1. PROCEDURE PURPOSE

This Procedure provides further technical and process details to guide the Administration and Regulatory Affairs Department, as well as city operating departments, in achieving the high-level targets and requirements in the Municipal Building Decarbonization and Benchmarking Policy (the "Policy").

2. SCOPE

This Procedure applies to all Covered City Buildings, with benchmarking measures (§5.4) applicable to those properties with sufficient operational history for benchmarking. The Administration and Regulatory Affairs Department is responsible for coordinating benchmarking and reporting efforts, and all Operating Departments are responsible for implementing the requirements of this Procedure among the buildings and facilities they operate, maintain, design, renovate, or otherwise manage.

3. DEFINITIONS

Capitalized terms in this document have the meanings ascribed to them in AP 3-40, Municipal Building Decarbonization and Benchmarking Policy.

Aggregated, whole-building data: energy, water, or waste data that has been summed for an entire property

Enhanced commissioning: investigating, analyzing, and monitoring the performance of building systems to verify a building's performance is in line with design specifications post-occupancy. Design and construction project teams may refer to LEED BD+C v4 EA Enhanced commissioning credit requirements for more detail.

EVSE Installed: the installation of a Level 2 or higher electric vehicle charging station, as defined by the US Department of Energy.

EVSE Ready: including sufficient electrical components to facilitate the installation of a Level 2 or higher electric vehicle charging station (i.e., including a full circuit installation near parking spaces: 208/240V, 40-amp panel capacity, raceway, wiring, receptacle, and overprotection devices).

Knowledge exchange*:* leading efforts (including presentations, trainings, or written reports) to share knowledge with and educate fellow City buildings staff on topics relevant to the Policy and this Procedure.

Net-zero Energy Building*:* a building designed and constructed to be highly energy efficient and to produce enough onsite zero-emission energy to offset its energy consumption on an annual basis.

Net-zero Energy Ready Building*:* a building designed and constructed to be highly energy efficient, such that it could one day offset its energy consumption on an annual basis with onsite zero-emission energy. These buildings are designed and constructed with the necessary infrastructure to receive a solar photovoltaic system or other zero-emission energy generation technologies in the future.

4. ROLES AND RESPONSIBILITIES

4.1 ARA Building Decarbonization Staff Member

4.1.1 Overall coordination

4.1.1.1. Oversee compliance with the Policy and this Procedure across Operating Departments (ongoing)

4.1.1.2. Coordinate Building Decarbonization Staff Members across Operating Departments (ongoing)

4.1.1.3. Ensure fulfillment of continuous improvement provisions in the Policy (i.e., energy performance targets) (ongoing)

4.1.1.4. Convene relevant Buildings Staff to discuss major projects, opportunities, challenges, risks, etc. related to the Policy and this Procedure (quarterly)

4.1.2 Benchmarking

4.1.2.1. Maintain Benchmarking Tool for all Covered City Buildings (ongoing)

4.1.2.1.1. Develop and maintain automatic or manual updates for all Benchmarking Information (electric power, natural gas, and water consumption, waste generation)

4.1.2.1.2. Develop and coordinate process for updating building characteristic and use data annually (including square footage, hours of operation, occupancy details, etc.)

4.1.2.2. Oversee data collection and review process in Operating Departments for all Benchmarking Information (annual)

4.1.2.3. Assess and work to fill data gaps in Benchmarking Information, especially covered City Buildings not currently tracked in Benchmarking Tool, for example through the use of meter audits (ongoing)

4.1.3 Reporting and disclosure

4.1.3.1. Prepare internal reporting for the Mayor; ARA, Operating Department, and Tenant Department directors; and City Councilmembers as part of the annual benchmarking exercise (annual)

4.1.3.2. Coordinate development and maintenance of public-facing online portal to disclose Benchmarking Information with the public (ongoing)

4.1.4 Building Audits

4.1.4.1. Coordinate contract(s) with commissioning agent(s) for required building Audits on behalf of Operating Departments (ongoing)

4.1.5 Education and training

4.1.5.1. Compile and maintain compendium of training / educational resources related to Policy topics to share with City Buildings Staff (by one year from adoption of this Procedure, then ongoing)

4.1.5.2. Actively engage in quarterly or more frequent meetings with Building

Decarbonization Staff Members in other departments

4.2 Operating Department Building Decarbonization Staff Member

4.2.1 Overall

4.2.1.1. Oversee compliance with the Policy and this Procedure within the Operating Department (*ongoing*)

4.2.2 Benchmarking

4.2.2.1. Support data collection and lead review for relevant building Benchmarking Information in Benchmarking Tool (*annual*)

4.2.3 Building Audits

4.2.3.1. Support ARA Building Decarbonization Staff Member in coordinating building Audits (*annual*)

4.2.3.2. Ensure Audit reports go to Operating Department Director or designee overseeing relevant buildings, especially when used to inform a Building Decarbonization Plan (*annual*)

4.2.3.3. Maintain records of audits of Covered City Buildings and Building Decarbonization Plans to provide to ARA Director upon request

