SUSTAINABLE DESIGN STANDARDS

Part of Milwaukee County's commitment to achieving net zero carbon emissions by 2050 while advancing Equity, Justice, & Community Resilience

MARCH 2025

MILWAUKEE COUNTY

Message from County Leadership

On Earth Day 2021, The Milwaukee County Board of Supervisors adopted File No. 21-389 committing the County to achieve carbon neutral operations by 2050. In support of Milwaukee County's vision for achieving racial equity and our commitment to carbon-neutral operations, the Office of Sustainability has developed the Milwaukee County Climate Action 2050 Plan.

We are proud to say that the County has already made substantial progress in reducing emissions since 2005, our adopted baseline year. Our 2023 emissions inventory has shown a 46% overall reduction in greenhouse gas emissions compared to 2005. To help the County achieve our 50% reduction goal by 2030 and 100% reduction goal by 2050, aggressive climate action strategies must be implemented.

As of 2025, approximately 65% of Milwaukee County's operational emissions are associated with buildings. The development and implementation of Milwaukee County Sustainable Design Standards (SDS) for buildings is a primary climate action strategy to address this share of our emissions. It is our hope that these SDS will be utilized by Milwaukee County stakeholders and partners to thoroughly encompass our sustainability goals into all new construction, renovation, and replacement projects moving forward.

Together, we will continue to develop creative and meaningful solutions that not only address climate change but also are investments in Milwaukee County's future.

Respectfully,

Grant Helle

Director - Office of Sustainability

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1. Overview

1.1 Purpose

Milwaukee County, located in southeastern Wisconsin and home to nearly one million residents, with an existing portfolio of over 900 buildings spanning 12 million square feet, has a long history of environmental stewardship. Early efforts focused on energy efficiency, waste management, and conservation within its renowned parks. In 2021, the Milwaukee County Board of Supervisors adopted File 21-389, committing the County to achieving carbon-neutral operations by 2050. This action reinforced the County's leadership in addressing climate change and signaled a shift toward more aggressive sustainability strategies, including electrification of County operations, increased renewable energy deployment, and enhanced resilience planning.

Building on this commitment, the County is currently developing a comprehensive Climate Action 2050 Plan (CA50) to achieve carbon neutrality and climate adaptation goals. The Sustainable Design Standards (SDS) support this effort by embedding sustainability into building design and construction. These standards provide clear sustainability requirements and practical guidance for County new construction, renovation, and replacement projects, ensuring alignment with broader climate objectives.

Developed through extensive stakeholder collaboration, the SDS reflects a shared vision for resilience, equity, and environmental responsibility. It institutionalizes sustainable practices within County operations, guiding the transition toward a low-carbon, climate-resilient future. Ongoing stakeholder engagement will be key to successful implementation and continuous improvement.

Alignment with County's Strategic Vision:
The SDS aligns with the County's strategic goals and the forthcoming CA50 by embedding sustainability into all aspects of building development. These standards advance the County's commitment to environmental stewardship, equity, and resilience by promoting strategies such as energy efficiency, renewable energy adoption, and low-impact development. By prioritizing sustainable practices, the SDS directly supports the CA50's key objectives of achieving carbon neutrality, reducing greenhouse gas emissions, and enhancing the County's climate resilience. This holistic approach positions Milwaukee County as a leader in sustainable development.

1.2 Environmental Justice and Community Wellness

In 2019, Milwaukee became the first jurisdiction in the nation to declare racism a public health crisis. The County is committed to achieving racial equity as a cornerstone of its vision to become the healthiest county in Wisconsin and recognizes that environmental sustainability must go hand in hand with social equity and community wellness to create a truly sustainable future. Each sustainability strategy proposed within the standards should be assessed through a social equity and community health lens to ensure that the benefits of sustainable development, such as enhanced

energy efficiency and resilient infrastructure, are shared equitably. Guided by the County's core values of Inclusion, Influence, and Integrity, the standards reflect a collaborative approach that actively seeks diverse perspectives in decision-making and strives to positively impact the broader community. By integrating environmental justice into its sustainability efforts, the County seeks to promote healthier, more inclusive communities while advancing its key goals of racial equity, carbon neutrality and climate resilience.

1.3 Sustainability Vision and Focus Areas

The sustainability vision statement communicates the County's aspirations for sustainability and serves as a guiding framework for both current and future decisions. To develop this vision statement, County stakeholders actively participated in a visioning workshop, contributing to the development of a draft statement. The draft vision statement was circulated for further review and feedback, leading to the following sustainability vision statement for the SDS:

> The Sustainable Design Standards will support Milwaukee County's commitment to achieving net zero carbon emissions by 2050 while advancing Equity, Justice, & Community Resilience. These Standards will facilitate the planning, design, construction and renovation of resilient, net-zero carbon facilities that foster thriving communities and a sustainable future for the community.

This vision statement is a cornerstone for embedding sustainability into County projects, ensuring that all future initiatives contribute to long-term environmental, social, and economic well-being. It reinforces the County's commitment to sustainability while aligning with broader goals of equity and climate resilience.

As part of the SDS development process, eight key sustainability focus areas have been identified:

1. **Energy Efficiency**
2. **Emissions and Pollution Control**
3. **Climate Resilience and Adaptation**
4. Site
5. Water Conservation and Stormwater Management
6. Materials and Waste Management
7. Occupant Health and Wellbeing
8. Education and Community Engagement

Among these, the first three focus areas have been identified as **priority areas** due to their direct alignment with the CA50. These priority areas will include mandatory requirements and encouraged measures for each sustainability strategy (detailed in Section 3). The emphasis in this first version of the standards will be on strategies that support the CA50 and County's North Star goal of achieving net-zero carbon emissions, ensuring that sustainability efforts are both ambitious and achievable while laying a strong foundation for future improvements in the other focus areas.

1.4 Applicability and Exclusions

The SDS is designed to help guide project teams in implementing sustainable design and construction practices across all County projects. These standards apply to all County new construction, renovation, and replacement projects at its facilities, and must be followed to the maximum extent possible. While the current version of the SDS focuses on building projects, sustainability standards for infrastructure projects will be addressed in future updates.

To accommodate the varying scopes and impacts of different County projects, a compliance pathway graphic has been developed to help users quickly identify relevant requirements based on project type, size, and cost. County projects are categorized into two tiers (see below). This approach ensures that sustainability practices are appropriately applied to each project while recognizing the unique circumstances of individual projects.

Tier 1	**Meet all mandatory requirements ("Mandatory for all projects" and "Better (Tier 1 Mandatory)") where applicable to the project scope.**
Tier 2	**Meet all mandatory requirements ("Mandatory for all projects") where applicable to the project scope.**

All sustainability focus areas outline sustainability strategies and best practice guidance, but only the three sustainability focus areas identified as priority areas (Energy Efficiency, Emissions and Pollution Control, and Climate Resilience and Adaptation) include mandatory requirements and encouraged measures. Mandatory requirements must be implemented where applicable (e.g., for an air handling unit (AHU) replacement project, requirements relating to building envelope are not applicable) for both Tier 1 and Tier 2 projects. Encouraged measures ("Best") are optional and not required for Tier 1 or Tier 2 projects but should still be considered as part of each project's broader sustainability plan.

It is recognized that due to the diverse nature of County projects, all sustainability strategies should be reviewed for applicability for each project.

The following project types have been identified as being exempt from the SDS:

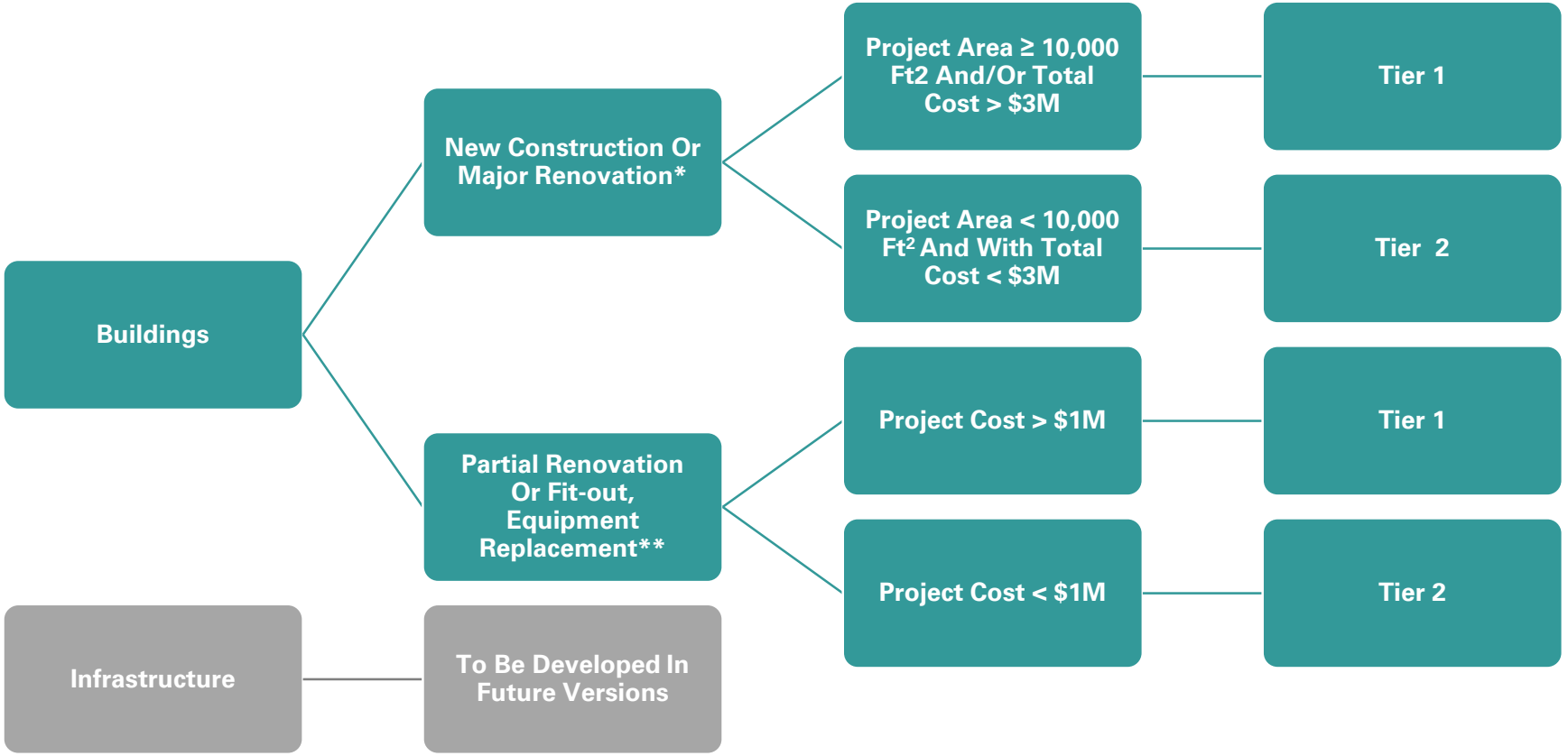
- Temporary structures (less than 5 years) e.g., job trailers
- Emergency repair or disaster response projects
- Leased spaces

Projects seeking exemption from the SDS (e.g., technical limitations / safety, operability) must complete an exemption request form and submit it to the Director of the Office of Sustainability during the Pre-Design stage.

Figure 1. Compliance Pathways

***Major Renovation** = Extensive alteration work in addition to work on the exterior shell of the building and/or primary structural components and/or core / peripheral MEP and service systems and/or site work (source: USGBC LEED v4 glossary)

****Partial Renovation or Fit-Out, Equipment Replacement** = system upgrades / replacements (e.g., lighting, finishes, plumbing, HVAC, windows, roof)



1.5 Governance

Minimum requirements are established herein for priority strategies, for every facility new construction or renovation/replacement project. Each project shall make every effort to meet these requirements. Projects which require any deviation from the mandatory sustainability requirements must seek written approval from the Director of Sustainability, Director of Architecture, Engineering and Environmental Services (AE&ES), Director of Facilities Management (FMD), and the Executive Director of the Department of Administrative Services (DAS) and complete an exemption request form. Included in the AE&ES annual report to the County Board of Supervisors, the Director of AE&ES must provide an update on the status of implementation of the Sustainable Design Standards. This shall itemize any approved deviations from the SDS requirements and highlight successes and key project indicators (KPIs).

Capital Project Charter documents shall include a section on applicable SDS requirements in accordance with the most recent approved version. Capital project management teams shall fold applicable sustainable design standards into all capital projects from the 2026 Capital Budget process forward. The capital project team shall use the project Charter as initial guidance but shall not rely on the Charter as the definition of applicability. Capital project teams shall conduct a comprehensive review of SDS to determine the applicability of each sustainability strategy / requirement and shall document the outcome of this SDS Applicability Review in the project file. The Director of Sustainability and Director of AE&ES may access the SDS Applicability Review document at any time to audit capital project compliance.

The County Facilities Planning Steering Committee (CFPSC) shall consider incorporation of SDS in its annual review and recommendation of capital project requests. The CFPSC recommendations, which are typically considered by the County Board in their further review and analysis of capital project requests, will be based on a pass/fail determination of incorporation of the SDS. Those capital project requests which do not include incorporation of SDS will not be recommended for inclusion in the County Executive's recommended capital budget or for adoption by the County Board.

No later than at the point of substantial completion of a project, the project team shall submit to the Director of Sustainability a report on the project achievements relative to the SDS. The standard form of report or SDS Scorecard shall be developed and maintained by the Director of Sustainability (see Appendix B). The Office of Sustainability shall use the library of completed SDS Scorecards to inform its next update of the Standards.

This version of the standards was developed and finalized in 2025 by a working group of Milwaukee County facility management professionals. These standards will be reviewed and formally updated at minimum every four years.

2. Sustainability Strategies

This section sets out goals, sustainability strategies, and best practice guidance for each sustainability focus area. Mandatory requirements and encouraged measures are provided for the three priority areas only (Energy Efficiency, Emissions and Pollution Control, and Climate Resilience and Adaptation).

The "Guidance" section under each sustainability strategy within the focus areas includes a list of best practices (for reference only) on how project teams may meet sustainability requirements and encouraged measures.

2.1 Energy Efficiency (EE)

Milwaukee County has a long history of incorporating energy efficiency measures into its operations, including retrofitting existing buildings with energy-efficient lighting, upgrading HVAC systems, and improving building envelopes to reduce energy consumption. These efforts have already resulted in significant energy savings and reduced operating costs across County facilities. Additionally, the County has implemented energy management programs to track and optimize energy use, further advancing its sustainability goals.

