Summary of IGP's Recommended Energy Conservation Measures (ECMs)

	Energy Conservation Measure (ECM)	Benefit
	STEAM HEATING SYSTEM	
1.	**Data Logger Study:** Do a temperature data logger study in selected spaces on different floors and different exposures (N, S, E, W) where tenants complain about being too hot or too cold. The results will inform decisions for installing (1) the Energy Management System (EMS) temperature sensors, or (2) Cozy radiator covers, or (3) TRVs. if the Board decides to install the Radiator Labs (RL) Cozy on all radiators in the building, the RL cloud-based EMS is included and the TRVs are not necessary.	Objectively pinpoints heating distribution problems and informs owner(s) where to place (1) temperature sensors employed by the EMS, or (2) which radiators are best suited to the RL Cozy and its EMS (i.e. exposed and easily covered like those on the 6th floor).
2.	**Install Energy Management System (EMS)** and wireless temperature sensors to enable optimization of the heating distribution system and to monitor the heating system more accurately. See details in **Section II *Energy Conservation Measures for the Board's Consideration*** These EMS can be simple and straightforward for a building with limited staff, or the RL Cozy EMS, or a highly complex EMS for large office buildings with on-site facility engineers. "Open source" cloud-based, visual digital display systems are best. Proprietary EMS systems may not stay up to date and will be more inflexible since you are tied to the manufacturer.	Provides real time energy management information, finds problems before they escalate into something more serious. Helps LL97
3.	**Remove TRVs** that are not installed correctly. See Figure 6	Eliminate incorrectly installed TRVs that interfere with this two-pipe air vent steam system.
4.	**Install TRVs in spaces that are generally overheated only after doing master venting. The Radiator Lab Cozy may be more effective at reducing overheating.** Install TRVs correctly using the Macon Controls Thermostatic 1-pipe steam radiator control (OPSK), which includes the radiator air vent and vacuum breaker. The effective system pressure range is 0 – 1 ½ PSI. Suggested maximum operating pressure is 2 PSI. **Do not install TRVs if the boiler operates above 2 PSI. The TRVs will not work with high boiler pressure.** See Exhibit A for the Macon TRV Cut Sheet (p. 22)	TRVs may be cheaper than the Cozy in the short term but cost more and save less energy in the end. See Exhibit C (p. 22) for information on the Cozy. Use TRVs on radiators in overheated spaces where the Cozy is not practical
5.	**Steam Traps:** There are a few steam traps incorrectly added to this two-pipe air-vent radiator system. Steam traps are not appropriate on these radiators. Check first with an experienced plumber or engineer to see if you can leave the existing radiator steam traps (or take out the steam trap's elements and leave the casings) and place air vents on the return side of the radiator.	Without steam team traps the two-pipe air vent system will operate in accordance with it original design intent.