4.2.4 Existing buildings

4.2.4.1. Identify Covered City Buildings not in compliance with the Policy or this Procedure, especially with the energy performance targets as determined through the benchmarking process (*annual, with some ongoing*)

4.2.4.2. Coordinate Buildings Staff developing Building Decarbonization Plans, then submit to ARA Building Decarbonization Staff Member for incorporation in reporting (*annual*)

4.2.5 New or replacement facilities and major renovation (where relevant in Operating Department)

4.2.5.1. Oversee compliance with requirements of the Policy and this Procedure, acting as advisor to Design & Construction (D&C) team during design, procurement, and construction phases (*ongoing during D&C projects*)

4.2.5.2. Provide D&C team access to resources helpful in implementing requirements of the Policy and this Procedure, including on energy modeling, electrification, and embodied carbon (*ongoing*)

4.2.6 Education, training, and incentives

4.2.6.1. Review department education and training policies (i.e., available professional development stipends, available worktime) to develop recommendations for increasing capacity (*ongoing*)

4.2.6.2. Recommend qualitative and/or quantitative performance indicators which may be utilized by the Operating Department Director to award performance-based salary increases in accordance with Administrative Procedure 3-13, *Performance Pay Zone (PPZ)* or incentive pay in accordance with Administrative Procedure 3-8, *Performance Incentive Pay Plans for Municipal Employees* to eligible Buildings Staff

(*by two years from adoption of the Policy*)

4.2.6.3. Maintain list of relevant actions by Buildings Staff qualifying for performance incentives (*ongoing*)

4.2.6.4. Actively engage in quarterly or more frequent meetings with Building Decarbonization Staff Members in other departments

4.3 Outside contractors

4.3.1 As needed and as funding allows, the CRSO, ARA Director, and/or Operating Departments Directors may enlist outside contractors or partners for technical support reviewing building energy, water, and waste performance, developing Building Decarbonization Plans for buildings not achieving energy performance targets, or other items that support the implementation of the Policy or this Procedure.

5. PROCEDURE DETAILS

See section 6 in the associated Policy for additional high-level procedures:

5.1 These Procedures apply to existing City buildings (§5.2), New or Replacement Facilities and Major Renovations (§5.3), and benchmarking and disclosure (§5.4). §5.5 addresses education and training for City Buildings Staff. They provide implementation detail and guidance for the Policy.

5.2 Energy performance standards and operational requirements for existing buildings

5.2.1 Energy performance targets

5.2.1.1. The energy use intensity (EUI) targets in this section promote improved operational efficiency and may inform capital expenditures and prioritized maintenance among existing City buildings.

5.2.1.2. Energy use intensity (EUI) targets for electric power:

Building Category	**Portfolio Manager types included in category**	**Site EUI Target, electricity**
Public Service	Fire station, library, transportation hub (non-airport), social/meeting hall	90 kBtu/sq. ft.
Police	Police stations	60 kBtu/sq. ft.
Office	Office buildings	100 kBtu/sq. ft.
Healthcare	Lab, Medical Office	None
Airports	Airport total (monitored outside of Portfolio Manager)	5% reduction annually, 110 kBtu/sq. ft. baseline *(includes consumption offset from onsite zero-emission power generation)*
Other	Warehouse, recreation	90 kBtu/sq. ft.

Electrification of equipment that previously ran on a fossil fuel may lead to an increase in the electricity site EUI for a building; if a building does not meet its assigned EUI target as it electrifies equipment, its Building Decarbonization Plan

shall include an estimate of what proportion of its gap above the target stems from electrification.

While buildings in the Healthcare category do not have an explicit electricity EUI target, all of the requirements in §5.2.2 still apply. Healthcare facilities shall engage in more frequent Audits than other Covered City Buildings to ensure they are in compliance with operational requirements and seeking energy savings – see §5.4.6 for details.

5.2.1.3. The electricity site EUI targets in this section shall decrease as follows: as City building energy performance improves, the ARA Director and the Operating Department Directors shall recalculate the spread of EUI values by building category, lowering the respective targets so that about twenty percent of Covered City Buildings in each category are above the newly specified target. This process shall occur at least every three years, and in no case shall specified EUI targets be raised above the values in the original baseline outlined in 5.2.1.2 of this Procedure. This holds true even if overall building energy performance in a category worsens such that greater than twenty percent of those buildings exceed the specified target. Updates to the Procedure shall also consider the addition of City-specific electricity site EUI targets for Healthcare buildings.

5.2.2 Building operational requirements for meeting performance standards

5.2.2.1. The Operating Department Directors agree on the non-exhaustive list of optimum efficiency requirements listed in this section.

5.2.2.2. Heating and cooling

5.2.2.2.1. As heating and cooling generally comprise 40% or more of a building's energy use, the HVAC system shall be operated to optimize energy efficiency and health with operating hours and facility utilization taken into account (i.e., buildings shall schedule HVAC operation to align with facility's standard operating hours). Temperature tolerance shall be monitored where there is HITS equipment, including Main and Intermediate Distribution Frames, leading to possible modifications of these setpoints and/or installation of HVAC mini splits.