While Wisconsin's state energy code is currently based on ASHRAE 90.1-2013 (as of January 2025), the County is taking a proactive approach by using ASHRAE 90.1-2022 as the reference standard for its SDS. This approach goes beyond current state requirements and positions the County ahead of future code changes, whilst setting a higher standard for energy efficiency.

Building on these initiatives, Milwaukee County is committed to continuously improving energy efficiency by integrating advanced technologies, enhancing energy performance in new and existing buildings, and promoting sustainable design practices. These strategies will not only improve operational efficiency but also reinforce Milwaukee County's leadership in sustainability, helping to create a more sustainable and resilient community for all residents.

Goal: To reduce energy consumption and improve energy efficiency by optimizing building envelopes, HVAC systems, lighting, and equipment, while integrating energy management strategies for long-term sustainability and performance.

Sustainability Strategies:

- EE1: High-Performance Building Envelope
- EE2: Energy-Efficient HVAC Systems
- EE3: Efficient Lighting Systems
- EE4: Building Automation and Energy Monitoring
- EE5: High-Efficiency Equipment and Appliances
- EE6: Demand Response and Load Management
- EE7: Commissioning and Performance Verification

Project Example | Countryside, IL – Net Zero Municipal Complex

Source: https://www.illinoisgreenalliance.org/net-zero-building-case-study-countryside-municipal-complex

The City of Countryside's new Municipal Complex, completed in 2019, exemplifies energy efficiency through its net-zero design. This facility, replacing the previous 49-year-old City Hall, incorporates energy-efficient design elements and renewable energy systems to minimize its environmental impact, meeting net zero energy standards whilst fulfilling the needs of a public facility and battling the fluctuating Illinois weather. Key features include high-performance building insulation, energy-efficient HVAC systems, LED lighting, a geothermal heat pump system with 32 deep wells, and an extensive 638-panel solar photovoltaic array that provides sufficient energy to offset the building's energy usage. Additionally, educational displays on energy use engage the public in sustainability awareness. The project achieved Zero Energy Certification from the International Living Future Institute (ILFI) and LEED v4 Gold Certification.

EE1: High-Performance Building Envelope

Strategy: Optimize the building envelope to reduce heat loss and gain, improving energy efficiency and occupant comfort.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Meet or exceed ASHRAE 90.1-2022 Section 5 (Building Envelope) requirements.	Optimize envelope performance using energy modeling to refine design (e.g., insulation, shading, glazing, and WWR ratio) to achieve 5% reduction in annual heating and cooling loads when compared to ASHRAE 90.1-2022 prescriptive envelope requirements and 40% WWR (excluding infiltration improvements). Carry out whole building testing and meet air barrier performance at 0.15 CFM/ft2 at 75 Pa.	Design building envelope to Passive House standards or equivalent, incorporating continuous insulation, triple-glazed windows, and airtightness below 0.6 ACH50.	ASHRAE 90.1-2022 (Section 5) LEED v4.1 BD+C Credit Optimize Energy Performance LEED v5 BD+C Credit Reduce Peak Thermal Loads

Guidance:

- Select high-performance insulation with high R-values appropriate for the local climate and apply continuous insulation to eliminate thermal bridging.
- Use thermal modeling software (e.g., THERM or WUFI) to analyze thermal performance and identify areas prone to thermal bridging, such as structural penetrations, window frames, and junctions.
- Design for penetration-free installations by routing ducts, pipes, and cables within the conditioned space where possible. Ensure all penetrations through the envelope are properly insulated and sealed to prevent heat loss or gain.
- Install continuous air barriers to prevent air leakage and incorporate vapor-permeable barriers within the wall assembly to manage moisture and humidity.
- Perform blower door tests during construction to identify and seal drafts, ensuring a tight building envelope and reducing energy loss through air infiltration.
- Where appropriate for climate, consider triple-pane windows with low-E coatings and inert gas fills (such as argon) to reduce heat transfer and improve insulation.
- Align buildings to maximize natural daylight, orienting the longest side to face the south for optimal sunlight exposure. Use overhangs, pergolas, and other shading devices to reduce heat gain in summer while allowing passive solar heating in the winter.

- Design the building envelope with an optimized window-to-wall ratio (typically no greater than 40%) to balance daylighting, views, and thermal performance.
- Use dynamic façade systems, such as operable shading devices or electrochromic (tinting) glass, to regulate heat gain and glare throughout the day based on environmental conditions.

EE2: Energy-Efficient HVAC Systems

Strategy: Use advanced, energy-saving HVAC technologies to optimize performance, reduce energy consumption and greenhouse gas emissions.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Install high-efficiency HVAC equipment that meet or exceed ASHRAE 90.1-2022 requirements. Ensure any necessary requirements for rebates under the Focus on Energy utility program are included in the project design.	Implement a highly efficient HVAC system that achieves 5% better efficiency than ASHRAE 90.1-2022 prescriptive requirements for total fan power allowance, heating generation, and cooling generation. If connected with a district system, performance should still be achieved on items that that project has control over.	Implement a highly efficient HVAC system that achieves 10% better efficiency than ASHRAE 90.1-2022 prescriptive requirements for total fan power allowance, heating generation, and cooling generation. If connected with a district system, performance should still be achieved on items that that project has control over.	ASHRAE 90.1-2022 (Sections 6-7) LEED v4.1 BD+C Credit Optimize Energy Performance

Guidance:

- Utilize advanced HVAC systems which leverage technologies such as heat pumps (air, ground or water source), heat recovery for ventilation and separating loads and ventilation.
- Ensure HVAC systems are sized correctly to meet a building's thermal loads. Use zoning to provide targeted heating and cooling in different areas, maximizing efficiency by avoiding over-conditioning spaces.
- Implement energy recovery ventilators (ERV) or heat recovery ventilators (HRV) to capture energy from exhaust air and reuse it for conditioning incoming air, reducing overall HVAC energy demand.
- Use high-efficiency fans and pumps with variable frequency drives (VFDs) to reduce energy consumption during part-load operation.
- Use high-induction diffusers and low-pressure duct systems to improve airflow distribution and reduce energy consumption by minimizing fan power.
- When connected to a district energy system, focus on improving components within the project's control, such as internal distribution, controls, and terminal units.
- Consider ductless mini-split systems in retrofits or smaller spaces to electrify heating and cooling without extensive ductwork installation.

EE3: Efficient Lighting Systems

Strategy: Implement energy-efficient interior and exterior lighting systems to minimize electricity use while maintaining optimal lighting levels.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Install LED lighting systems that meet or exceed ASHRAE 90.1-2022 requirements. Ensure any necessary requirements for rebates under the Focus on Energy utility program are included in the project design (e.g., lighting products must have the brand, model/catalog number(s), specification sheet(s), and invoicing match their respective DesignLights Consortium (DLC) product listing).	Integrate lower power density luminaires, optimized design layouts and surface finishes, and daylight harvesting and tunable lighting systems to achieve 10% lower interior lighting power annual energy when compared to the ASHRAE 90.1-2022 prescriptive requirements for lighting power density and controls.	Integrate advanced lighting systems with building-wide automation to enable real-time optimization and dynamic adaptation to occupant needs. Implement tunable luminaires, time-of-day scheduling, and task-specific lighting controls to achieve at least 15% lower interior annual lighting energy use compared to ASHRAE 90.1-2022 prescriptive requirements.	ASHRAE 90.1-2022 (Section 9) LEED v4.1 BD+C Credits Optimize Energy Performance and Interior Lighting Focus on Energy (Partnering with Wisconsin utilities) program[1]

Guidance:

- Review Focus on Energy program requirements for incentives and rebates (e.g., lighting products must have the brand, model/catalog number(s), specification sheet(s), and invoicing match their respective DesignLights Consortium (DLC) product listing).
- Optimize the lighting design to minimize over-lighting and ensure even illumination, using lighting simulation tools during design to achieve appropriate lighting levels with minimal energy use.
- Select energy-efficient LED lighting fixtures with high efficacy (lumens per watt) to reduce electricity consumption while providing adequate illumination.
- Install occupancy sensors to automatically turn off lights in unoccupied spaces (e.g., general lighting in offices larger than 250 square feet should be controlled by occupant sensors, with each sensor managing a zone no larger than 600 square feet) and integrate dimming controls offering continuous dimming capabilities ranging from 10% to 100% to adjust lighting levels based on occupancy or daylight availability, ensuring minimal energy use without sacrificing occupant comfort.
- Design lighting systems with independently controlled zones to allow for flexibility in adjusting lighting levels according to specific space functions.

[1] https://focusonenergy.com/Business

- Incorporate daylight sensors to adjust artificial lighting levels based on the amount of natural light in the space, reducing energy use and enhancing the quality of the indoor environment.
- Leverage smart lighting technologies, such as motion-sensing and time-based controls, that allow for more granular control over energy use, particularly in areas with variable occupancy patterns.
- Incorporate lighting systems that support circadian rhythms by adjusting color temperature and intensity throughout the day, enhancing occupant health and productivity. Install electric lighting (except decorative features, emergency lighting, and other special-purpose lighting) that has a color rendering index (CRI) ≥ 80.
- Ensure the lighting control panel communicates with the central BMS to be able to view all information required for control, supervision and data logging.

EE4: Building Automation and Energy Monitoring

Strategy: Deploy smart systems to control energy use efficiently by adjusting energy systems based on occupancy and demand.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Install systems to monitor energy use at the dedicated whole-building level and establish reporting protocols for buildings over 1,000 square feet of gross floor area. Comply with County BMS Guidelines and follow ASHRAE Guideline 36-2021 High Performance Sequences of Operation for HVAC Systems.	Implement advanced sub-metering for key systems (e.g., heating, cooling, fans, pumps, lighting, receptacles). Incorporate more advanced energy usage and efficiency optimization into BMS. Include the following energy metrics on the BMS dashboard: Gas consumption (MBTU), Electricity consumption (kWh), Photovoltaic generation (kWh) (where applicable), and Energy Use Intensity (kbtu/sqft).	Use real-time monitoring systems integrated with building wide automation to optimize building performance dynamically and public dashboards for transparency.	ASHRAE 90.1-2022 (Sections 8 and 10) LEED v4.1 BD+C Credit Advanced Energy Metering

Guidance:

- Install advanced energy meters and submeters for major energy-consuming systems (e.g., heating, cooling, fans, pumps, lighting) and plug loads. Use a centralized energy management system for continuous energy monitoring, diagnostics, and fault detection.
- Use real-time monitoring systems integrated with the Building Management System (BMS) to track and display key metrics such as gas consumption (MBTU), electricity consumption (kWh), photovoltaic generation (where applicable), and Energy Use Intensity (EUI). Enable automated alerts for anomalies or deviations from expected performance.

- Leverage data from real-time monitoring systems to enable demand-based controls, such as variable frequency drives (VFDs) for pumps and fans, and demand-controlled ventilation (DCV) to optimize energy use dynamically based on occupancy and load conditions.
- Use automation to optimize the sequencing of equipment operation, ensuring that only necessary systems run during off-peak hours, such as early morning warm-up or evening cool-down cycles.
- Utilize predictive analytics within the BMS to forecast energy consumption patterns, optimize system settings, and identify areas for energy savings.

EE5: High-Efficiency Equipment and Appliances

Strategy: Install energy-efficient appliances and equipment to reduce energy consumption and operational costs.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
For all eligible equipment and appliances, specify ENERGY STAR or equivalent-certified (e.g., appliances, office equipment, electronics). Ensure any necessary requirements for rebates under the Focus on Energy utility program are included in the project design.	Use smart power strips and centralized energy management systems to reduce standby power and plug load energy.	Specify Internet of Things (IoT)-connected equipment to optimize plug load usage dynamically based on building occupancy patterns and achieve plug load energy reductions of 20% or more.	ASHRAE 90.1-2022 (Sections 8 and 10) LEED v4.1 BD+C Credits Optimize Energy Performance and Grid Harmonization Focus on Energy (Partnering with Wisconsin utilities) program[2]

Guidance:

- Evaluate equipment choices based on both upfront costs and long-term energy consumption, lifespan, and operational efficiency to maximize overall cost-effectiveness and sustainability. Review Focus on Energy program requirements for incentives and rebates.
- For all eligible equipment and appliances (e.g., office equipment, kitchen appliances, and electronics), specify ENERGY STAR or equivalent-certified models.
- Prioritize appliances and electronics with low standby power consumption (below 0.5 watts) to minimize phantom loads when equipment is not in active use.
- Install smart power strips with load-sensing and scheduling features to cut off power to devices when not in use. Incorporate occupancy-sensing controls for appliances and office equipment to eliminate unnecessary energy use during off-hours.
- Specify motors, pumps, and fans with variable speed drives (VSDs) to adjust output based on demand, reducing energy use during partial load conditions and extending equipment lifespan.

[2] https://focusonenergy.com/Business

- Specify Internet of Things (IoT)-connected equipment capable of integrating with centralized energy management systems. Use these systems to dynamically adjust plug load energy based on real-time building occupancy patterns.

EE6: Demand Response and Load Management

Strategy: Optimize energy usage during peak demand periods by implementing strategies for load shedding and demand response.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Review the utility rate structure to understand peak demand charges and design systems to reduce peak energy usage through basic operational adjustments, such as optimizing equipment schedules or staggering equipment start-up times.	Design the building to be demand response (DR) capable by incorporating infrastructure that enables participation in DR programs (such as ability to load shed within the BMS) and ensuring control systems can receive and respond to external DR event signals. Undertake analysis of estimated energy utility costs using utility rate structure for the project.	Combine load management systems, integrating renewable energy and on-site energy or thermal storage to achieve at least a 10% peak demand reduction.	LEED v4.1 BD+C Credit Grid Harmonization Wisconsin Electric and Natural Gas Rates (We Energies)[3]

Guidance:

- Engage with utility providers offering incentives for reducing energy use during peak demand periods, such as enrolling in programs that provide financial incentives for load shedding.
- Analyze utility rate structures and design systems that optimize energy usage during peak times, such as adjusting operational schedules for energy-intensive equipment and staggering equipment start-up times to minimize peak demand charges.
- Implement strategies to shift energy-intensive operations to off-peak periods, such as pre-cooling or pre-heating spaces before peak hours to maintain occupant comfort with reduced energy use during demand peaks and scheduling non-essential processes (e.g., HVAC cooling, water heating, EV charging) during off-peak hours.
- Use zonal controls to prioritize critical areas while shifting or shedding non-critical loads during demand peaks.
- Ensure the building is demand response-capable by incorporating infrastructure that allows for real-time load shedding and response to DR event signals, including installing control systems that can receive and act on external DR signals from utility providers and enabling automated load reductions via the BAS.

