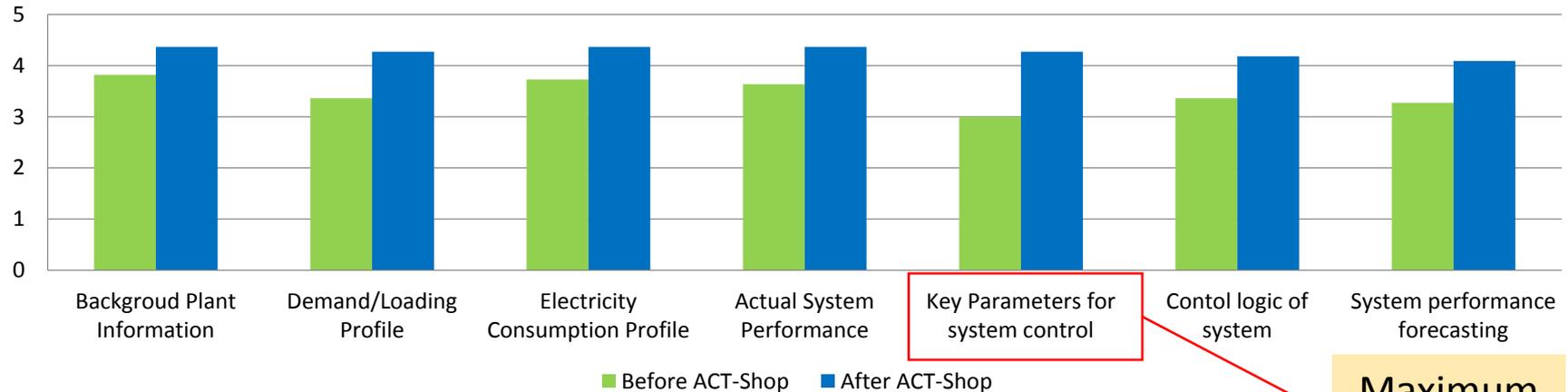
Feedback from participants

Organisers:

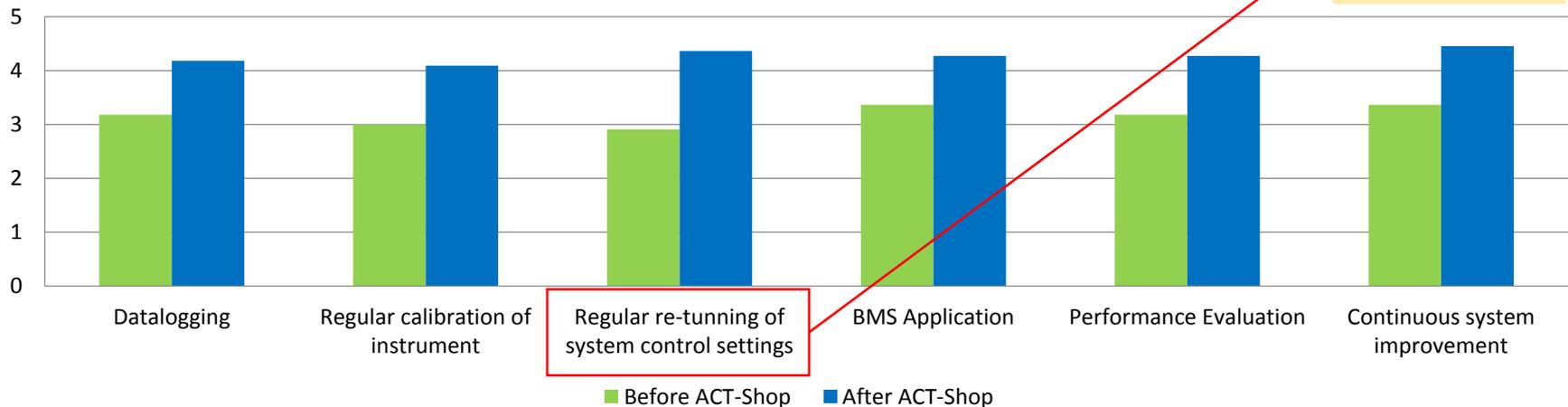
International Co-owners:

