Retro-Commissioning (RCx) - Energy Saving Opportunities (ESO) Tips

	Common Issues Encountered in RCx	Energy Saving Opportunity (ESO)	Related Equipment / System
1.	**Inaccuracy of sensors** and/or insufficient sensors	● Check the accuracy of sensors and take calibration if necessary; ● Add sensors if data are required for conducting RCx and/or other monitoring purposes; ● Check if the sensing range of sensor capable with operating condition; ● Check if the position of installed sensor are appropriate or in accordance with manufacturer's instruction; ● Check and ensure thermal compound be filled into sensing probes for insertion type sensors or in accordance with manufacturer's instruction.	All system / CCMS
2.	Incorrect chilled water and condensing water **flow rate**	● Review pump operation characteristics and adjust regulating valve and record the settings	Central air conditioning (Water-side)
3.	**Temperature difference (△T)** of main supply and return chilled water temperature is too low	● Quick Fixes: - a. Check and clean coil; b. Check thermostat settings ● System review: - c. Verify that all coils have interlocking controls that insure that the control valve is closed; d. Review flow rate of system/equipment and reduce water flow rate via pump speed control; e. Check if defective modulating valve operation and/or improper control/setting of AHU/PAU.	Central air conditioning (Water-side)
4.	VSD Pump always operating at nearly full speed or Improper or Constant Pressure setting for VSD Primary / Secondary Pump	● Automatic pressure reset control and/or review Differential Pressure sensor location if required re-locate the sensor	Central air conditioning (Water-side)
5.	Water distribution (Unbalancing in water system)	● Perform water balancing in whole building and/or install appropriate balancing valve and/or Pressure Independent Balancing Control valve (PIBCV).	Central air conditioning (Water-side)
6.	Failure of chilled water zone control	● Inspect zone valve condition and repair/replace defective zone valve/controller.	Central air conditioning (Water-side)
7.	**Condensation** on surface of chilled water pipeworks and/or accessories	● Inspect the insulation and repair defective insulation.	Central air conditioning (Water-side)
8.	Operating chiller capacity is greater than the required cooling load during cool climate	● Adopt **chilled water temperature reset** to save chiller energy while cooling loads can still be catered.	Central air conditioning (Water-side)
9.	Blockage of condenser tube	● Periodic maintenance of condenser tube; ● Consider to adopt automatic cleaning system for condenser tube can reduce the frequency and periodic maintenance which ensure the chiller efficiency and its expected life.	Central air conditioning (Water-side)

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10.	High Approach Temperature between heat exchanger and condenser	● Perform overhaul maintenance work every 3 months and backwash maintenance work at least once in each month.	Central air conditioning (Heat rejection system)
11.	AHU Fan with constant speed design only or Variable air volume control by fan inlet guide vanes or modulating damper	● Review operation condition and change belt drive pulley ratio for optimal supply air flow / pressure; ● Install/ change to VSD or EC Plug Fan to improve efficiency at part load condition	Central air conditioning (Air-side)
12.	VSD fan of AHU/PAU always operating at nearly full speed or improper/constant pressure setting	● Automatic pressure reset control and/or review setpoint for fan speed control.	Central air conditioning (Air-side)
13.	Indoor air temperature is too low	● Check balancing of air distribution system; ● Review/adjust the setpoint of room thermostat to match with operation need; ● Check sensor accuracy and control algorithm.	Central air conditioning (Air-side)
14.	Indoor air distribution (Unbalancing in VAV air supply system)	● Check variable-air-volume boxes working properly; ● Perform air balancing and adjust air dampers.	Central air conditioning (Air-side)
15.	Air leakage from air duct	● Inspect and repair air ductwork	Central air conditioning (Air-side)
16.	Unsatisfactory cleanliness of air filter and/or cooling coil	● Replace/clean air filter and/or cooling coil;	Central air conditioning (Air-side)
17.	Warm return air is mixed during spring or fall	● Consider adopt economizer for free cooling which fully utilized the cool outside are so as to save chiller energy consumption	Central air conditioning (Air-side)
18.	Incomplete or missing ductwork and pipework insulation	● Add ductwork and pipework insulation to reduce the amount of energy lost in transmitting heated or cooled fluids	Central air conditioning (Air-side)
19.	Review equipment operating schedules	● Check and review all equipment which are on only when they are necessary to be operated.	Central air conditioning (Air-side)
20.	Over-illuminated at some areas	● Overlit or underlit areas should be corrected; ● Consider to de-lamping some lighting.	Lighting
21.	Too large grouping of lighting and/or wrong grouping match with layout/operation equipment	● Re-arrange the grouping of lighting system; ● Re-arrange quantity of lighting for each on/off control group.	Lighting

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22.	Lighting is "ON" during no occupancy period / non-peak hour period	● Add timer control or occupancy sensor control to match the operation schedule; ● Replace malfunction of timer and/or occupancy sensor; ● Identify unused lights by colour coding the individual lighting switches in multiple switch circuits; ● Remove light tubes/lamps when lightings cannot be switched off due to group switching arrangement ● Re-arrange the lighting control arrangement to enable lights can be switched off individually when part of the area is not in occupied.	Lighting
23.	Insufficient calibration of Lighting control system	Time based ● Correct operating time schedule - lights are operating only when the building is occupied Occupancy based ● Sensors depends on customizing the sensitivity and time-delay settings to the requirements of each individual space; ● Check sensor's position Lighting level based ● Photocell controls should be checked to ensure desired daylighting dimming or daylight switching response; ● Setpoints should be adjusted so that the desired light levels are maintained	Lighting
24.	Insufficient review power quality of electrical distribution network	● Ensure the loads are balanced across the three phases; ● Check the operation of Capacitance bank and/or harmonic filter to enhance overall power quality and/or match operation needs/efficiency requirement	Electrical
25.	Insufficient review the total power factor for a circuit which is lower than the design value	● Install power factor correction device if economically viable	Electrical
26.	Total harmonic distortion of current for a circuit exceed the limited design percentage	● Install harmonic filter at the source of distortion to limit THD	Electrical
27.	Insufficient power monitoring device	● Install sufficient metering facilities to monitor the power consumption and energy performance of outgoing circuits	Electrical

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28.	Insufficient review of Tariff	● Electricity charge is based on the electricity consumption rate as well as the maximum demand; ● Minimize of maximum demand in peak hour; ● If possible, equipment should run during the less expensive off-peak hours; ● For certain buildings, pre-cooling and/or pre-heating strategies may be called for.	Electrical
29	Insufficient administrative approach to optimize the operating quantity of Lift/Escalator with operation needs	● Review operation hours and occupancy situation and adjust the operation schedule of lifts and escalators; ● Consider both static and dynamic zoning to improve traffic performance; ● Assign only one or two lifts available to casual end-users after normal working hours and on holidays ● Encourage the end-users to walk up or down one or two storeys rather than taking the lift.	Lift & Escalator
30.	Insufficient monitoring on power quality on lift and escalator	● To provide electric filter hence to improve both the power factor and total harmonic distortion, irrespective of DCTL VV or VVVF typed.	Lift & Escalator
31.	Little energy saving measures in lift car and machine room	● Switch on the lighting in the lift machine room only when it is occupied; ● Switch off all lightings and ventilation fans inside the lift car automatically when the lift is parked; ● Switch off all ventilation fans and air-handling units in the lift machine room when all lifts have been parked for a significant period (e.g. at night)	Lift