5.2.2.2.2. Cooling operations: The thermostat shall be adjusted so that the temperature falls in the range of 72-76°F in the warmest occupied office work areas during hours of operation with a relative humidity not in excess of 60%. Temperature setpoints for cooling may fall outside of this prescribed range in buildings meeting all three of the following criteria:

5.2.2.2.2.1. Building gross square footage below 10,000.

5.2.2.2.2.2. No outside air handler.

5.2.2.2.2.3. Measured air exchange with outdoor air of *X* cubic feet per minute (cfm) or higher, where *X* is equal to the gross square footage of the building. For example, a 2,500 square foot building with an air exchange rate of 3,000 cfm.

5.2.2.2.3. Heating operations: The thermostat shall be adjusted so that the temperature falls in the range of 68-72°F in the coldest occupied office work areas during hours of operation with a relative humidity not in excess of 60%.

5.2.2.3. Ventilation and humidity control

5.2.2.3.1. Introduction of outside air to a building shall be reduced to the minimum required by mechanical code – to the extent that employee health or safety are not negatively impacted – to balance the exhaust requirements and maintain a slight positive pressure to reduce infiltration that causes heat losses and heat gains.

5.2.2.4. Lighting

5.2.2.4.1. Lighting generally represents more than 20% of building energy use, necessitating optimization for City functions.

5.2.2.4.2. Task area lighting: areas where task lighting is necessary should meet and not exceed Illuminating Engineering Society and International Energy Conservation Code recommendations for lighting levels and power density. Operation of task lighting shall be conservative and, when fiscally plausible, lighting shall have occupancy sensing ability to turn off when users are not in the space.

5.2.2.4.3. Non-security interior lighting shall be off when the building is vacant. Interior security lighting shall be maintained at a level no greater than that required per then-current building code. If individual room light switches exist, lighting shall be turned off during unoccupied periods. Operating Department directors shall work with outside contractors (for example, janitorial) to ensure that individuals with access to the building follow this requirement as well.

5.2.2.4.4. Mechanical rooms, bathrooms, and other low-traffic areas shall have occupancy/motion sensors and/or timed control of lighting to minimize lights being left on in these spaces.

5.2.2.4.5. Exterior lighting shall be used primarily for security and safety purposes and shall be off during daylight hours. For exterior lighting, facilities shall be installed with downward directed fixtures (i.e., shielded and Dark Sky Lighting approved by the International Dark-Sky Association) when fiscally plausible.

5.2.2.4.6. Schedulable lighting control systems that take business hours into consideration and involve motion sensors shall be used to accomplish these practices when fiscally plausible. Facilities shall be transitioned to automatic lighting where feasible if the opportunity arises during other renovation work.

5.2.2.4.7. Facilities shall be installed with LED fixtures, avoid fluorescent fixtures, and replace existing incandescent lighting with LEDs.

5.2.2.4.8. Operating Departments shall make best efforts to include Covered City Buildings in "Lights Out Texas," coordinating with Audubon Texas to minimize light pollution and its effect on bird migration.

5.2.2.5. Domestic water

5.2.2.5.1. Domestic water often consumes between 2% and 4% of the total energy

used in large office buildings; therefore, the generating and storage temperature levels shall be reduced to the code minimum required for washing hands, usually 110°F.

5.2.2.5.2. Provide hot water booster systems to kitchens and other areas where needed, rather than providing higher than necessary temperatures for the entire building.

5.2.2.5.3. Mitigate water waste with low flow fixtures and irrigation controllers and sensors when fiscally plausible.

5.2.2.5.4. Ensure separate meters or submeters for irrigation systems, cooling towers, or other major water-consuming equipment.

5.2.2.6. General operations and maintenance

5.2.2.6.1. Operating Departments and Tenant Departments shall use best practices and best efforts to properly maintain all equipment in Covered City Buildings.

5.2.2.6.2. The Administration and Regulatory Affairs Department and all Operating Departments shall follow the energy and water benchmarking requirements for the properties over which they are responsible. They shall evaluate whether a facility is performing per the design and construction intent, following continuous commissioning standards, as described in ASHRAE Guideline 0.

5.2.2.6.3. Covered City Buildings, as possible, should be demand response ready. This means having a sequence of operation that can shed load based on a response to a grid signal. Qualified Covered City Buildings shall be involved in demand response programs where reasonable to shave peak grid demand.

5.2.2.6.4. For landscape and lawn care, contract selection shall place a priority on bids guaranteeing the use of zero-emission (typically all-electric) lawn care equipment.

5.2.2.6.5. Operating Departments shall consider installing and maintaining Building Automation Systems to reduce operational energy consumption across demand categories (HVAC, lighting, plug loads, etc.).

5.2.2.7. Equipment use

5.2.2.7.1. Computers, monitors, copiers, printers, televisions and any other electrical devices (except for networking, data center, and radio equipment) shall be powered off or in sleep mode when not in use after business hours, except those that are vital to the City's operational needs, network functions, or are in use for emergency response purposes. Sleep mode shall be enabled on all computers. HITS and the operating departments shall make efforts to automate this shift, decreasing reliance on individual employee behavior and considering technologies such as plug load management systems.

