Hong Kong Green Building Council Limited
香港綠色建築議會有限公司
1/F Jockey Club Environmental Building
77 Tat Chee Avenue, Kowloon Tong, Hong Kong
香港九龍塘達之路77號賽馬會環保樓一樓
Tel +852 3994 8888 Fax +852 3994 8899
www.hkgbc.org.hk

Annex 1: List of Current Retrofitting Initiatives

A. HVAC - Water-side	
A1	Replacement of inefficient chillers with more efficient chillers and review of new chiller combination during life cycle replacement
A2	Conversion of air-cooled chillers to water-cooled chillers
A3	Replacement of cooling tower constant speed fan by variable speed fan
A4	Installation of tube cleaning and other cleaning systems for chiller's water-cooled condenser
A5	Installation of electromagnetic clamp-on device for condensing water system
A6	Conversion of the chilled water system to variable flow by replacing constant speed pumps with variable speed pumps
A7	Conversion of de-coupler or differential by-pass chilled water system to variable primary flow system
A8	Conversion of centralised chilled water pumps circuit to de-centralised pumping systems with in-line pumps on each equipment/floor/zone
A9	Installation of automatic valves to control chilled water flowrate by the design temperature difference between the supply and return chilled water of terminal devices (e.g. AHUs) or sub-circuits (risers, zones)
A10	Separation of risers, circuits or systems for different equipment (e.g., AHU, FCU, chilled ceiling, computer room air conditioning (CRAC) unit, etc.) with different chilled water requirements so that some chillers can operate at a higher chilled water supply temperature all or part of a year
B. HVAC – Air-side	
B1	Replacement of traditional induction motor FCU with variable speed direct current (DC) permanent magnet motor incorporated with smart control thermostat or direct digital control (DDC) controller
B2	Replacement of air filters with lower pressure drop air filters using sonic, ionisation or other new technologies which can improve filter efficiency
B3	Replacement of centrifugal fan in AHU/ pre-cooling air handling unit (PAU) using electronically commutated (EC) plug fan
B4	Enlargement of fresh air inlet and air duct to allow higher % or 100% of fresh air for free cooling in autumn and winter seasons on days with low outdoor relative humidity (RH)
B5	Conversion of constant air volume (CAV) system to variable air volume (VAV)

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	system
B6	Conversion of VAV system to dry fan coil unit systems with pre-treated fresh air using desiccant dehumidification
B7	Use of heat exchanger or regenerative indirect evaporative cooling system to pre-cool the primary fresh air by the exhaust air
B8	Use of demand control fresh air system to reduce fresh air amount when the indoor air quality (IAQ) meets the desired level according to IAQ sensor inputwhile coupling with variable exhaust system
B9	Use of radiant cooling technologies such as chilled beam or chilled ceiling
B10	Use of spot cooling, ceiling fans for certain locations such as corridors and lift lobbies
C. Electrical systems	
Lighting	
C1	Retrofit of office layout to maximise the utilisation of natural day light
C2	Use of occupancy sensor
C3	Use of smart lighting control
C4	Adoption of task light with lower background lighting
C5	Adoption of lighting source of high efficacy
C6	Adoption of luminaires with high efficacy and distribution pattern matching the need of the space
C7	Upgrade of light fittings from fluorescent tubes and halogen bulbs to more efficient, longer lasting light emitting diodes (LEDs)
Electricity distribution system	
C8	Power and Harmonic Analyser
C9	Provision of smart metering
Lift & Escalator	
C10	Installation of regenerative drive for lifts
C11	Modernisation of aged lifts with gearless machine
C12	Upgrade of lift controllers with standby mode features
C13	Reduce the weight of interior decorations
C14	Modernisation of escalators with standby speed/on demand start function
D. Smart Control Systems	
D1	Incorporation of smart building energy management platform with IoT infrastructure that can collect building operation data, perform monitoring and evaluation; demand control and optimisation of the various systems
D2	Installation of meters or by other means to visualise energy consumption data for

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	demand side energy management
D3	Implementation of various AI energy optimisation solutions to all major equipment with high energy consumptions
D4	Integration of people counting sensors with water-side & air-side optimisation and smart lift control
E. Server Room/ Data Centre	
E1	Replacement of Uninterrupted Power System (UPS) by more energy efficient system
E2	Installation of enclosure to separate hot-aisle/cold-aisle (hot aisle containment/ cold aisle containment)
E3	Use of emerging technologies such as immersion cooling and heat pipes for cooling the data centre servers
E4	Use of cold door for server racks cooling instead of using CRAC Unit
F. Carpark	
F1	Use of zoning for carpark operation
F2	Use of demand control to vary exhaust air/fresh air by carbon monoxide (CO) and temperature sensors
F3	Use of induction units to eliminate ducting and hence reduce fan power
G. Others	
Heating	
G1	Replacement of electric or gas heater with heat pump as the heat source to reduce the energy consumption for heating
Building Envelope	
G2	Solar film, spray or solar reflective blind on building façade
G3	Installation of a second plane of glazing behind the building façade
G4	Application of coating on roof that can irradiate heat to the atmosphere
G5	Installation of green roofs
G6	Use of double door or revolving door or air curtain to reduce infiltration
G7	Natural ventilation and lighting
G8	Renewable energy
H. Kitchen	
H1	(TBC)
I. Architectural	
I1	(TBC)