[3] https://www.we-energies.com/payment-bill/rates

- Use on-site renewable energy sources (e.g., solar PV) in combination with energy storage systems (e.g., battery energy storage Systems, thermal energy storage) to offset grid energy use during peak periods.

EE7: Commissioning and Performance Verification

Strategy: Ensure systems are properly commissioned, verified, and optimized to maintain high energy performance over time.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
For new buildings / additions or major renovations with minimum 5,000 square feet of gross floor area, perform commissioning (Cx) process activities for mechanical, electrical, plumbing, and renewable energy systems.	Engage a third-party commissioning provider to perform enhanced commissioning for building enclosure (e.g., building air leakage testing, water penetration testing, infrared imaging).	In addition to building enclosure commissioning, perform enhanced and monitoring-based commissioning for mechanical, electrical, plumbing, and renewable energy systems.	ASHRAE 90.1-2022 (Sections 4-10) LEED V4.1 BD+C Credit Enhanced Commissioning

Guidance:

- Establish a commissioning plan that covers mechanical, electrical, plumbing (MEP), and renewable energy systems, as well as the building enclosure (if applicable). The plan should define scope, budget, schedule, and responsibilities, ensuring alignment with project goals and sustainability standards. Select a qualified Commissioning Provider (CxP) to oversee the process and ensure thorough execution.
- Perform commissioning activities during design, construction, and initial occupancy phases. Include pre-functional and functional performance testing for MEP, renewable energy, and enclosure systems to verify installation and operational efficiency.
- Integrate monitoring systems that enable continuous data collection on building performance. Use this data to identify inefficiencies, inform adjustments, and continuously optimize system performance.
- Conduct enhanced commissioning for building enclosure systems, including air leakage testing, water penetration testing, and thermal imaging to ensure a high-performance building envelope that minimizes energy loss and prevents moisture-related issues.
- Establish a periodic re-commissioning schedule for all major systems (e.g., every 3-5 years), particularly for buildings with significant energy consumption or complex MEP systems. For existing buildings, conduct retro-commissioning (RCx) to identify and correct any performance issues that could lead to energy inefficiencies. Review Focus on Energy RCx offering[4].
- Ensure building operators are well-trained on system operations, monitoring tools, and maintenance practices. Include procedures for ongoing performance verification and

[4] https://focusonenergy.com/business/building-optimization

troubleshooting. Provide commissioning documentation, including system manuals, test results, and performance benchmarks.

Consolidated List of Energy Efficiency (EE) Sustainability Strategies

Sustainability Strategy	Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)
Design			
High-Performance Building Envelope	Meet or exceed ASHRAE 90.1-2022 Section 5 (Building Envelope) requirements.	Optimize envelope performance using energy modeling to refine design (e.g., insulation, shading, glazing, and WWR ratio) to achieve 5% reduction in annual heating and cooling loads when compared to ASHRAE 90.1-2022 prescriptive envelope requirements and 40% WWR (excluding infiltration improvements). Carry out whole building testing and meet air barrier performance at 0.15 CFM/ft2 at 75 Pa.	Design building envelope to Passive House standards or equivalent, incorporating continuous insulation, triple-glazed windows, and airtightness below 0.6 ACH50.
Energy-Efficient HVAC Systems	Install high-efficiency HVAC systems that meet or exceed ASHRAE 90.1-2022 requirements.	Implement a highly efficient HVAC system that achieves 5% better efficiency than ASHRAE 90.1-2022 prescriptive requirements for total fan power allowance, heating generation, and cooling generation. If connected with a district system, performance should still be achieved on items that that project has control over.	Implement a highly efficient HVAC system that achieves 10% better efficiency than ASHRAE 90.1-2022 prescriptive requirements for total fan power allowance, heating generation, and cooling generation. If connected with a district system, performance should still be achieved on items that that project has control over.

Sustainability Strategy	Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)
Efficient Lighting Systems	Install LED lighting systems that meet or exceed ASHRAE 90.1-2022 requirements. Ensure any necessary requirements for rebates under the Focus on Energy utility program are included in the project design (e.g., lighting products have the brand, model/catalog number(s), specification sheet(s), and invoicing match their respective DesignLights Consortium (DLC) product listing).	Integrate lower power density luminaires, optimized design layouts and surface finishes, and daylight harvesting and tunable lighting systems to achieve 10% lower lighting power annual energy when compared to the ASHRAE 90.1-2022 prescriptive requirements for lighting power density and controls.	Integrate advanced lighting systems with building-wide automation to enable real-time optimization and dynamic adaptation to occupant needs. Implement tunable luminaires, time-of-day scheduling, and task-specific lighting controls to achieve at least 15% lower annual lighting energy use compared to ASHRAE 90.1-2022 prescriptive requirements.
Building Automation and Energy Monitoring	Install systems to monitor energy use at the dedicated whole-building level and establish reporting protocols for buildings over 1,000 square feet of gross floor area. Comply with County BMS Guidelines and follow ASHRAE Guideline 36-2021 High Performance Sequences of Operation for HVAC Systems.	Implement advanced sub-metering for key systems (e.g., heating, cooling, fans, pumps, lighting, receptacles). Incorporate more advanced energy usage and efficiency optimization into BMS. Include the following energy metrics on the BMS dashboard: Gas consumption (MBTU), Electricity consumption (kWh), Photovoltaic generation (kWh) (where applicable), and Energy Use Intensity (kbtu/sqft).	Use real-time monitoring systems integrated with building wide automation to optimize building performance dynamically and public dashboards for transparency.
High-Efficiency Equipment and Appliances	For all eligible equipment and appliances, specify ENERGY STAR or equivalent-certified (e.g., appliances, office equipment, electronics).	Use smart power strips and centralized energy management systems to reduce standby power and plug load energy.	Specify Internet of Things (IoT)-connected equipment to optimize plug load usage dynamically based on building occupancy patterns and achieve plug load energy reductions of 20% of more.

Sustainability Strategy	Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)
Demand Response and Load Management	Review the utility rate structure to understand peak demand charges and design systems to reduce peak energy usage through basic operational adjustments, such as optimizing equipment schedules or staggering equipment start-up times.	Design the building to be demand response (DR) capable by incorporating infrastructure that enables participation in DR programs (such as ability to load shed within the BMS) and ensuring control systems can receive and respond to external DR event signals. Undertake analysis of estimated energy utility costs using utility rate structure for the project.	Combine load management systems, integrating renewable energy and on-site energy or thermal storage to achieve at least a 10% peak demand reduction.
Construction			
Commissioning and Performance Verification	For buildings with minimum 5,000 square feet of gross floor area, perform commissioning (Cx) process activities for mechanical, electrical, plumbing, and renewable energy systems.	Engage a third-party commissioning provider to perform enhanced commissioning for building enclosure (e.g., building air leakage testing, water penetration testing, infrared imaging).	In addition to building enclosure commissioning, perform enhanced and monitoring-based commissioning for mechanical, electrical, plumbing, and renewable energy systems.

2.2 Emissions and Pollution Control (EPC)

Milwaukee County is committed to emissions reduction and pollution control through various sustainability initiatives, including energy efficiency upgrades in County facilities, investments in renewable energy, and the expansion of green infrastructure. These efforts have already contributed to reducing the County's carbon footprint and improving local air quality. The County's CA50 and participation in state and regional sustainability programs underscore its commitment to achieving net-zero emissions and fostering environmental stewardship.

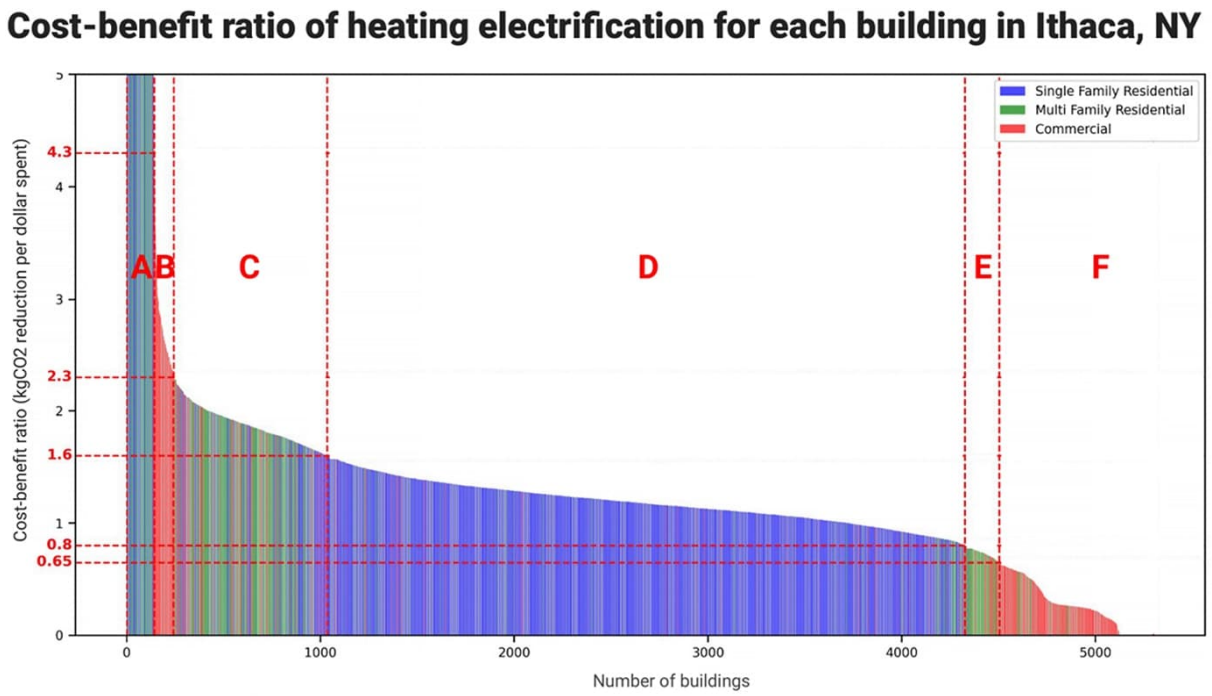
Ongoing efforts, such as transitioning County buildings to clean energy, promoting low-emission transportation (e.g., alternative fuel vehicles, electric vehicle infrastructure), and implementing pollution management strategies in construction projects, are critical steps toward meeting these goals. By continuing to incorporate emissions and pollution control measures into building design, operations, and maintenance, Milwaukee County is well-positioned to lead in sustainability, reduce environmental health disparities, and create a healthier, more resilient future for its residents.

Goal: To minimize environmental and health impacts by reducing greenhouse gas emissions, improving air quality, and eliminating pollution from buildings and materials, fostering a healthier and more sustainable community.

Sustainability Strategies:

- EPC1: Building Electrification
- EPC2: Renewable Energy
- EPC3: Embodied Carbon Assessment
- EPC4: Electric Vehicles
- EPC5: Low-Carbon Construction Practices
- EPC6: Construction Pollution Management
- EPC7: Refrigerant Management
- EPC8: Low-Emission and Healthy Material Selection

Project Example | Ithaca, NY – Electrification of Municipal Buildings



Source: Cornell University's Environmental System Lab

The City of Ithaca, NY, is electrifying all municipal and privately-owned buildings to support its ambitious Ithaca Green New Deal goal of carbon neutrality by 2030. Partnering with BlocPower, the city is retrofitting properties with electric heating, cooling, and energy systems powered by renewable energy. Federal, state, and private incentives, totaling $1.4 million, have reduced costs for building owners by about two-thirds, facilitating upgrades like heat pumps and weatherization measures to enhance energy efficiency. This initiative not only lowers emissions but also positions Ithaca as a model for urban sustainability, including aligning all city operations with 100% renewable electricity by 2025 and conducting rigorous greenhouse gas inventories to track progress.

EPC1: Building Electrification

Strategy: Transition from fossil-fuel based systems to electric systems.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Identify and document opportunities for beneficial electrification and create a building decarbonization plan aligned with 2050 carbon neutral goals. Implement strategies to allow the building to be all electric ready (e.g., low temperature heating systems, space for electric equipment, increase in electrical requirements, structural load on roof, space and size of renewables, and improvements to the thermal envelope which enable electrification).	Perform life-cycle cost analysis (LCCA) for energy systems with and without social cost of carbon[5] as agreed with County (e.g., $300/tCO$_2$e), including at least one all-electric option, and prioritize lowest carbon option where LCCA shows parity or savings in line with Climate Action 2050 Plan.	Design and implement fully electric systems for all energy-consuming functions (heating, cooling, water heating, and cooking).	LEED V5 BD+C Credit Electrification

Guidance:

- Conduct detailed energy modeling and feasibility studies to evaluate and document opportunities for transitioning to all-electric systems in new and retrofit projects.
- Replace fossil fuel-based HVAC systems (e.g., gas boilers, furnaces) with efficient electric alternatives (e.g., air-source, ground-source heat pumps).
- Replace domestic hot water systems with electric alternatives such as electric heat pump water heaters or point-of-use electric water heaters.
- Electrify cooking appliances in commercial and institutional kitchens, prioritizing induction systems and integrating training programs for staff on induction technology.
- Conduct a life-cycle cost analysis (LCCA) energy-consuming systems to compare electric options against fossil fuel-based alternatives, considering future energy costs, carbon pricing (e.g., $300/tCO$_2$e), maintenance, available rebates, and operational savings.
- Develop a phased electrification roadmap for existing County facilities, prioritizing buildings with the highest emissions or outdated systems and factoring current and future climate projections, and incorporate cost-benefit analyses and funding strategies, such as utility rebates and federal tax credits, to offset electrification costs.

[5] Social cost of carbon (SCC) is a monetary estimate / dollar value of the long-term economic damages from carbon emissions and is measured in USD per tonne of carbon dioxide equivalent ($/tCO$_2$e). Including SCC in the LCCA helps ensure that the long-term environmental and social costs of carbon choices are considered in decision-making.

- When considering future proofing for electrification, consider steam heat exchangers, low-temperature hot water systems, space for future electric equipment, and electric capacity.
- Take advantage of available federal, state, and local rebates or incentives for electrification systems (e.g., Focus on Energy program).