5.2.2.7.1.1. This equipment shall also be placed away from thermostats and cooling/heating vents as possible to minimize wasted cooling and maximize airflow in spaces.

5.2.2.7.2. Space heaters – Space heaters are prohibited in City facilities. These use excessive amounts of energy and local receptacles are likely not designed to handle the electrical load, posing a potential fire hazard.

5.2.2.7.3. Personal printers – Personal printers are prohibited and shall be phased out through attrition by turning them into the Administration & Regulatory Affairs Asset Disposition Section. Attrition standards shall be based on the depletion of on-hand toner cartridges. Department Directors can approve exceptions to this rule in situations that involve personal printers that have been networked with five or more employees, for an employee the employee's Director determines an exception is warranted to conduct the business of the City, or for employees who perform an acceptable amount of custom printing, such as award certificates.

5.2.2.8. Equipment purchasing

5.2.2.8.1. All equipment, appliance and computer purchases (except for networking, data center, and radio equipment) shall be on Energy Star's "Most Efficient" list, as available. Otherwise, they shall be Energy Star rated and have sleep modes for when not in use, as available.

5.2.2.8.2. All equipment and appliance purchases for space and water heating, cooking, and other relevant end uses shall be electric (but not electric resistance for space and water heating) or otherwise not generate direct onsite greenhouse gas emissions.

5.2.2.9. Occupant behavior and amenities

5.2.2.9.1. All staff-occupied buildings shall have access to a safe and secure bicycle parking option for building occupants and visitors arriving by bicycle.

5.2.2.9.2. Where possible, facilities shall have showers and changing rooms for the use of bicycle commuters.

5.2.2.10. Where possible, buildings shall have safe, secure, and visible access to stairwells for building occupant use as an alternative to elevators or escalators.

5.3 Standard for New or Replacement Facilities and Major Renovations

5.3.1 Unless otherwise stated, standards in this section apply to all New or Replacement Facilities to be owned and operated by the City of Houston, as well as Major Renovations of Covered City Buildings. This section shall be complied with fully unless the project receives an exemption. For a building exemption, the Operating Department or Tenant Department staff shall submit a waiver form developed by ARA and seek approval from the Operating Department director with oversight of the facility and the director of ARA. Waivers shall be submitted to, and kept on hand by, the property's Operating Department Director. Typical reasons for project exemption include:

5.3.1.1. Where a renovation is planned for a building that will be removed from the City's portfolio because it is reaching the end of its useful life or being transferred to a new owner within five (5) years.

5.3.1.2. Where a renovation occurs in response to an urgent life-safety matter that requires

initiating immediate action (scoping, budgeting, and initiating construction) within six (6) months or less, with the goal to return the building to its normal operating state.

5.3.1.3. Temporary facilities not intended for long-term occupancy, such as construction and office trailers, as well as non-habitable structures, including but not limited to, picnic pavilions, park shelters, dugouts, and small utility structures.

5.3.1.4. In a life-safety emergency situation, such as a natural disaster, or during the recovery from one, where the directors of the relevant Operating Department and ARA determine that compliance with this section would impact the City's ability to respond to and / or recover from an emergency in a timely and safe manner.

5.3.1.5. Where a Major Renovation is determined by the directors of the relevant Operating Department and ARA to be consistent with the purpose of this section, but where full compliance would not be possible or feasible.

For projects not eligible for exemption, design and construction teams shall prepare a brief report for the CRSO to explain how each element of section 5.3 is being met.

Unless otherwise noted below in section 5.3, all operational requirements outlined in section 5.2.2 for existing buildings (i.e., lighting, equipment purchasing, etc.) also apply to all New or Replacement Facilities and Major Renovations.

5.3.2 Energy efficiency and renewable power: New or Replacement Facilities and Major Renovation efforts shall strictly limit onsite energy consumption and seek to cover that consumption with renewable power. Specifically, project teams shall:

5.3.2.1. Achieve Net-Zero Energy (NZE) Building performance or demonstrate quantitatively to the relevant Operating Department Director why doing so is not feasible due to not being fiscally plausible or other limitations, and instead…

5.3.2.1.1. Achieve Net-Zero Energy Ready (NZER) Building performance or demonstrate quantitatively to the relevant Operating Department Director why doing so is not feasible due to not being fiscally plausible or other limitations, and instead…

5.3.2.1.1.1. As default, demonstrate, via energy modeling, these listed percent savings below the most recent ASHRAE 90.1 baseline:

5.3.2.1.1.1.1. 30% - Full building new construction for any non-Healthcare use

5.3.2.1.1.1.2. 19.5% - Full building new construction for any Healthcare use

5.3.2.1.1.1.3. 18% - Major renovations of existing buildings of any type

5.3.3 New or Replacement Facilities and Major Renovation efforts shall seek to minimize the environmental and greenhouse gas footprint associated with backup power, where backup power is needed. First, designs shall limit intended power consumption during emergency situations where the electric grid is unavailable, creating a plan to cover critical loads that support health and safety, while not aiming to cover whole building energy consumption with backup power. Project teams shall also consult with HITS when defining backup power needs. For the source of backup power, project teams shall:

5.3.3.1. Utilize battery storage with or without onsite solar power for backup power, or demonstrate quantitatively to the relevant Operating Department Director why doing so is not feasible due to not being fiscally plausible or other limitations, or otherwise not environmentally beneficial, and instead…

5.3.3.1.1. Utilize a zero-emission fuel cell for backup power, or demonstrate quantitatively to the relevant Operating Department Director why doing so is not feasible due to not being fiscally plausible or other limitations, or otherwise not environmentally beneficial, and instead…

5.3.3.1.1.1. Utilize an installed or mobile high-efficiency natural gas or propane generator for backup power, part of the City's fleet of generators for emergency situations that rotate across buildings.