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	Energy Conservation Measure (ECM)	Benefit
6.	**Reset Boiler Heat Timer Controls:** Change the Heat Timer boiler set points. According to the building Superintendent, the Heat Timer's set points are currently set to: • Daytime at 55°F set to N, • Nighttime at 50°F set to M. • These settings may indicate continuous operation. See the **Heat Timer Cycle Length Table on page 15 and the Heat Timer Manual in Exhibit B.** Have an engineer or Ace Atlas, the boiler maintenance company, change the boiler setpoints to decrease operating time and allow for a series of cycles during a 24-hour period. You can call the Heat Timer Tech Rep at 973-575-4004 for advice. See www.heat-timer.com	Resetting Heat Timer controls will enable boiler to save energy. Helps LL97
7.	**Install Radiator Labs "Cozy"** on as many radiators on each floor as possible. The Cozy has its own EMS. The **Cozy** is eligible for NYSERDA's RTEM Program through one of the RTEM service providers. Use the OneDrive link on page 22 to access Exhibit C for these documents: **1.** NYSERDA's study ***"A Focused Demonstration Project: The "Cozy" by Radiator Labs"*** and **2. Heat Balancing with the Cozy,** Habitat Magazine, February 2020.	NYSERDA study shows the Cozy can reduce energy consumption by 25% on average to eliminate overheating in steam-heated buildings. Helps LL97
8.	**Master Venting** the Steam Supply Lines to enable steam to rise as fast as possible to the furthest radiator on the 13th floor. This measure allows boiler pressure to be reduced and saves energy. If you decide to install TRVs, you must do master venting first, to help to reduce the boiler pressure, or the TRVs will not be effective.	Improves heating distribution efficiency Helps LL97
	BUILDING ENVELOPE	
9.	**Windows:** The single pane wire windows in the elevator shaft are responsible for significant air penetration and heat loss from the building envelope. To comply with the NYC Fire Code, get assistance from a Registered Design Professional, install new double pane windows in freight elevator/air shaft (wire glass) and other areas, such as the 17th Street side of the building.	New windows will significantly reduce hot air penetration in summer and cold air penetration in the winter. Now the A/Cs and boiler work overtime due to penetrations in the building envelope. Helps LL97
10.	**Weather sealing doors and windows and Building Envelope:** • Seal all exterior doors and windows. • Seal single pane windows in freight elevator/air shaft prior to installing new FDNY approved double pane wire glass windows. This will temporarily reduce the significant air penetration and heat loss from these locations on each floor. • Weather seal all openings to the outside being used to exhaust each floor's central air conditioning units. These are primarily through windows on the 17th Street side of the building. See thermal image of elevator shaft windows in **Section VI ECMs for the Board's Consideration (p. 12)**	Reduces heat loss in winter to reduce stress on boiler. Reduces air penetration during the summer to reduce energy consumption of air conditioning systems. Improves tenant comfort level throughout the building. Saves money on each tenant's electric bills. Helps minimize LL97 penalty.
	COOLING SYSTEM	

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	Energy Conservation Measure (ECM)	Benefit
11.	**Commissioning:** On February 14, 2020, when the outside temperature was 30°F, we observed that many of the packaged air-cooled units throughout the building were operating in economizer mode. Commission all central air conditioning units on each floor to confirm the use of outside air (O/A) economizers.	Improves energy efficiency with existing equipment in shortest time period. Helps LL97
12.	**Upgrade A/C to DCV:** Retrofit demand-controlled ventilation (DCV) for units serving primarily open office space	Improves efficiency
13.	**Upgrade A/C to VAV:** Replace old A/C units with new high efficiency units with Variable Air Volume (VAV). Unlike Constant Air Volume (CAV) systems, which supply a constant airflow at a variable temperature, VAV systems vary the airflow at a constant temperature.	Improves efficiency
14.	**Feasibility Study:** Review feasibility of conversion to a building-wide central water-cooled air conditioning system. Depending on the tenants' desire to act independently or as one Cooperative Owner, represented by the Board, this study can be done through either the NYSERDA Commercial Tenant Program (tenant by tenant) or the NYSERDA FlexTech Program (for the Owner) which generally covers half the cost of the study.	This Study will inform the Board's long-term capital plan to prepare for LL97 penalty calculation in 2030.
15.	**A/C EMS/BMS:** Install EMS/BMS including Fault Detection and Diagnostics to monitor and optimize the individual floor central Air Conditioning units. If possible, use an EMS/BMS that can capture data for both the heating and air conditioning systems. This would also be eligible for NYSERDA's RTEM incentive program.	Provides real time energy management information, finds problems before they escalate into something more serious.
	LIGHTING	
16.	**New LED Bulbs:** Change CFL or fluorescent bulbs in fixtures, and replace them with LED bulbs through the Con Edison Instant Lighting Program.	"Low hanging fruit" incentivized energy efficiency measure
17.	**New LED Fixtures:** For maximum energy savings, replace all fluorescent light fixtures with new LED fixtures in offices and bi-level LED fixtures with battery backup in stairwells and other common areas, using the Con Edison Commercial & Industrial Program or the NYSERDA Commercial Tenant Program. Consider occupancy sensors were appropriate. It may be easier to use the Commercial Tenant Program.	With NYSERDA's Commercial Tenant program, each floor owner determines what LED lighting with controls is best for them
	RENEWABLE ENERGY	
18.	**Renewable Energy:** Possible Solar PV to power common area electrical needs. Solar PV Contractor can assess feasibility quickly using Google Maps and CUNY Portal Solar Map with monthly aggregated electric bills. For maximum effectiveness of Solar PV, master metered electricity with submeters (not direct meters) is always preferable because the Solar PV is connected to one electric meter.	Helps LL97

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