EPC2: Renewable Energy

Strategy: Integrate on-site and/or procure off-site renewable energy sources to reduce reliance on non-renewable energy, prioritizing on-site generation first.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Evaluate and document on-site renewable energy feasibility (e.g., is there unshaded roof space for solar PV, is there opportunity for solar carport over parking?). Design building to be solar-ready by including conduit, roof space, capacity within existing electric infrastructure, and structural support for future photovoltaic systems (e.g., where not heavily shaded and roof area is >200sq.ft.) and roof layouts to maximize available solar potential.	Perform life-cycle cost analysis (LCCA) for solar PV and energy storage and install if life-cycle cost effective (LCCE).	Achieve net-zero energy through 100% renewable energy generation or procurement agreements, ensuring energy resilience with advanced storage systems.	LEED v4.1 BD+C Credit Renewable Energy Milwaukee County Solar Photovoltaic Systems Feasibility Study (2024)[6]

Guidance:

- Conduct a site-specific feasibility study to evaluate renewable energy potential, including rooftop and building integrated solar, solar carports, small wind turbines, or geothermal systems. Identify local resource availability and system performance.
- Design buildings to be "solar-ready" or "microgrid-ready" by integrating necessary infrastructure such as conduit pathways, roof load capacity, and switchgear provisions. This ensures future renewable energy systems can be installed or expanded without extensive retrofits.
- Procure renewable energy through certified green power purchasing programs, Renewable Energy Certificates (RECs), or utility offerings (e.g., Focus on Energy program). Explore virtual

[6] https://county.milwaukee.gov/files/county/administrative-services/Sustainability/Milwaukee-County-Solar-Feasibility-Study.pdf

power purchase agreements (VPPAs) or participation in community solar programs for large facilities or distributed locations.

- Incorporate energy storage systems (e.g., batteries, thermal storage) to maximize the use of on-site renewable energy. Use advanced energy management technologies, such as bi-directional batteries or vehicle-to-grid systems, to balance energy demand and supply.
- Design energy systems for future expansion by ensuring scalability of renewable energy infrastructure (e.g., solar panels, wind turbines) and incorporating grid-interactive capabilities to adapt to evolving energy needs.

EPC3: Embodied Carbon Assessment

Strategy: Assess and minimize embodied carbon emissions across a building's life cycle.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
[No mandatory requirement]	Provide at least five Environmental Product Declarations (EPDs) for distinct material categories (e.g., concrete, steel, insulation) that demonstrate reduced Global Warming Potential (GWP) compared to industry averages.	Conduct a whole-building life-cycle assessment (LCA) using recognized tools (e.g., EC3, One Click LCA) to calculate embodied carbon. Set and achieve a minimum embodied carbon reduction target of ≥ 20% compared to baseline designs.	LEED v4.1 BD+C Credit Building Life-Cycle Impact Reduction

Guidance:

- Perform Whole Life Cycle (WLC) assessments during the early design phase and revisit them throughout the project lifecycle. Include major and secondary components (e.g., structure, façade, systems, finishes) to capture carbon impacts during design, construction, and post-occupancy phases.
- Establish specific and measurable targets for both embodied and operational carbon reductions (e.g., ≥ 20% reduction in embodied carbon from an industry baseline). Aim for achieving net-zero carbon emissions across the building's entire life cycle, including construction, operation, and decommissioning.
- Choose materials based on Environmental Product Declarations (EPDs) and third-party verified low-carbon certifications (e.g., Cradle-to-Cradle, Declare Label). Opt for renewable, bio-based materials like timber where feasible and sustainable.
- Utilize modular components, reversible connections, and durable materials to allow for easy disassembly and material reuse at the end of the building's lifecycle. Optimize structural design for material efficiency, reducing the need for high-carbon materials like steel and concrete.

- Engage early with suppliers to source materials with low Global Warming Potential (GWP) and encourage waste reduction during manufacturing and delivery. Require contractors, and their subs, to provide carbon data for materials and align their practices with the project's WLC goals.
- Integrate WLC analysis into design, procurement, and construction processes by utilizing carbon accounting tools and certification systems (e.g., LEED, BREEAM, EC3 Tool) to ensure consistent tracking and improvement of embodied carbon performance.

EPC4: Electric Vehicles

Strategy: Promote electric vehicle (EV) adoption by providing infrastructure to support EV use.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
[No mandatory requirement]	Provide EV-ready parking spaces with conduit for future charging for 10% of total parking spaces.	Install electrical vehicle supply equipment (EVSE) that provides a Level 2 charging capacity for at least 10% of total parking spaces.	LEED v4.1 BD+C Credit Electric Vehicles

Guidance:

- Prepare at least 10% of parking spaces with dedicated conduit, electrical capacity, and space allocation for future EV chargers, ensuring scalability based on demand, building type, and future technology advancements.
- Install EV charging stations for a minimum of 10% of parking spaces, prioritizing Level 2 or Level 3 chargers and incorporating fast-charging capabilities where feasible to meet the diverse needs of EV users.
- Use on-site renewable energy, such as solar panels, to power EV chargers and incorporate battery storage systems to manage peak demand, enhance grid resilience, and reduce overall carbon emissions.
- Include infrastructure for shared EV mobility options like car-sharing services or dedicated fleet management and consider advanced charging technologies such as wireless charging or dynamic charging for innovative mobility solutions.
- Develop policies and incentives to encourage EV adoption and use, such as priority EV parking, reduced or free charging rates, subsidies for EV leases, or providing workplace charging incentives for tenants and employees.
- Design the parking lot and infrastructure to be adaptable to the growing needs of EVs in the future by incorporating flexibility in the electrical system and planning for easy future expansion of charging stations as demand increases.
- Identify federal and local tax credits / incentivization programs for EV charging infrastructure (e.g., federal alternative fuel infrastructure tax credit).

EPC5: Low-Carbon Construction Practices

Strategy: Implement construction practices that minimize carbon emissions through sustainable materials and techniques.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
[No mandatory requirement]	Develop and implement a construction carbon management plan and optimize logistics to reduce transportation emissions.	Employ low-carbon construction methods, including electrified equipment, low-carbon materials, modular construction, and alternative fuels.	-

Guidance:

- Create a construction carbon management plan to identify major emissions sources (e.g., material production, transportation, equipment usage) and outline strategies for emissions reduction and mitigation. Incorporate measurable targets to track progress.
- Select low-carbon materials (e.g., recycled steel, low-carbon concrete) and alternative materials (e.g., cross-laminated timber, reclaimed wood) for major building components, such as foundations and structural systems. Specify materials with lower embodied carbon footprints.
- Reduce transportation-related emissions by sourcing materials locally and optimizing logistics. Plan just-in-time material deliveries to minimize trips and avoid unnecessary transportation.
- Use energy-efficient or zero-emission construction equipment (e.g., electric or hybrid vehicles) and minimize idle times to reduce onsite emissions.
- Implement modular or prefabricated construction methods to reduce on-site waste, material usage, and emissions. Employ digital tools like Building Information Modeling (BIM) and AI-driven logistics to improve efficiency and reduce resource consumption.
- Power construction sites with renewable energy sources (e.g., portable solar arrays) and offset any remaining emissions with verified carbon credits to achieve net-zero construction.

EPC6: Construction Pollution Management

Strategy: Reduce air, water, and soil pollution during construction through proper site management and dust control measures.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
[No mandatory requirement]	Implement enhanced pollution controls that exceed local code requirements, such as advanced dust management systems, stormwater treatment, and non-toxic site stabilization materials.	Utilize low- to zero-emission construction equipment where available, real-time air quality monitoring, and advanced stormwater pollution control measures during construction.	LEED v4.1 BD+C Prerequisite Construction Activity Pollution Prevention and Credit Construction Indoor Air Quality Management Plan

Guidance:

- Implement robust erosion and sediment control measures in compliance with local codes, including solutions like silt fences, sediment basins, bio-swales, or retention ponds to protect water quality and manage stormwater runoff effectively.
- Develop and implement a construction indoor air quality management plan to minimize indoor air quality contamination during construction and before occupancy, including strategies such as protecting HVAC systems from dust infiltration, using low-emission materials, sequencing high-emission activities appropriately, and performing building flush-outs or air testing before occupancy.
- Reduce dust and air pollution by using water spraying, dust suppressants, and barriers such as screens or fences. Limit vehicle idling and prioritize the use of low-emission or zero-emission construction equipment, ensuring regular maintenance for optimal performance.
- Deploy on-site air quality monitoring systems, such as sensors to track dust levels and air quality and adjust construction operations to ensure compliance with air quality standards, proactively mitigating pollution.
- Prioritize the reduction, recycling, and reuse of construction waste materials. Ensure proper handling and disposal of hazardous materials, including hazardous chemicals or materials, to prevent environmental contamination and encourage a circular economy approach.
- Introduce strategies for preventing water pollution, including spill prevention and containment measures, proper disposal of construction wastewater, and treatment of contaminated water before discharge.

EPC7: Refrigerant Management

Strategy: Use low-global warming potential (GWP) refrigerants and manage leaks to minimize environmental impact.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
[No mandatory requirement]	Do not use ozone-depleting substances and high Global Warming Potential (GWP) chemicals where EPA's Significant New Alternatives Policy (SNAP) Program has identified acceptable substitutes. Include leak detection systems to minimize refrigerant loss.	Use natural refrigerants (e.g., ammonia, CO_2, hydrocarbons) or refrigerants with ultra-low GWP (<10), ODP=0, AND implement advanced monitoring systems to track refrigerant performance and minimize leakage throughout the lifecycle.	LEED v4.1 BD+C Prerequisite Fundamental Refrigerant Management and Credit Enhanced Refrigerant Management

Guidance:

- Replace high-GWP refrigerants with low-GWP alternatives (e.g., HFOs, CO_2, ammonia) and ensure system compatibility and ability to maintain system performance with different refrigerant type.
- Use advanced technologies (e.g., infrared sensors, automated systems) for proactive leak detection and continuous monitoring.
- Implement a scheduled maintenance plan to check for leaks, pressure, and system performance to prevent refrigerant loss.
- Establish a refrigerant recovery program for safe recycling and reuse of refrigerants from decommissioned systems.
- Quickly repair leaks and consider upgrading to energy-efficient systems with lower refrigerant charge requirements.
- Ensure proper training and certification for all personnel handling refrigerants, with an emphasis on best practices and low-GWP technologies.

EPC8: Low-Emission and Healthy Material Selection

Strategy: Choose materials with low emissions and potential harmful impacts on indoor air quality and human health.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Specify materials that meet low-VOC criteria per industry standards.	Use materials certified under rigorous health and environmental standards (e.g., Cradle to Cradle, Declare Label).	Ensure all interior materials are non-toxic, fully recyclable, and contribute to improved indoor air quality.	LEED v4.1 BD+C Credit Low-Emitting Materials

Guidance:

- Specify paints, coatings, adhesives, finishes, and other materials with low or zero volatile organic compounds (VOCs) to minimize indoor air pollution and enhance indoor air quality (IAQ). Opt for non-toxic finishes and natural building materials such as clay, bamboo, cork, and those with minimal chemical additives.
- Ensure that construction machinery and equipment, such as storage tanks and generators, use low-VOC or zero-VOC products to reduce emissions during the building process, thereby improving air quality during both construction and occupancy.
- Choose materials certified under health and emissions standards such as Green Seal, FloorScore, Cradle to Cradle, or Declare Label, which evaluate the material's lifecycle impacts, toxicity, and IAQ (see databases such as Environdec and UL Spot).
- Select materials with low embodied carbon, high recycled content, and those made from rapidly renewable resources to reduce environmental impact and conserve natural resources. Consider products with a high percentage of post-consumer and post-industrial recycled content.

- Strive for materials that can be recycled, disassembled, and reused at the end of their life, contributing to a circular economy and reducing landfill waste. Prioritize products designed for easy disassembly, reuse, or repurposing.
- Opt for materials with air-purifying properties or those that can absorb toxins to improve indoor air quality. Ensure that materials used meet stringent IAQ standards, such as those established by the California Department of Public Health (CDPH) or Green Seal.

Consolidated List of Emissions and Pollution Control (EPC) Sustainability Strategies

Sustainability Strategy	Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)
Design			
Building Electrification	Identify and document opportunities for electrification and create a building decarbonization plan aligned with 2050 carbon neutral goals. Implement strategies to allow the building to be all electric ready (e.g., low temperature heating systems, space for electric equipment, increase in electrical requirements, structural load on roof, space and size of renewables, and improvements to the thermal envelope which enable electrification).	Perform life-cycle cost analysis (LCCA) for energy systems with and without social cost of carbon as agreed with County (e.g., $\$300/tCO_2e$), including at least one all-electric option, and prioritize lowest carbon option where LCCA shows parity or savings in line with Climate Action 2050 Plan.	Design and implement fully electric systems for all energy-consuming functions (heating, cooling, water heating, and cooking).
Renewable Energy	Evaluate and document on-site renewable energy feasibility (e.g., is there unshaded roof space for solar PV, is there opportunity for solar carport over parking?). Design building to be solar-ready by including conduit, roof space, capacity within existing electric infrastructure, and structural support for future photovoltaic systems (e.g., where not heavily shaded and roof area is >200sq.ft.) and roof layouts to maximize available solar potential.	Perform life-cycle cost analysis (LCCA) for solar PV and energy storage and install if life-cycle cost effective (LCCE).	Achieve net-zero energy through 100% renewable energy generation or procurement agreements, ensuring energy resilience with advanced storage systems.

Sustainability Strategy	Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)
Embodied Carbon Assessment	-	Provide at least five Environmental Product Declarations (EPDs) for distinct material categories (e.g., concrete, steel, insulation) that demonstrate reduced Global Warming Potential (GWP) compared to industry averages.	Conduct a whole-building life-cycle assessment (LCA) using recognized tools (e.g., EC3, One Click LCA) to calculate embodied carbon. Set and achieve a minimum embodied carbon reduction target of ≥ 20% compared to baseline designs.
Electric Vehicles	-	Provide EV-ready parking spaces with conduit for future charging for 10% of total parking spaces.	Install electrical vehicle supply equipment (EVSE) that provides a Level 2 charging capacity for at least 10% of total parking spaces.
Refrigerant Management	-	Do not use ozone-depleting substances and high Global Warming Potential (GWP) chemicals where EPA's Significant New Alternatives Policy (SNAP) Program has identified acceptable substitutes. Include leak detection systems to minimize refrigerant loss.	Use natural refrigerants (e.g., ammonia, CO_2, hydrocarbons) or refrigerants with ultra-low GWP (<10), ODP=0, AND implement advanced monitoring systems to track refrigerant performance and minimize leakage throughout the lifecycle.
Construction			
Low-Carbon Construction Practices	-	Develop and implement a construction carbon management plan and optimize logistics to reduce transportation emissions.	Employ low-carbon construction methods, including electrified equipment, low-carbon materials, modular construction, and alternative fuels.