5.3.4 New or Replacement Facilities and Major Renovation efforts shall be designed and built to support electric vehicle charging.

5.3.4.1. At minimum, the following percentages of those parking spaces required by Chapter 26 of the Municipal Code of Ordinances (i.e., spaces intended for or used by City staff) shall be Electric Vehicle Support Equipment (EVSE) Ready and Installed, increasing after adoption of the Policy through 2030 by the schedule outlined below:

Year	**EVSE Ready requirement**	**EVSE Installed requirement**
2022	10%	3%
2026	15%	5%
2030	20%	7%

5.3.4.2. In operation, Operating Departments shall manage Electric Vehicle (EV) chargers with schedules that align with grid resources and follow the best practices outlined by Energy Star.

5.3.4.3. Power consumption from EV chargers shall be sub-metered, subtracted from whole building energy consumption, and monitored. A few options exist for maintaining this measurement separate:

5.3.4.3.1. Set a new and distinct electrical service with its own meter for each charger.

5.3.4.3.2. Sub-meter each charger, and work with the electricity provider for automatic subtraction from the main meter.

5.3.4.3.3. Power chargers directly with photovoltaic panels, disconnected from primary building power.

5.3.4.4. The Operating Department shall work with Tenant Department(s), where applicable, and the Fleet Management Department, where applicable, to ensure a maintenance plan is in place for all EV chargers in Covered City Building parking lots.

5.3.5 Design and construction divisions shall work to minimize embodied carbon from construction materials and activities.

5.3.5.1. Prioritize renovating older buildings instead of tear-down and new construction.

5.3.5.2. Work in an integrated design process to optimize the geometry of the building for low embodied carbon (bay size, story height, floor depth, shape, etc.), incorporating embodied carbon as a metric throughout the design process. To assess a building's embodied carbon content, utilize whole building life-cycle assessment tools, such as Tally, Athena Impact Estimator for Buildings, One Click LCA, or the Embodied Carbon in Construction Calculator (EC3). Alternatively, perform material takeoffs for high-volume, high-impact materials such as concrete, steel, wood, insulation, ceiling tile, carpet, aluminum, and glass. Utilize material baselines or industry-average Environmental Product Declarations (EPDS) to optimize for low-embodied carbon. Use these analyses to set an embodied carbon target early in the design process to inform earlier and more impactful design changes.

5.3.5.3. Consider using carbon-sequestering building materials such as mass-timber, provided that it is coming from a sustainably managed forest as verified by FSC certification. Incorporate other carbon sequestering materials (examples include straw-bale, sheep's wool, hempcrete, and bamboo).

5.3.5.4. In specifications, include language requiring third-party verified, product-specific, type III EPDs for high-volume, high-impact materials. Include a stipulation that if the material supplier is unable to provide such an EPD, they shall explicitly say so. If these EPDs are available, utilize an EPD database like EC3 to compare low-carbon materials, as measured through Global Warming Potential (GWP).

5.3.5.4.1. Do so for at least the most carbon-intensive materials (including concrete, structural steel, insulation, ceiling tile, carpet, aluminum, and glass).

5.3.5.4.2. If EPDs are available, use open-sourced EPD databases such as EC3 to facilitate comparison.

5.3.5.4.3. While not all products will have existing EPDs, design teams can request them from suppliers with sufficient lead time for the supplier to develop one (lead time for development of a product-specific EPD can be up to one year).

5.3.5.5. When revisiting the Policy and this Procedure within a few years after adoption, the ARA Director and Operating Department Directors shall develop performance-based specifications, or prescriptive specifications at minimum, and set maximum global warming potential limits for at least the most carbon-intensive products (including concrete, structural steel, insulation, ceiling tile, carpet, aluminum, and glass). The methodology for defining these targets can follow similar methodology for defining electricity site EUI targets outlined in §5.2.1.2: maximum global warming potential limits are set initially to the 80th percentile of products (eliminating the worst performing 20%), and they shall become more stringent over time as available products improve. Additionally, set whole building embodied carbon reduction targets or requirements for each building category based on data collected from whole building life-cycle assessments.

5.3.5.6. Encourage architecture and engineering design firms with which the City contracts to join commitment programs such as Architecture 2030 and SE 2050 that support firms in their embodied carbon reduction efforts through program requirements that ensure accountability.

5.3.5.7. To avoid premature demolition, design for flexible and adaptive reuse or at least for disassembly at end-of-life. Furthermore, design beautiful buildings that are

aesthetically and functionally beneficial to the community.