Results of Feedback Survey

Participant's knowledge gain on their HVAC System



Participant's knowledge gain on Retro-commissioning



Organisers:



International Co-owners:



Feedback

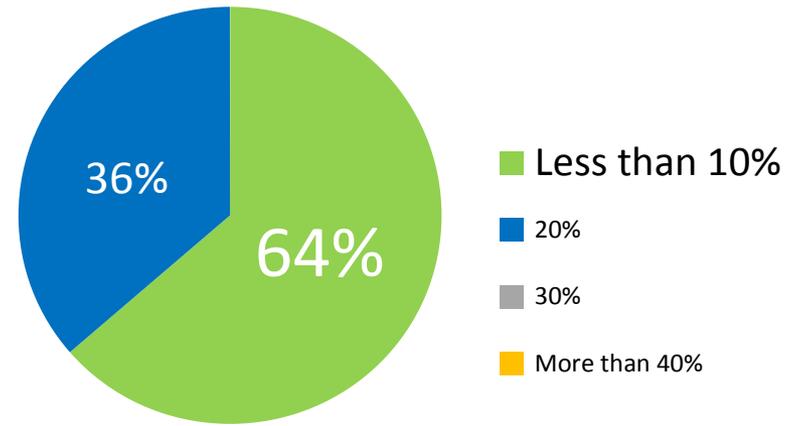
- Contents of “ACT-Shop” rated “Absolutely Necessary” by Participants:

1. Interpretation of analysis results **73%**
2. Preliminary system diagnosis **64%**
3. System performance forecasting technique **64%**

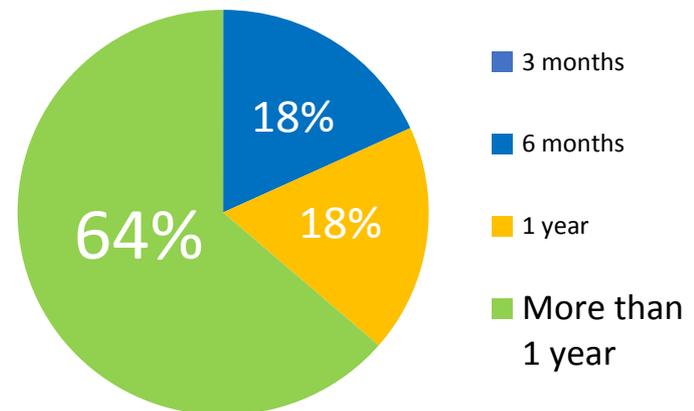
- Overall Satisfaction of the Programme:

100% Satisfied to very satisfied

Extra time spent on ACT-Shop at work

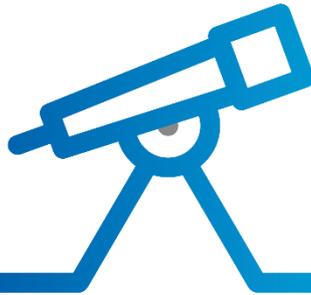


Programme duration suggested by Participants



Looking ahead

A main stream practice for the industry





In the pipeline Active Training

Target Participants

- Building Managers / Engineers / Operators
- Service / Product Providers / Contractors

Mode of training - Semi-ACT-Shop

- **Go through** the essential **process** of retro-commissioning
- **Use real data** from participants' buildings

Participants are expected to:

- Have **in-depth knowledge/skills** and know how retro-commissioning works
- **Lead** in-house team / service provider to carry out retro-commissioning
- Provide **Specification & requirements** to service providers when contract out the process



Organisers:



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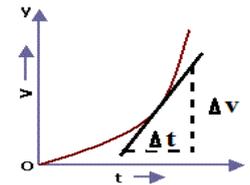


Opportunity



Extending

Accelerating



Leveraging on commercial values

- o Merging technology with people
- o Hotels and FM managed buildings
- o Creating value and edge for Facility management companies
- o Include services/product providers for ACT-Shop and training
- o Linking available incentive schemes