Sustainability Strategy	Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)
Construction Pollution Management	-	Implement enhanced pollution controls that exceed local code requirements, such as advanced dust management systems, stormwater treatment, and non-toxic site stabilization materials.	Utilize low- to zero-emission construction equipment where available, real-time air quality monitoring, and advanced stormwater pollution control measures during construction.
Low-Emission and Healthy Material Selection	Specify low-VOC materials per industry standards (e.g., Green Seal, GREENGUARD).	Use at least 20 distinct, permanently installed materials certified under rigorous health and environmental standards (e.g., Cradle to Cradle, Declare Label).	Ensure all interior materials are non-toxic, fully recyclable, and contribute to cradle-to-cradle sustainability, while enhancing indoor air quality and reducing embodied carbon.

2.3 Climate Resilience and Adaptation (CRA)

Milwaukee County is committed to ensuring that buildings are resilient to the growing impacts of climate change, including extreme weather events, flooding, and temperature extremes. This effort is guided by the need to assess climate risks and vulnerabilities, integrate resilient design features, and plan for long-term adaptability. By incorporating climate resilience into building design and infrastructure, the County aims to protect communities, reduce potential damages, and ensure that structures can withstand and recover from climate-related disruptions.

These strategies support the County's CA50, aligning with regional climate adaptation plans and state and federal resilience initiatives. By prioritizing resilience, Milwaukee County is preparing for future climate challenges while fostering sustainable development that can thrive in a rapidly changing environment.

Goal: To enhance the resilience of buildings against climate impacts by conducting climate risk and vulnerability assessments, integrating adaptive design features, and prioritizing flexibility in building systems to ensure long-term durability and functionality in the face of evolving climate conditions.

Sustainability Strategies:

- CRA1: Climate Change Vulnerability Assessment
- CRA2: Resilient Site Design
- CRA3: Climate-Adaptive Building Design
- CRA4: Emergency Preparedness and Critical Buildings Redundancy
- CRA5: Nature-Based Solutions for Resilience

Project Example | Santa Cruz, CA – Resilient Coast Santa Cruz Initiative

Source: https://www.cityofsantacruz.com/home/showpublisheddocument/82336/637418110343870000

The Resilient Coast Santa Cruz Initiative addresses coastal flooding and erosion resulting from sea-level rise by implementing adaptation strategies informed by comprehensive vulnerability assessments. Key measures include nature-based solutions like living shorelines and beach nourishment to mitigate climate risks. The initiative emphasizes resilient site and building design, incorporating features that enhance adaptability to extreme weather conditions. Infrastructure improvements, such as stormwater system upgrades and seawall retrofits, are integral to protecting the community. A significant aspect of the project is the development of a Coastal Change Monitoring Network in partnership with UC Santa Cruz and other agencies, enhancing the city's capacity to respond to climate impacts. The initiative also prioritizes community-driven resilience through public engagement, ensuring that adaptation plans reflect the needs and values of residents. In 2024, the city was awarded nearly $8 million from the National Oceanic and Atmospheric Administration (NOAA) to support these coastal resilience projects, underscoring the initiative's commitment to safeguarding Santa Cruz's unique coastal environment.

CRA1: Climate Change Vulnerability Assessment

Strategy: Identify, assess, and prioritize potential climate-related risks to inform resilient design and adaptation measures.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Review and consider implications of the Milwaukee County Vulnerability Assessment[7] conducted as part of the Climate Action 2050 Plan. Account for findings in the design.	Conduct a site-specific climate change vulnerability assessment using local climate data, focusing on current hazards and referencing the Milwaukee County Vulnerability Assessment conducted as part of the Climate Action 2050 Plan.	Expand the assessment to include future climate projections, evaluate impacts on building systems, and integrate findings into design documents.	LEED V5 BD+C Prerequisite Climate Resilience Assessment

Guidance:

- Evaluate potential climate-related risks for each site, including flooding, extreme heat, severe storms, wildfires, and water-level rise, referencing the County Vulnerability Assessment. Use historical climate data, geographic information systems (GIS), and climate projection models to assess both current and future risks.
- Collaborate with local stakeholders, government agencies, environmental experts, and community members to better understand regional climate vulnerabilities and incorporate local knowledge into risk assessments and resilience strategies.
- Utilize the results of vulnerability assessments to inform resilient design strategies, ensuring structures are designed to withstand extreme weather events. Establish metrics to measure resilience, such as reduced exposure to hazards, minimized recovery time, and maintained functionality during adverse events.
- Develop adaptation strategies based on the identified risks, such as enhanced stormwater management, flood-resistant materials, heat-mitigating designs, and fire-resistant landscaping. Adaptation measures should also consider the long-term durability of materials and infrastructure in response to changing climate conditions.
- Continuously monitor climate data and reassess risks at regular intervals (e.g., annually, bi-annually) to account for evolving climate patterns, emerging threats, and new scientific knowledge to help ensure that design strategies remain effective over time.
- Coordinate climate risk assessments with broader urban planning initiatives, such as zoning, transportation, and infrastructure planning, to enhance overall community resilience. Focus on strategies that integrate climate adaptation across all scales of development.

[7] https://milwaukeecounty.legistar.com/View.ashx?M=F&ID=12470895&GUID=3C260B43-DEE0-4337-BE24-348EF0005BE0

CRA2: Resilient Site Design

Strategy: Design sites to withstand and recover from climate-related hazards and impacts of extreme weather.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Incorporate basic resilient site features, such as erosion control, permeable surfaces, and stormwater detention basins, appropriate to the project scope. If project development is in a total maximum daily load (TMDL) area and stormwater is being impacted, connect with County Environmental department to ensure green infrastructure requirements are met.	Design site infrastructure to handle extreme weather events (e.g., heat waves, flooding) and elevate or protect critical systems.	Use advanced modeling to create a regenerative site design that integrates nature-based solutions, achieves net-positive stormwater management, and adapts dynamically to changing conditions.	LEED V5 BD+C Credit Enhanced Resilient Site Design

Guidance:

- Design sites to manage extreme weather impacts by elevating critical infrastructure (e.g., electrical systems, mechanical equipment) above projected flood levels (e.g., current 100-year flood elevation) on flexible connections for future adaptability. Use flood-resistant materials for ground-level structures and utility systems to minimize flood damage.
- Incorporate erosion-resistant ground covers, retaining walls, and vegetation buffers to stabilize soil and reduce degradation during heavy rainfall or storms. Utilize native plant species to ensure long-term resilience.
- Implement green infrastructure such as permeable pavements, green roofs, and bio-retention areas to manage runoff, improve water infiltration, and reduce the risk of flooding.
- Integrate cool roofs, reflective pavements, and increased vegetation to reduce the urban heat island effect, enhance site cooling, and protect against heat waves.
- Design sites to accommodate long-term climate change by considering the future impacts of extreme weather events (e.g., droughts, heatwaves) and using flexible, adaptive site planning strategies such as modular landscapes or adaptable / modular stormwater systems.
- Choose materials that are not only sustainable but also resilient to the impacts of extreme weather, including materials that are fire-resistant, UV-resistant, or engineered for high winds, heavy rainfall, and extreme cold and snow.

CRA3: Climate-Adaptive Building Design

Strategy: Incorporate flexible, climate-adaptive design strategies and construction techniques that can adjust to changing climate conditions.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Ensure that building systems and spaces can accommodate future updates, such as simplified retrofitting for climate-related upgrades (e.g., additional HVAC space, pre-wiring for solar, flexible mechanical rooms).	Incorporate modular or flexible design elements (e.g., 2-4-inch flashing overlaps and metal copings) to allow adaptation to significant changes in use or climate conditions over the building's lifecycle.	Design a fully climate-adaptive building with dynamic systems that respond to climate data in real time, including modular structures and adaptive façades.	LEED v5 BD+C Credit Resilient Spaces WELL v2 Air Feature A07 Operable Windows

Guidance:

- Implement modular construction techniques with prefabricated components for easy assembly and disassembly. Design structural systems with expandable frameworks, allowing for future adaptability in response to changing needs or climate conditions (e.g., additional floors, wings, or structures).
- Incorporate flexible floor plans with movable walls and partitions, enabling easy reconfiguration of spaces to meet future requirements or shifting building functions in response to climate-driven changes in use.
- Where feasible, incorporate operable windows to enhance natural ventilation, reduce mechanical cooling demand, and provide occupants with greater control over indoor environmental conditions. Design window placement to optimize cross-ventilation and passive cooling strategies, especially in response to rising temperatures and extreme heat events.
- Use HVAC systems with adjustable controls to respond to varying climate conditions, including systems that integrate natural ventilation, radiant cooling, and heat recovery ventilation, enhancing energy efficiency and adapting to seasonal temperature fluctuations.
- Design building systems to accommodate renewable energy sources, such as solar or wind power, ensuring that buildings can easily incorporate future renewable technologies to reduce reliance on fossil fuels.
- Implement green roofs, permeable paving, and integrated stormwater management systems that can adapt to increasing precipitation and changing rainfall patterns.
- Choose materials resistant to climate stressors, such as moisture, extreme temperatures, and UV radiation. Opt for treated wood, high-performance glass, and durable composite materials that can withstand these stressors.
- Integrate sensors and automation systems to continuously monitor environmental factors (temperature, humidity, air quality) and adjust building systems to optimize performance based on real-time conditions.

- Involve local stakeholders in the design process to ensure the building aligns with the community's climate adaptation needs and long-term resilience goals**,** ensuring that the building serves as a proactive part of the local climate strategy.

CRA4: Emergency Preparedness and Critical Buildings Redundancy

Strategy: Ensure continuous operation during emergencies by integrating redundancy and backup power solutions into building design.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
Provide backup power for critical buildings and spaces (e.g., Mission Essential Functions) and ensure accessible egress routes in line with the County's Continuity of Operations Plan (COOP).	Equip critical buildings with emergency systems (e.g., backup generators or battery energy systems) capable of maintaining essential operations for at least 72 hours during outages.	Design for full self-sufficiency during emergencies, including renewable energy with storage, water recycling systems, and adaptable shelter spaces.	WELL v2 Community Feature C15 Emergency Resilience and Recovery LEED v5 BD+C Credit Grid-Interactive

Guidance:

- Identify and equip safe gathering areas within buildings, such as shelters for occupants during severe weather or natural disasters. Ensure these spaces are stocked with essentials, including first aid supplies, food, water, and blankets, and have clear evacuation routes.
- Integrate reliable backup power solutions, such as generators or battery storage systems, that automatically activate during power outages. These systems should support critical infrastructure, including medical equipment, emergency lighting, HVAC systems, and communication devices.
- Design buildings with emergency water storage systems, such as cisterns or tanks, to ensure an accessible supply of potable water during emergencies. Ensure these systems are regularly maintained and can be easily accessed in times of crisis.
- Set up communication systems that function independently of the main power grid, including satellite phones or two-way radios, to maintain contact with emergency responders and ensure occupant safety. Provide training for building staff on how to use these systems effectively.
- Design critical building systems (e.g., HVAC, electrical, fire suppression) with redundancy to ensure operation during emergencies. Implement failover strategies, such as dual power sources or backup cooling, to maintain functionality when primary systems fail.
- Establish regular training and emergency response drills for building occupants and staff to ensure readiness and familiarity with evacuation procedures, emergency systems, and shelter locations. This training should be updated regularly (e.g., annually, bi-annually) based on new risks or building upgrades.

CRA5: Nature-Based Solutions (NBS)[8] for Resilience

Strategy: Enhance resilience by leveraging natural systems to mitigate climate risks and improve ecosystem health.

Mandatory For All Projects	Better (Tier 1 Mandatory)	Best (Encouraged)	References
[No mandatory requirement]	Integrate at least one nature-based solution, such as a bioswale or rain garden, into the project.	Create a site-wide resilience plan that strengthens ecosystems, increases biodiversity (e.g., native planting, green infrastructure), and restores natural water cycles (e.g., rain gardens).	LEED v4.1 BD+C Credit Rainwater Management FEMA's Building Community Resilience With Nature-Based Solutions, A Guide For Local Communities

Guidance:

- Design bioswales and rain gardens to capture and filter stormwater per FEMA's Building Community Resilience With Nature-Based Solutions, A Guide For Local Communities. Utilize native plant species that are well-suited to local conditions, which enhances ecological value and supports biodiversity. Ensure landscape design promotes natural water infiltration and minimizes runoff. Permeable pavements enhance groundwater recharge.
- Integrate green infrastructure elements such as tree canopies, green walls, and shaded outdoor spaces to reduce the urban heat island effect.
- Implement sustainable soil management practices, such as reducing soil compaction, enhancing soil health, and using permeable surfaces, to support the functionality of natural systems and improve stormwater absorption and retention.
- Integrate habitat restoration initiatives, including planting native vegetation and creating wildlife corridors, to enhance biodiversity, promote ecosystem services, and strengthen the resilience of both natural and built environments.
- Encourage NbS adoption through subsidies for green infrastructure or ecosystem restoration.
- Collaborate with institutions like the University of Wisconsin-Milwaukee to research and implement innovative NbS tailored to Milwaukee's specific environmental challenges.
- Leverage the Urban Ecology Center's resources to educate residents about NbS and involve them in local environmental projects, fostering a sense of stewardship and resilience.

[8] Nature-based Solutions (NBS) are practical ways of working with nature to solve problems like flooding, extreme heat, or air pollution, while also improving the environment (e.g., planting trees to cool down hot areas and improve air quality).

Consolidated List of Climate Resilience and Adaptation (CRA) Sustainable Strategies

Sustainability Strategy	Mandatory for all projects	Better (Tier 1 Mandatory)	Best (Encouraged)
Planning			
Climate Change Vulnerability Assessment	Review and consider implications of the Milwaukee County Vulnerability Assessment conducted as part of the Climate Action 2050 Plan. Account for findings in the design.	Conduct a site-specific climate change vulnerability assessment using local climate data, focusing on current hazards and referencing the Milwaukee County Vulnerability Assessment conducted as part of the Climate Action 2050 Plan.	Expand the assessment to include future climate projections, evaluate impacts on building systems, and integrate findings into design documents.
Design			
Resilient Site Design	Incorporate basic resilient site features, such as erosion control, permeable surfaces, and stormwater detention basins, appropriate to the project scope.	Design site infrastructure to handle extreme weather events (e.g., heat waves, flooding) and elevate or protect critical systems.	Use advanced modeling to create a regenerative site design that integrates nature-based solutions, achieves net-positive stormwater management, and adapts dynamically to changing conditions.
Climate-Adaptive Building Design	Ensure that building systems and spaces can accommodate future updates, such as simplified retrofitting for climate-related upgrades (e.g., additional HVAC space, pre-wiring for solar, flexible mechanical rooms).	Incorporate modular or flexible design elements (e.g., 2–4-inch flashing overlaps and metal copings) to allow adaptation to significant changes in use or climate conditions over the building's lifecycle.	Design a fully climate-adaptive building with dynamic systems that respond to climate data in real time, including modular structures and adaptive façades.
Emergency Preparedness and Critical Buildings Redundancy	Provide backup power for critical buildings and spaces and ensure accessible egress routes.	Equip critical buildings with emergency systems (e.g., backup generators or battery energy systems) capable of maintaining essential operations for at least 72 hours during outages.	Design for full self-sufficiency during emergencies, including renewable energy with storage, water recycling systems, and adaptable shelter spaces.