5.3.5.8. During construction projects, track emissions from transportation to the site and activity onsite, including any required demolition and excavation. These emissions can be normalized (for example, as kgCO2-e/sq. meter of demolished structure) to form a baseline for future reduction efforts.

5.3.5.9. During design and construction, identify opportunities for water reclamation and recycling and reuse of materials.

5.3.5.10. Construction teams shall comply with the diversion requirement and at least one path of the waste prevention requirement under LEED-NCv4.1 MR Construction and Demolition (C&D) Waste Management credit, diverting at least fifty percent of C&D waste from the landfill and generating less than 15 lbs. C&D waste/square foot.

5.3.6 Design teams shall perform whole building life cycle assessments, including end-of-life decommissioning, for both cost and greenhouse gas emissions, minimizing both as possible. LEED NC v4 MRc1 Option 4 provides an example recommended approach. Collect data from as-built whole building life-cycle assessments to establish baselines for future embodied carbon reduction targets.

5.3.7 Separately meter all utilities coming into the building; when appropriate, separately sub-meter significant use types within the building including at minimum parking garages, large kitchens, cooling towers, chillers, backup generators, irrigation systems, and commercial spaces.

5.3.8 Meet the requirements for at least one point under the LEED-NCv4 EAc4 Demand Response Case 3 or LEED-NCv4.1 EAc4 Grid Harmonization case 3 (with the opportunity to use the alternative pilot credit EApc152 Grid Optimal Building ACP), demonstrating evaluation of grid peak contribution, grid carbon alignment, site renewable utilization efficiency, short-term demand flexibility, long-term demand flexibility, and/or dispatchable demand flexibility. Aim to achieve a second point and the additional innovation point under this credit, where possible.

5.3.9 Meet the requirements of LEED-NCv4.1 Indoor Water Use Reduction credit, including reducing indoor potable water use by a minimum of 35%.

5.3.10 Sub-meter irrigation separately from other potable water use. Comply with the LEED-NCv4.1 outdoor Water Use Reduction credit, including a reduction of water use by at least 30% using the EPA's WaterSense Water Budget tool or provide no irrigation from potable sources (with possible exception during establishment periods for planted Green Stormwater Infrastructure and/or native plants). Project teams shall prioritize native plants (the Lady Bird Johnson Wildflower Center maintains a helpful database), identify opportunities to incorporate onsite Green Stormwater Infrastructure, and avoid turf grass where it is not necessary for recreation.

5.3.11 Cases of performance-based contracts may require an additional contract for maintenance with the contract parties until at least the point of measuring building performance. At minimum, all New or Replacement Facilities and Major Renovation efforts shall require an enhanced commissioning from parties to the construction contract after occupancy to adjust building operations and equipment such that it better aligns with design intent.

5.4 Energy, water, and waste benchmarking requirements for all buildings

5.4.1 Collecting and entering benchmarking data.

5.4.1.1. Each year the ARA Department's Building Decarbonization Staff Member ("ARA Staff Member" in this section) shall collect and enter all data needed to benchmark all Covered City Buildings for the previous calendar year into the Benchmarking Tool,

in a manner that conforms to latest guidance for use of the tool. Operating Department Building Decarbonization Staff Members may instead undertake benchmarking without the support of ARA, for example in the case of the Airports and their Sustainable Management Plan tool. Aggregated whole-building energy and water data for each building shall be compiled using one or more of the following methods:

5.4.1.1.1. Obtaining aggregated whole-building data from an energy, water, or waste vendor.

5.4.1.1.2. Reading a master meter.

5.4.1.2. If the ARA staff member does not have access to aggregated whole-building energy, water, and waste data for certain Covered City Buildings, they shall request aggregated whole-building data from each vendor that provides energy, water, or waste service to those buildings.

5.4.1.3. Likewise, each year the ARA staff member shall collect and update building descriptive information (i.e., square footage) in the Benchmarking Tool. The ARA staff member shall confirm or update this information with other relevant City departments through existing or new communication channels.

5.4.2 Benchmarking reporting and disclosure

5.4.2.1. For every Covered City Building, the ARA staff member shall annually submit to the ARA Director an energy, water, and waste benchmarking report in an electronic format, by the date specified in §5.4.3. The only exceptions are wastewater treatment and drinking water operation plants, for which benchmarked data will be collected and tracked, but reporting is not required at adoption of this Procedure.

5.4.2.2. The information included in the annual energy and water benchmarking report shall include, at a minimum, the Benchmarking Information for the previous calendar year.

5.4.2.3. The ARA staff member shall enter data into the Benchmarking Tool such that the energy, water, and waste benchmarking report shall be based on an assessment of the aggregated total energy and water consumed and waste produced by each building for the entire calendar year being reported. The ARA staff member shall separately be able to provide, upon request, hourly, or shorter, electricity consumption, as available from the vendor or retail electric provider.

5.4.2.4. In the first year after Policy adoption, the ARA staff member shall work with the Building Decarbonization Staff Members in the Operating Departments to review current benchmarked information for accuracy.