Sustainability Strategy	Mandatory for all projects	Better (Tier 1 Mandatory)	Best (Encouraged)
Nature-Based Solutions for Resilience	-	Integrate at least one nature-based solution, such as a bioswale or rain garden, into the project.	Create a site-wide resilience plan that strengthens ecosystems, increases biodiversity (e.g., native planting, green infrastructure), and restores natural water cycles (e.g., rain gardens).

2.4 Site (S)

Milwaukee County is committed to creating resilient, environmentally responsible sites that enhance biodiversity and integrate seamlessly with surrounding communities. Past efforts include the integration of green infrastructure to manage stormwater, projects to reduce the urban heat island effect through increased tree canopy and green roofs, and initiatives to enhance public access to parks and natural spaces. These measures have demonstrated the County's commitment to fostering sustainable development while protecting natural ecosystems.

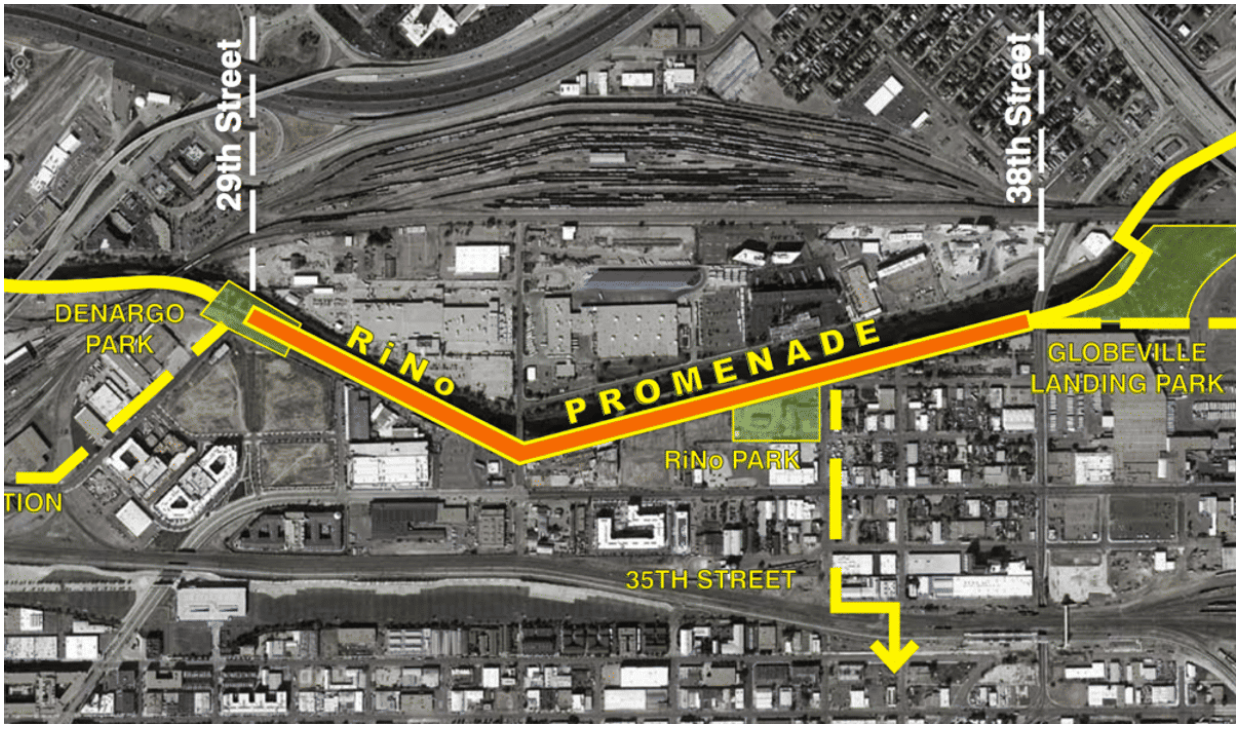
Through the preservation of biodiversity and habitat, as well as thoughtful community integration and public access, the County fosters a balanced relationship between development and nature. These strategies contribute to healthier, more sustainable communities, supporting Milwaukee County's commitment to environmental stewardship and the creation of spaces that promote both ecological and community resilience.

Goal: To create environmentally responsible and resilient sites that protect and enhance biodiversity, optimize resource use and minimize impacts on the surrounding community, fostering a harmonious balance between development and the environment.

Sustainability Strategies:

- S1: Context-Sensitive Site Planning
- S2: Enhanced Air Quality and Noise Management
- S3: Proximity to Public Transit and Active Transportation
- S4: Urban Heat Island Mitigation
- S5: Community Integration and Public Access
- S6: Biodiversity and Habitat Preservation

Project Example | Rino, CO – Arkins (RiNo) Promenade



Source: https://rinoartdistrict.org/post/rino-promenade

The City of Denver, CO, transformed an existing local street within a former industrial zone along the South Platte River into the River North (RiNo) Promenade, a vital mixed-use arts district. The project integrates nature-based solutions, including native vegetation, riparian buffers, and wildlife corridors, to enhance biodiversity and protect water quality. Green infrastructure elements, such as permeable paving, tree-lined streets, and bioswales, mitigate the urban heat island effect and manage stormwater runoff. Public amenities, walking and cycling paths, and cultural programming have made the promenade a vibrant public space that balances development with environmental stewardship, supporting the city's long-term climate and resilience goals.

S1: Context-Sensitive Site Planning

Strategy: Design sites that respond to local environmental, cultural, and historical contexts while minimizing ecological disruption.

Guidance:

- During project identification, assess the project's potential impact to broader external systems such as growth patterns, congestion, energy and water demand/production, and how these influence the long-term sustainability of the community or region.
- Conduct detailed environmental assessments (e.g., EPA Phase 1 and/or Phase 2) to identify sensitive ecosystems, wetlands, floodplains, or wildlife habitats on or near the site and evaluate the site's proximity to major highways, industrial zones, and urban infrastructure to assess potential exposure to noise, air pollution, and other environmental hazards.
- Avoid construction on protected areas, including forests, wetlands, or areas with high ecological, cultural, or historical value, ensuring that the development respects these spaces.
- Establish buffer zones around sensitive habitats and natural features to mitigate potential development impacts, preserving the integrity of ecosystems.
- Avoid developing in flood-prone areas or steep slopes to minimize risks of flooding, erosion, and landslides.
- Prioritize building locations that minimize disruption to natural features such as mature trees, rock formations, water bodies, and wildlife corridors, integrating the natural landscape into design.
- Encourage the reuse of previously developed land, such as brownfields or abandoned lots, to reduce the environmental impact of new development and promote sustainable land regeneration.
- Use plant species and designs that reflect the region's natural and cultural identity, using native plants wherever possible.

S2: Proximity to Public Transit and Active Transportation

Strategy: Promote sustainable mobility by ensuring convenient access to public transit, walking, and cycling infrastructure.

Guidance:

- Design safe (e.g., Crime Prevention Through Environmental Design (CPTED)), accessible, and clearly marked pedestrian walkways that connect directly to nearby transit stops, ensuring compliance with ADA standards for accessibility.
- Install comprehensive, clear signage that includes real-time transit schedules, maps, and directional guidance to enhance user experience and facilitate access to transit facilities.
- Develop and maintain well-marked, protected bike lanes within the project site that connect to key transit hubs, local pathways, and neighborhoods, ensuring safe crossings and adequate lighting.
- Provide secure, conveniently located bike racks and/or indoor bicycle storage facilities (e.g., showers, changing facilities, lockers) at transit stops and building entrances to support cyclists.

- Integrate covered, weather-protected transit shelters at key stops within the project site, equipped with seating, lighting, and other amenities to improve comfort and safety.
- Implement "bike-share" programs or partnerships with local bike-sharing services to further promote cycling as a convenient transportation option.
- Ensure that transit and cycling infrastructure is integrated with green spaces or green corridors, promoting both sustainability and aesthetic value.

S3: Enhanced Air Quality and Noise Management

Strategy: Implement measures to reduce air pollution and noise impacts from construction and operation on surrounding communities.

Guidance:

- For noise management, follow a mitigation hierarchy of avoidance/source elimination, minimization, abatement/receiver reduction, and offsetting/compensation.
- Use dense vegetation as vegetative buffers to filter air pollutants. Install high-efficiency air filtration systems to improve both indoor and outdoor air quality.
- Orient buildings strategically to minimize exposure to prevailing winds that carry pollutants from nearby highways, railways, or industrial areas. Utilize passive ventilation and design strategies to reduce reliance on mechanical systems.
- Construct physical sound barriers, such as walls or berms, made from acoustic attenuation materials. Incorporate living walls and green roofs as natural noise buffers and use sound-insulating materials in building envelopes (e.g., double-glazed or better windows, insulated walls, and sound-dampening doors).
- Install air quality and noise sensors to continuously monitor conditions, enabling real-time data for effective mitigation actions. Implement strategies based on the data to address any issues promptly.
- Assess potential air quality and noise impacts during the construction and operational phases. Develop a comprehensive noise and pollution management plan, incorporating mitigation measures like temporary barriers or noise-reduction practices during high-impact activities.

S4: Urban Heat Island Mitigation

Strategy: Reduce heat island effects through reflective surfaces, green roofs, and increased vegetation.

Guidance:

- Apply roofing materials with high solar reflectance and thermal emittance and retrofit existing surfaces with reflective coatings on rooftops (e.g., Cool Roof Rating Council (CRRC) rated roof products), pavements, and other impervious surfaces to reduce heat absorption.
- Replace traditional asphalt with cool pavements made of reflective, light-colored materials or permeable surfaces that allow natural cooling through water infiltration.

- Plant trees to provide natural shading, and incorporate shrubs, ground cover, and green spaces along pedestrian paths, parking lots, and building perimeters to reduce heat buildup and improve comfort for occupants.
- Incorporate both extensive green roof systems (with low-growing vegetation and shallow soils) for cooling and insulation, and intensive green roofs (with deeper soil for larger plants) to increase the cooling effect, enhance stormwater management, and improve air quality.
- Introduce water bodies, such as ponds, fountains, or rain gardens, within urban spaces to provide evaporative cooling and reduce surrounding temperatures.
- Incorporate shading structures, such as pergolas, trellises, and solar canopies, to minimize heat exposure on hardscapes and outdoor areas, while also improving pedestrian comfort.
- Surface at least 60% of the building's gross exterior wall area (including vertical fenestration) with a "cool-wall material", which must be opaque to sunlight, exhibit an initial solar reflectance of at least 0.60, and exhibit an initial thermal emittance of at least 0.75. To avoid disproportionate placement of cool-wall materials on the building face that receives the least sun, no more than 25% of the building's total cool-wall area should be sited on the wall facing away from the equator.

S5: Community Integration and Public Access

Strategy: Foster vibrant communities by providing accessible public spaces and promoting local social and cultural engagement.

Guidance:

- Design inclusive green spaces that cater to diverse activities and age groups, incorporating playgrounds, picnic areas, sports facilities, and accessible, flexible seating.
- Promote ecological and community engagement through native, pollinator-friendly plant species, community gardens, and educational signage that highlights local ecosystems and culture.
- Ensure universal accessibility by incorporating ADA-compliant features like ramps, continuous surfaces and railings, tactile surfaces, and adequate lighting in all public spaces. Ensure equitable access by offering community amenities at minimal or no cost to ensure inclusivity and broaden participation.
- Integrate water bodies and natural landscapes with boardwalks, trails, and observation points, enhancing / encouraging public access while minimizing environmental impact.
- Develop walking and cycling trails that wind through natural landscapes, incorporating educational signage to highlight local ecosystems, history, and culture.
- Use sustainable materials and durable designs to ensure longevity and climate resilience, while reflecting local cultural heritage through art and public design.

S6: Biodiversity and Habitat Preservation

Strategy: Protect and restore local ecosystems by maintaining and enhancing native habitats and wildlife corridors.

Guidance:

- Conduct a site ecological assessment to map existing vegetation, wildlife habitats, and critical areas before development to ensure informed decision-making.
- Prioritize native plants, including local flora, fruits, and vegetables, to support wildlife, enhance soil health, and increase ecosystem resilience.
- Protect and preserve significant trees and critical root zones during construction by implementing measures such as fencing and careful planning.
- Integrate pollinator-friendly plants to support bees, butterflies, and other essential pollinators, fostering biodiversity.
- Establish wildlife corridors to connect fragmented habitats, allowing for safe wildlife movement across urban developments.
- Develop a long-term maintenance plan for ongoing habitat health, including controlling invasive species, promoting native plant growth, and maintaining ecosystem features.

2.5 Water Conservation and Stormwater Management (WC)

Milwaukee County has long prioritized water conservation and stormwater management to protect local water resources and mitigate flooding risks. Past efforts include implementing green infrastructure projects, such as bioswales, rain gardens, and permeable pavements, in County parks and public spaces. These initiatives have successfully reduced stormwater runoff, improved water quality, and supported the County's environmental and sustainability goals. Additionally, the County has adopted water-efficient systems in its facilities, including low-flow fixtures and smart irrigation technologies, to minimize potable water use.