5.4.2.5. Before submitting a benchmarking report, the ARA staff member shall run all automated data quality checker functions available within the Benchmarking Tool and shall verify that all data has been accurately entered. The ARA staff member shall also seek confirmation of the data from the designated Building Decarbonization Staff Members in the Operating Departments. In order for the benchmarking report to be considered in compliance with this Procedure, the ARA staff member shall correct all missing or incorrect information as identified by the data quality checker prior to submitting the benchmarking report to the ARA Director.

5.4.2.6. Where the ARA staff member learns that any Benchmarking Information reported is inaccurate or incomplete, they shall amend the information reported within the Benchmarking Tool, and shall provide the ARA director with updated Benchmarking Information within 30 days of learning of the inaccuracy.

5.4.3 Benchmarking Schedule.

5.4.3.1. No later than May 1 of each year, the ARA Building Decarbonization Staff Member shall submit to the ARA Director a benchmarking report for the previous calendar year for each Covered City Building.

5.4.3.2. The initial benchmarking reports for each Covered City Building shall be filed as soon as possible after Policy adoption, no later than May 1, 2023.

5.4.3.3. The ARA Director shall annually make available on a publicly accessible website the Benchmarking Information, as defined in section 3. DEFINITIONS, for the previous calendar year for each covered city building.

5.4.4 Benchmarking exemptions.

5.4.4.1. Benchmarking is not required if:

5.4.4.1.1. A full demolition permit has been issued and legal occupancy is no longer possible prior to April 1 of the given year;

5.4.4.1.2. The building does not meet the eligibility criteria for the 1-100 ENERGY STAR score for the building type for the reporting year;

5.4.4.1.3. The building does not receive energy, water, or waste services; or

5.4.4.1.4. The ARA Director and relevant Operating Department Director determine that, due to special circumstances affecting a specific Covered City Building, excluding high energy use characteristics and not based on a condition caused by action of the City, strict compliance with provisions of this program would cause undue distress or would not be in the public interest.

5.4.5 Public reporting and analysis of Benchmarking Information.

5.4.5.1. Beginning no later than December 31, 2023, and every year thereafter, the ARA Department Director shall make available to the public on the internet, the following information:

5.4.5.1.1. An annual report evaluating the overall energy and water efficiency of Covered City Buildings, including a summary of energy and water consumption statistics and an assessment of compliance rates, accuracy and issues affecting accuracy, changes across the portfolio over time, energy and water efficiency trends, cost savings, and job creation effects resulting from energy and/or water efficiency improvements.

5.4.5.1.2. The shared municipal Benchmarking Information for the previous year.

5.4.6 Performing audits.

5.4.6.1. The ARA Director shall perform or cause to be performed a Level 1 Audit (as defined by ASHRAE in its *Procedures for Commercial Building Energy Audits*, Standard 211) for every Covered City Building (not including wastewater and drinking water facilities) at minimum every 5 years. These Audits shall also include a check of compliance with building operating requirements outlined in section 5.2.2, including (but not limited to) highlighting instances of prohibited personal equipment (space

heaters and printers).

5.4.6.2. After an initial Level 1 Audit, the ARA Director shall budget and perform or cause to be performed Level 2 or Level 3 audits (as defined by ASHRAE in its *Procedures for Commercial Building Energy Audits*, Standard 211) for the 20% of buildings with the highest measured electric power site EUI in each building category (i.e., those not achieving the targets set out in §5.2.1). These buildings, while they remain in the top 20% of their category for electric power site EUI, shall receive a Level 2 or 3 Audit at least every 5 years. These Audits shall also include all Covered City Buildings in the healthcare category, given the lower stringency of the electricity site EUI targets laid out in §5.2.1, to ensure these buildings are still meeting operational requirements outlined in §5.2.2 and maintaining efficient operations. The Audit reports shall directly inform Building Decarbonization Plans.

5.4.7 Internal reporting, compliance, and knowledge sharing

5.4.7.1. The ARA Director and Operating Department Directors shall have the option to choose a set of Covered City Buildings to review, to ensure both accuracy of data and compliance with benchmarking and decarbonization requirements.

5.4.7.2. After each annual benchmarking process, the ARA Department Director will submit to the Mayor and City Council and share with other City departments (Directors and staff) the following:

5.4.7.2.1. Full list of Covered City Buildings (not including wastewater and drinking water facilities) with their energy and water performance (site electricity use intensity, site natural gas use intensity, and indoor water use intensity); the list should highlight Covered City Buildings in the top and bottom of performance as it relates to energy use intensity

5.4.7.2.2. High-level energy and water efficiency and building decarbonization statistics, comparing year-to-year changes and a baseline

5.4.7.2.3. Building Decarbonization Plans submitted by Operating Department Directors (with collaboration from Tenant Department Directors, where relevant) for buildings not achieving their target electricity EUI values, as outlined in §5.2.1.2 and including a view of building equipment repair and replacement costs, to facilitate learnings across operating departments with similar building types.

5.4.7.3. To support continuous improvement, the ARA Building Decarbonization Staff Member and the Operating Department Building Decarbonization Staff Members shall share learnings and progress with each other, with the CRSO, and with City Buildings Staff.

5.4.7.3.1. Once quarterly, CRSO or designee shall convene Building Decarbonization Staff Members and other staff as relevant from the Operating Departments to discuss major projects, opportunities, challenges, risks, etc. related to the Policy and this Procedure.

5.5 Increased education, training, and incentives for City building staff

5.5.1 Education and training

5.5.1.1. Operating Department Directors shall identify Continuing Education opportunities for Buildings Staff related to high performance buildings, energy efficiency, renewable

power, low-carbon materials, or the other topics touched upon by the Policy and this Procedure.

5.5.1.2. CRSO or designee, with support from the Operating Departments, shall compile, share with Buildings Staff, and maintain a compendium of training / educational resources related to the topics touched upon by the Policy and this Procedure within one year of Policy adoption.

5.5.2 Incentives for Buildings Staff maintaining high-performing buildings

5.5.2.1. The General Services Department and the Parks and Recreation Department may identify performance factors that contribute to improvements in building performance on energy, water, and waste which may serve as a basis for an award of performance-based salary increase in accordance with Administrative Procedure 3-13, *Performance Pay Zone (PPZ)* or incentive pay in accordance with Administrative Procedure 3-8, *Performance Incentive Pay Plans for Municipal Employees* for their Buildings Staff.

5.5.2.1.1. Operating Department Directors are encouraged to identify additional qualifying actions which may serve as the basis for non-monetary awards (e.g., Mayoral or director recognition), as long as these actions support the advancement of the Policy and this Procedure.

6. RELATED DOCUMENTS AND INFORMATION

- ASHRAE Standard 211, Procedures for Commercial Building Energy Audits – https://www.ashrae.org/technical-resources/bookstore/standards-180-and-211
- Building Performance Standards: A Framework for Equitable Policies to Address Existing Buildings - https://www.usdn.org/uploads/cms/documents/bps-framework_july-2021_final.pdf
- Houston Climate Action Plan – http://greenhoustontx.gov/climateactionplan/
- Resilient Houston – https://resilientcitiesnetwork.org/downloadable_resources/Network/Houston-Resilience-Strategy-English.pdf
- Construction and Demolition Waste Management LEED credits - https://www.usgbc.org/credits/new-construction-core-and-shell-schools-new-construction-retail-new-construction-healthc-190?view=language
- Electric Vehicle charging definitions - https://afdc.energy.gov/files/pdfs/pev_handbook.pdf
- Electric Vehicles in building codes - https://www.swenergy.org/transportation/electric-vehicles/building-codes
- Electric Vehicle readiness terms – https://www.chargedfuture.com/ev-capable-ev-ready-and-ev-installed/
- Embodied Carbon in Buildings - https://rmi.org/insight/reducing-embodied-carbon-in-buildings
- Energy Star - www.EnergyStar.gov
- Energy Star Energy Use Intensity by Property Type - https://portfoliomanager.energystar.gov/pdf/reference/US%20National%20Median%20Table.pdf
- Energy Star Eligibility Criteria for the 1-100 Energy Star Score - https://www.energystar.gov/buildings/benchmark/understand_metrics/score_criteria
- Federal Sustainability Progress, Plans, and Performance – https://www.sustainability.gov/performance.html
- Fuel Cells for backup power - https://www.energy.gov/sites/prod/files/2014/10/f19/ftco_early_mkts_fc_backup_power_fact_sheet.p

df
- Grid Optimal LEED credit - https://www.usgbc.org/credits/gridoptimal-152-v4
- Harvard Green Building Requirements Innovation Points - https://green.harvard.edu/sites/green.harvard.edu/files/HarvardGreenBuildingStandards2017.pdf
- Marin County Low Carbon Concrete Requirements - https://www.marincounty.org/-/media/files/departments/cd/planning/sustainability/low-carbon-concrete/12172019-update/low-carbon-concrete-code.pdf?la=en
- National League of Cities – www.nlc.org
- National Institute of Building Science Whole Building Design Guide - http://www.wbdg.org/project/buildingcomm.php;
- New Buildings Institute Building Decarbonization Code - https://newbuildings.org/wp-content/uploads/2021/02/DecarbonizationCodeOverlay_20210217.pdf;
- Performance-based contracts example - https://www.architectmagazine.com/technology/performance-based-contracts-put-money-behind-the-promise-of-green-design_o
- Pittsburgh Ordinance on Sustainable Development for City-Owned Facilities - https://library.municode.com/pa/pittsburgh/codes/code_of_ordinances?nodeId=PIZOCO_TITNINEZOCO_ARTVIDEST_CH915ENPEST_915.08SUDECINEFA
- Smart Energy Cities - www.smartenergycity.com
- Solar Ready definition from IECC - https://codes.iccsafe.org/content/iecc2018/appendix-ca-solar-ready-zone-commercial
- U.S. Dept. of Energy/Environmental Protection Agency - www.eere.energy.gov
- U.S. General Services Administration Facilities Standards – https://www.gsa.gov/cdnstatic/2018%20P100%20Final%205-7-19_0.pdf
- USGBC LEED Credits overview – https://www.usgbc.org/credits

7. APPENDICES (Optional)

- Policy exemption form