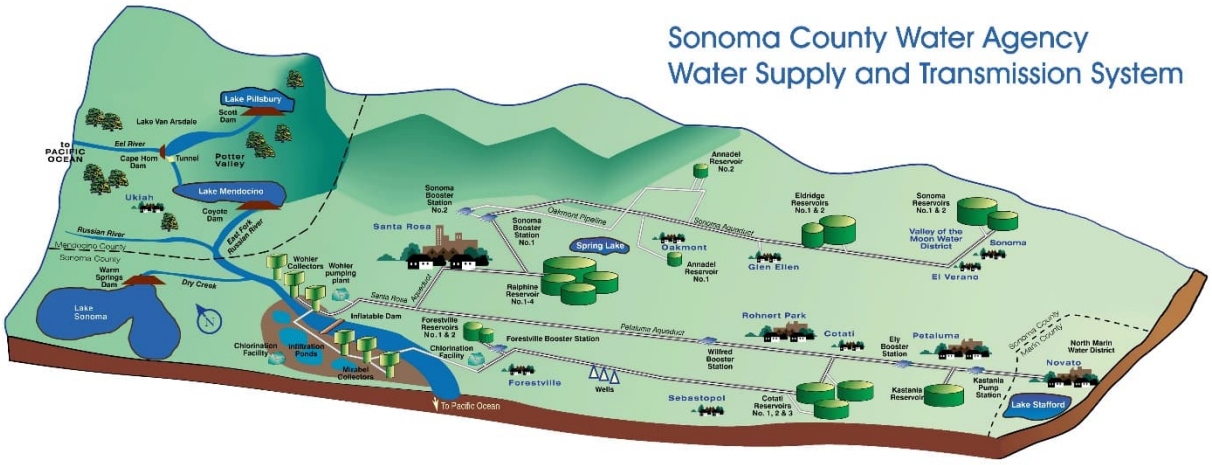
By implementing these strategies, Milwaukee County seeks to create sustainable, water-efficient communities that protect local water resources, improve resilience to flooding, and reduce pollution. These efforts align with the County's broader environmental goals, contributing to the long-term sustainability of both urban and natural environments, while ensuring that water resources are preserved for future generations.

Goal: To reduce water consumption and enhance stormwater management by promoting water-efficient systems, alternative water sources, smart irrigation, green infrastructure, and measures to protect water quality, ensuring sustainable use of water resources.

Sustainability Strategies:

- WC1: Water-Efficient Fixtures and Systems
- WC2: Smart Irrigation and Landscaping
- WC3: Alternative Water Use Systems
- WC4: Green Infrastructure for Stormwater Management
- WC5: Water Quality Protection Measures

Project Example | Sonoma County, CA



Source: https://www.sonomawater.org/Infrastructure

Sonoma County enforces comprehensive water conservation and stormwater management measures to promote sustainable water use. Per County Code Section 25B-13, all water well permits—excluding public and injection wells—must comply with best management practices. Level 1 water conservation requirements, effective countywide, mandate leak assessments, the installation of water-efficient faucets and showerheads, and adherence to water-efficient landscape regulations as specified in County Code Section 7D3. Notably, developments post-October 4, 2022, face restrictions on grass lawns, which are prohibited unless compliant with these regulations, and cannot exceed 2,500 square feet without adherence. Additional measures include the disconnection of downspouts and compliance with rules set by Groundwater Sustainability Agencies. The county also offers various water-saving partnership programs and rebates to encourage conservation. These initiatives have yielded significant results; for instance, in June 2022, Petaluma city water users reduced consumption by 34.3%, ranking sixth in conservation statewide and leading in the San Francisco Bay hydrologic area.

WC1: Water-Efficient Fixtures and Systems

Strategy: Install water-efficient fixtures and water systems to reduce potable water consumption in buildings.

Guidance:

- Install EPA WaterSense-labeled fixtures and systems that use less water than standard products (e.g., LEED baseline water consumption of fixtures and fittings), including dual-flush and aerated toilets, low-flow or waterless urinals, low-flow faucets, and efficient showerheads.
- Integrate smart water leak detection systems that provide real-time alerts to facility managers about potential leaks or unusual water usage, ensuring prompt action to prevent waste.
- Utilize automated water shutoff valves to minimize water losses in case of pipe bursts or system failures.
- Implement occupancy sensors in faucets and urinals to adjust water flow based on actual demand, particularly in high-traffic commercial or public facilities.
- Display signage in restrooms and other high-traffic areas to promote water conservation practices, including turning off taps when not in use and using water-efficient fixtures properly.

WC2: Smart Irrigation and Landscaping

Strategy: Implement smart irrigation technologies and drought-tolerant landscaping to minimize outdoor potable water use.

Guidance:

- Design landscapes that do not require permanent irrigation systems beyond an initial two-year establishment period, reducing long-term water dependency.
- Prioritize native or climate-adapted plant species that are more resilient to local environmental conditions, requiring less water, and offering additional benefits for local wildlife. Refer to online databases such as the EPA's WaterSense "What to Plant' database and Water Use Classification of Landscape Species (WUCOLS).
- Reduce turfgrass areas by incorporating ground covers, xeriscaping, and drought-tolerant grass varieties to minimize water-intensive lawn maintenance.
- Utilize weather-based ET (Evapotranspiration) controllers that adjust irrigation schedules based on real-time weather conditions, along with soil moisture sensors to prevent overwatering and optimize water use.
- Install drip irrigation systems that deliver water directly to plant roots, reducing evaporation and runoff, and ensuring efficient water delivery.
- Implement zoning for irrigation systems, grouping plants with similar water needs together, and programming irrigation schedules to match their specific requirements for water use.

WC3: Alternative Water Use Systems

Strategy: Incorporate alternative water use systems that reuse graywater, harvest rainwater, and/or use reclaimed water for non-potable uses.

Guidance:

- Install rainwater harvesting systems for non-potable uses, such as irrigation, toilet flushing, cooling towers, and landscape irrigation, to reduce dependence on potable water sources.
- Incorporate water filtration mechanisms, such as sediment traps and first-flush diverters, to ensure water is adequately treated for safe non-potable uses while reducing contaminants.
- Ensure compliance with local codes and regulations by designing and installing systems that adhere to all relevant building codes, health standards, and water quality guidelines.
- Reuse graywater from safe sources like sinks, showers, bathtubs, and washing machines for non-potable uses, while excluding higher-contamination water from toilets and kitchens.
- Implement subsurface irrigation systems for graywater reuse to minimize evaporation, promote water efficiency, and limit exposure to humans and animals.

WC4: Green Infrastructure for Stormwater Management

Strategy: Integrate green infrastructure solutions to manage and treat stormwater on-site.

Guidance:

- Incorporate drought-tolerant, low-maintenance vegetation such as sedums, native grasses, and wildflowers, paired with lightweight growing media designed for high water retention to manage stormwater effectively.
- Position rain gardens in low-lying areas to intercept runoff, using soil mixtures that offer high infiltration rates. Incorporate native, deep-rooted plants to minimize irrigation needs and optimize stormwater capture and infiltration.
- Design bioswales with gentle slopes (<4%) to slow down water flow, promoting infiltration. For steeper slopes (>4%), integrate check dams or berms to enhance water retention and sediment capture.
- Use permeable materials such as permeable concrete, asphalt, or interlocking pavers for driveways, walkways, and parking areas to enable water infiltration and reduce runoff.
- Implement systems like infiltration trenches, detention basins, or constructed wetlands to capture, store, and treat stormwater on-site, reducing the burden on municipal systems and improving water quality.
- Regularly maintain green infrastructure elements, using vacuum sweepers or pressure washers to remove sediment and debris from permeable surfaces, ensuring sustained functionality and water quality.

WC5: Water Quality Protection Measures

Strategy: Adopt measures that prevent pollution and protect local water bodies by controlling runoff and filtration.

Guidance:

- Install rainwater harvesting systems with gutters equipped with debris guards and leaf screens to prevent clogging, ensuring proper filtration and retention of water quality.
- Install oil and grease separators at high-risk locations, such as parking lots and fueling stations, positioned upstream of stormwater discharge points to capture pollutants before they enter water bodies.
- Select appropriate sediment filters based on site conditions and incorporate them with settling basins as pretreatment measures. Ensure the filters are positioned downstream of erosion-prone areas.
- Regularly inspect and clean sediment filters, especially after heavy rain, and ensure that erosion-prone areas are adequately controlled to prevent pollution from reaching water bodies.
- Establish dense vegetated buffer zones with native plants between water bodies and developed areas to stabilize soil, reduce runoff, and filter pollutants.
- Monitor vegetative buffers and other soil stabilization measures for damage from storms or erosion. Replace damaged plants and implement corrective actions to maintain water quality protection.

2.6 Materials and Waste Management (MWM)

Milwaukee County has a history of incorporating materials and waste management practices into its operations, focusing on reducing environmental impacts and promoting sustainable resource use. Past initiatives include efforts to divert construction and operational waste from landfills, implement recycling programs in County facilities, and prioritize the procurement of sustainable materials. These efforts have laid the groundwork for a more circular approach to material use and waste management.

Through these strategies, Milwaukee County seeks to reduce the environmental footprint of construction projects and operations, promote resource efficiency, and foster a culture of sustainability across the building lifecycle. These efforts align with the County's broader sustainability objectives, contributing to a circular economy where materials are reused, repurposed, and recycled, ensuring a healthier and more sustainable community for future generations.

Goal: To minimize environmental impact by using sustainable materials, promoting materials reuse and deconstruction, reducing construction and operational waste, and implementing on-site waste management systems to support adaptability and circularity throughout the building lifecycle.

Sustainability Strategies:

- MWM1: Sustainable Materials Procurement
- MWM2: Materials Reuse and Deconstruction
- MWM3: Construction and Operational Waste Diversion
- MWM4: On-Site Waste Management Systems
- MWM5: Design for Adaptability and Circularity

Project Example | Marin County, CA – Marin County's Zero Waste Marin Program

Source: https://zerowastemarin.org/

Marin County's Zero Waste Marin program exemplifies effective materials and waste management by emphasizing sustainable materials procurement, materials reuse and deconstruction, construction and operational waste diversion, on-site waste management systems, and design for adaptability and circularity. In the 2022/23 fiscal year, the Household Hazardous Waste Facility collected over 1 million pounds of materials, serving 27,577 households and 308 small quantity generators. Additionally, the Reuse Area facilitated the reuse of 38,649 pounds of materials. The program provides resources to contractors and project managers to comply with local, state, and federal regulatory requirements, promoting sustainable construction and demolition practices. By focusing on reuse and deconstruction first and providing guidance on source separation of materials at project sites, Zero Waste Marin supports the highest and best use of building materials, assisting with certifications like LEED. These efforts contribute to Marin County's goal of reducing waste and promoting recycling and composting throughout the region.

MWM1: Sustainable Materials Procurement

Strategy: Prioritize the use of environmentally responsible materials with low embodied carbon, recycled content, and third-party sustainability certifications.

Guidance:

- Develop and implement a sustainable procurement policy that includes commitments to identify and select manufacturers and/or suppliers that implement sustainable practices.
- Prioritize low embodied carbon materials (e.g., low carbon concrete, engineered wood products, biobased materials) to minimize the environmental impact over the project's lifecycle.
- Select materials with high recycled content and ensure that they have recognized sustainability certifications, such as Forest Stewardship Council (FSC) for wood, Cradle-to-Cradle for recyclable materials, and ISO 14001 for overall environmental performance.
- Source materials locally to reduce transportation emissions, decrease supply chain complexity, and support regional economies. Collaborate with local suppliers and manufacturers to enhance community sustainability.
- Implement "take-back" programs with manufacturers / suppliers to encourage recycling and reuse of materials such as carpet tiles, ceiling systems, and other building components, reducing landfill waste and promoting circular economy practices.
- Optimize material efficiency by selecting durable, long-lasting materials that require less frequent replacement, thereby reducing overall resource consumption and waste over time.

MWM2: Materials Reuse and Deconstruction

Strategy: Facilitate material reuse and recycling by designing for deconstruction and salvage to minimize construction waste.

Guidance:

- Incorporate design principles that prioritize the disassembly of buildings at the end of their life cycle, making it easier to salvage and reuse materials like wood, bricks, metals, and concrete.
- Encourage the use of modular furniture or furniture made with fasteners (no glues or adhesives), recyclable carpet tiles, demountable partitions or modular wall systems (i.e., these systems use screws, clips, or interlocking pieces that can be removed and reused in different configurations or locations, and the materials (glass, wood, metal) can also be recycled at the end of their life), wooden or plastic pallets (i.e., they can be repurposed into furniture or building materials, or recycled into new products at end of life).
- Identify and prioritize materials that can be salvaged and reused (e.g., structural components, fixtures, and finishes) to reduce waste and promote resource conservation.
- Collaborate with local salvage operations, reuse organizations, and building material exchanges to ensure the proper redistribution of recovered materials within the community.
- Provide training and certification for professionals on deconstruction methods, including the safe removal, storage, and handling of materials for reuse.

- Where feasible, integrate salvaged or upcycled materials (e.g., salvaged wood, bricks, or metals) into new construction projects, reducing the need for virgin materials and contributing to a circular economy.
- Track and document the quantity and types of materials diverted from landfills to quantify the impact and inform future projects, supporting transparency and sustainability goals.

MWM3: Construction and Demolition Waste Diversion

Strategy: Implement practices and infrastructure to divert construction and demolition waste from landfills through recycling, composting, and reuse.

Guidance:

- Establish measurable targets for waste diversion, aiming for at least 80% diversion from landfills during construction and demolition.
- Ensure that contractors, site staff, and facility managers receive training on waste diversion best practices, proper sorting, and contamination reduction. Consider recommending third-party training programs such as GPRO (Green Professional Building Skills Training) or other industry-recognized courses to build competency in sustainable construction waste management.
- Utilize software or manual tracking systems to monitor waste types, quantities, and diversion rates, ensuring ongoing measurement of progress and identification of opportunities for improvement.
- Perform detailed waste audits before starting construction to assess existing waste streams and identify key areas for diversion and reduction during construction and operations.
- Incorporate practices to maximize material reuse (e.g., deconstructing rather than demolishing) and establish on-site recycling stations for construction debris. Encourage the use of recycled materials in new building components.
- Collaborate with certified recycling and waste diversion companies to ensure materials are responsibly diverted and properly processed, minimizing contamination and maximizing the efficiency of waste streams.

MWM4: On-Site Waste Management Systems

Strategy: Establish on-site systems to manage waste sustainably, such as composting, recycling, and waste separation.

Guidance:

- Create dedicated spaces on-site for the collection, storage, and separation of various waste streams (e.g., recyclables, compostables, landfill waste), ensuring the spaces are easily accessible to all occupants and waste haulers.
- Provide well-labeled bins for different waste types, accompanied by clear signage and instructions to promote proper waste sorting, tailored to the needs of the facility.
- Develop operational waste management plans that promote recycling, composting, and minimal waste generation in building operations. Include strategies for tenant engagement and educating building occupants.

- Conduct periodic waste audits to track waste diversion rates, assess sorting accuracy, and identify opportunities for improvement in waste management practices.
- Promote practices that reduce waste generation on-site, such as purchasing in bulk, using reusable packaging, and avoiding single-use items wherever possible.
- Provide ongoing training and educational campaigns to ensure that occupants are aware of proper waste management procedures and the environmental impact of their actions.
- Set measurable goals for waste diversion (e.g., percentage of materials diverted from landfills) and report performance regularly to identify areas for improvement and recognize successes.

2.7 Occupant Health and Wellbeing (OHW)

Milwaukee County is dedicated to promoting occupant health and well-being by incorporating measures to improve indoor air quality, thermal comfort, and access to natural light across its facilities. Past efforts include retrofitting existing structures with better ventilation systems, integrating energy-efficient lighting, and improving thermal performance to create more comfortable and healthier environments for employees and visitors. These initiatives reflect the County's ongoing commitment to creating spaces that promote physical and mental health for both residents and employees.

Incorporating biophilic design elements, such as the use of natural materials, green spaces, and visual connections to nature, further enhances occupant wellness. These strategies align with the County's broader sustainability goals, creating healthy, livable spaces that prioritize the wellbeing of residents and workers while contributing to the overall resilience and sustainability of the built environment.

Goal: To promote occupant health and wellbeing by promoting good indoor air quality, thermal comfort, natural lighting, acoustic comfort, and access to drinking water, while incorporating biophilic design elements to create environments that support physical and mental health.

Sustainability Strategies:

- OHW1: Daylight and Views
- OHW2: Access to Drinking Water
- OHW3: Thermal Comfort and Zoning
- OHW4: Enhanced Ventilation and Humidity Control
- OHW5: Biophilic Design and Restorative Spaces
- OHW6: Sound Quality and Acoustic Comfort

Project Example | San Francisco, CA – San Francisco Airport Harvey Milk Terminal 1

Source: https://www.flysfo.com/hmt1

San Francisco International Airport's (SFO) Harvey Milk Terminal 1 exemplifies a commitment to occupant health and well-being through comprehensive sustainability initiatives. The terminal features dedicated spaces for exercise, yoga, and meditation, offers access to healthy, sustainable food, and connects occupants to nature with both indoor and outdoor areas. It accommodates new mothers and utilizes non-toxic cleaning products. To enhance indoor air quality, SFO implemented a green cleaning policy and adhered to the City and County of San Francisco's Green Procurement Standards. The terminal's air filtration system, designed to reduce particulate matter, VOCs, formaldehyde, and odors, includes MERV 14 filters, an ultraviolet photocatalytic oxidation filter, and a 1-inch bonded particulate structure carbon filter. Additionally, the terminal's design incorporates dynamic glazing to optimize natural lighting and thermal comfort, contributing to a healthier indoor environment. These efforts have earned the terminal LEED Platinum and WELL Building Standard Platinum certifications in 2022, underscoring its dedication to occupant health and sustainable design.

OHW1: Daylight and Views

Strategy: Maximize access to natural light and outdoor views to enhance occupant mood, productivity, and well-being.

Guidance:

- Position windows and glazing strategically to bring in natural light, and incorporate skylights, clerestories, light shelves or light wells to illuminate interior spaces deeper and more evenly, ensuring regularly occupied spaces have access to daylight.
- Consider using electrochromic or "smart glass," which can adjust its transparency or tint to control glare, heat gain, and privacy while still allowing natural light.
- Use reflective surfaces, such as light-colored walls, ceilings, and finishes, to bounce daylight further into the building. Opt for low-emissivity (low-E) glass to maintain energy efficiency without compromising daylight transmission.
- Design open floor plans or use transparent or translucent interior partitions (e.g., glass walls) to allow daylight to permeate shared and enclosed spaces while maintaining privacy as needed.
- Incorporate adjustable shading devices (e.g., blinds, louvers, external shading systems) and/or optimize window overhangs to minimize glare and reduce solar heat gain while maintaining views to the outdoors.
- Ensure that windows are positioned at appropriate heights and sizes to provide clear outdoor views for most occupants, even when seated. Where possible, design outdoor landscapes with greenery, water features, and seasonal interest to enhance the visual experience and promote biophilic connections.
- Use daylight-responsive lighting controls to balance natural and artificial lighting, optimizing energy efficiency while maintaining consistent light levels throughout the day.

OHW2: Access to Drinking Water

Strategy: Ensure convenient access to clean, potable drinking water throughout the building to promote occupant hydration and health.

Guidance:

- Install easily accessible drinking water stations (e.g., drinking water fountains / water bottle filling stations) in key areas such as lobbies, break rooms, hallways, and near restrooms and in publicly accessible areas, ensuring compliance with ADA standards for inclusivity.
- Use certified, non-toxic materials for all plumbing systems to ensure water safety and prevent contamination.
- Integrate advanced water filtration systems, such as carbon filters or reverse osmosis, to remove harmful contaminants and enhance water quality.
- Conduct regular water quality testing (e.g., quarterly) and system maintenance to monitor contaminants and ensure water remains safe and clean.
- Incorporate low-flow or motion-activated water dispensers to promote water conservation and minimize waste.

- Provide clear signage and educational materials to encourage regular hydration and raise awareness about the benefits of clean drinking water.

OHW3: Thermal Comfort and Zoning

Strategy: Provide thermal zoning and control systems to maintain comfortable indoor temperatures for different occupant needs.

Guidance:

- Implement zone-specific temperature controls with individual thermostats or smart controls, allowing occupants to adjust their environment based on personal comfort preferences.
- Incorporate systems (e.g., variable air and water systems) to optimize airflow and temperature adjustments based on occupancy levels, external weather conditions, and room-specific requirements.
- If feasible, install radiant heating and cooling systems (e.g., radiant ceilings, walls, floors, or panels), which provide more consistent thermal comfort.
- Design HVAC systems with efficient thermal zoning to balance heating and cooling loads, ensuring consistent temperature regulation across different areas of the building and supporting energy efficiency.
- Install occupancy sensors that automatically adjust temperature and ventilation settings based on room usage, reducing energy consumption when spaces are unoccupied.
- Integrate advanced building management systems (BMS) to monitor and adjust thermal comfort conditions in real time, providing data-driven insights for ongoing optimization and improving energy use without compromising occupant wellbeing.

OHW4: Enhanced Ventilation and Humidity Control

Strategy: Improve indoor air quality by implementing enhanced ventilation systems and maintaining optimal humidity levels.

Guidance:

- Design mechanical ventilation systems that go beyond the minimum requirements set by ASHRAE 62.1-2022, ensuring an adequate supply of fresh outdoor air and reducing the concentration of indoor pollutants.
- Incorporate Energy Recovery Ventilation (ERV) systems to exchange indoor and outdoor air while capturing heat or cooling energy, optimizing energy use and maintaining comfortable indoor temperatures.
- Use filters with a minimum MERV 13 rating for ventilation systems, upgrading to MERV 16 or HEPA filters for spaces with sensitive populations or high pollutant levels.
- Combine air filtration systems with energy recovery or heat recovery ventilation (ERV/HRV) to enhance both indoor air quality and energy efficiency.
- Maintain indoor relative humidity between 30-60% to reduce the risk of mold, bacteria, and allergens. Utilize dehumidifiers or humidifiers integrated into the HVAC systems to regulate moisture levels effectively.

- Install humidity sensors throughout the building to continuously monitor and adjust the levels to ensure a healthy indoor environment.
- Design buildings with strategic placement of windows and doors to facilitate natural cross-ventilation, allowing fresh air to flow freely throughout the space and reducing dependence on mechanical systems.
- Implement HVAC zoning based on occupancy and room usage, optimizing ventilation to meet specific needs while improving energy efficiency and ensuring optimal air quality in all areas.

OHW5: Biophilic Design[9] and Restorative Spaces

Strategy: Create a biophilia plan / narrative which incorporates natural elements and design features that promote relaxation, reduce stress, and support occupant mental health.

Guidance:

- Use natural materials such as wood, stone, bamboo, and clay in building elements and finishes to create tactile connections with nature and enhance visual warmth and texture.
- Install greenery like indoor plants or vertical gardens to improve indoor air quality, reduce stress, and foster a strong visual connection to the natural world.
- Create green roofs with diverse vegetation to promote biodiversity, reduce the urban heat island effect, and provide accessible outdoor spaces for relaxation and mindfulness.
- Integrate shapes, textures, and patterns that mimic natural forms (e.g., flowing water, tree canopies, organic shapes) in furniture, finishes, and architectural details to evoke a sense of nature.
- Add natural water elements such as fountains, small streams, or reflective pools to promote tranquility, improve air quality, and encourage moments of relaxation.
- Ensure biophilic elements are sensitive to the local climate, flora, and fauna, while also reflecting cultural values and traditions related to nature, fostering a sense of place and belonging.

OHW6: Sound Quality and Acoustic Comfort

Strategy: Design spaces with appropriate acoustic treatments to minimize noise pollution and enhance occupant comfort.

Guidance:

- Incorporate carpets, rugs, and acoustic wall panels with high sound absorption properties to reduce noise levels and control reverberation.
- Use specialized ceiling tiles and wall panels designed for sound absorption to minimize echoes and improve room acoustics.
- Strategically separate high-noise areas (e.g., kitchens, mechanical rooms) from quieter spaces (e.g., meeting rooms, lounges) with buffer zones or sound barriers to enhance comfort. Stagger door alignments down hallways to minimize noise trespass between spaces.

[9] Biophilic design is an architectural approach that incorporates natural elements (e.g., sunlight, plants) into buildings to improve the health and wellbeing of people.

- Implement white noise systems or ambient soundscapes in open-plan offices and shared spaces to improve privacy and reduce distractions.
- Choose HVAC equipment that operates quietly to avoid disruptive sounds that can negatively impact occupant comfort and acoustic quality (e.g., 55dB, max.).
- Install noise monitoring systems to continuously track and adjust sound levels in real-time, ensuring compliance with acoustic comfort standards.
- Use strategic placement of furniture, partitions, and plants to absorb and deflect sound, minimizing unwanted noise in collaborative or quiet zones.

2.8 Education and Community Engagement (ECE)

Milwaukee County has a strong foundation in promoting sustainability through education and community engagement, with efforts guided by tools like the County's Community Engagement Toolkit. This toolkit has been instrumental in ensuring that public participation is inclusive, transparent, and meaningful across various County initiatives. Past efforts include hosting educational workshops, community listening sessions, sustainability-focused public events, and outreach programs such as online surveys that encourage residents to actively participate in shaping the County's environmental strategies.

By incorporating sustainable design elements that promote environmental stewardship, the County seeks to inspire a sense of responsibility and connection to the environment. These efforts not only build awareness but also strengthen the community's role in shaping a more sustainable and resilient region, reinforcing Milwaukee County's commitment to long-term environmental, social, and economic sustainability.

Goal: To foster community engagement and sustainability awareness by providing interactive educational elements and community-focused features into building design, facilitating public participation, and incorporating sustainable design elements that promote environmental stewardship and inspire collective action.

Sustainability Strategies:

- ECE1: Interactive Signage and Displays
- ECE2: Community Workshops and Tours
- ECE3: Community Feedback Mechanisms
- ECE4: Public Art with Sustainability Themes

Project Example | St. Louis Park, MN – The Westwood Hills Nature Center

Source: https://www.stlouisparkmn.gov/government/departments-divisions/parks-rec/westwood-hills-nature-center

The Westwood Hills Nature Center in St. Louis Park, Minnesota, exemplifies sustainable building design by integrating educational and community-oriented elements. Serving as a teaching tool, the center features interactive signage and displays that educate visitors on energy efficiency and stormwater management. It offers community workshops and tours, providing hands-on learning experiences about Minnesota's landscape and wildlife. Public spaces are designed to encourage informal gatherings, fostering community engagement, and accessible restrooms, seating areas, and braille wayfinding signage enhance usability. Art installations with sustainability themes are incorporated into the design, enriching the visitor experience. Additionally, the center has established educational partnerships with the local school district, integrating its exhibits into STEM curricula to reach a diverse audience.

ECE1: Interactive Signage and Displays

Strategy: Highlight sustainability features with interactive signage and displays.

Guidance:

- Place digital kiosks or interactive displays in highly visible and accessible locations, such as building lobbies or public gathering areas, to maximize engagement. Ensure the design is intuitive, durable, and sustainably sourced.
- Display real-time metrics (e.g., energy usage, water consumption, renewable energy generation) alongside historical data and trends. Use visually engaging comparisons to demonstrate performance improvements and regularly update the data (e.g., weekly).
- Ensure displays and signage are inclusive by offering content in multiple languages and providing accessibility features such as text-to-speech options, visual aids, and high-contrast design for users with visual impairments.
- Use touch-screen interfaces, augmented reality (AR), and/or gamification features (e.g., quizzes or challenges) to educate users about sustainability systems like solar panels or rainwater harvesting in an engaging, hands-on way.
- Complement digital displays with static signage made from durable, sustainably sourced materials. Include concise explanations and diagrams of key features (e.g., green roofs, energy-efficient systems), and add QR codes linking to online resources, virtual tours, or deeper content.
- Allow visitors to provide feedback via kiosks or digital forms, such as rating sustainability initiatives or suggesting additional improvements. Display aggregated feedback periodically to show how community input informs future updates.

ECE2: Community Workshop and Tours

Strategy: Offer guided tours and hands-on workshops to engage the community in sustainable design practices and building operations.

Guidance:

- Organize open houses and guided tours to engage the community. These events can be scheduled monthly, quarterly, or annually to maintain continuous engagement and education.
- Tailor events to accommodate different community demographics, including families, schools, businesses, and local organizations.
- Integrate demonstrations of sustainable technologies such as solar panels, rainwater harvesting systems, green roofs, and energy-efficient appliances into events.
- Partner with local community groups, schools, and organizations to help organize and promote events.
- Provide information and event materials in multiple languages to ensure accessibility for all community members.

ECE3: Community Feedback Mechanisms

Strategy: Implement systems that allow for continuous community input on building design and operations to improve sustainability outcomes as per the County's Community Engagement Toolkit.

Guidance:

- Implement a variety of feedback mechanisms (e.g., surveys, suggestion boxes, focus groups, and public meetings), ensuring they are available both in-person and online to capture broad community input on sustainability priorities.
- Develop user-friendly, mobile-compatible platforms (e.g., surveys, interactive apps, and a centralized website) to gather feedback and share updates on sustainability initiatives. Enhance engagement using social media tools like polls, posts, and live sessions.
- Ensure all feedback channels are accessible to people with disabilities by offering multiple options, such as audio-enabled surveys, large-print materials, and ensuring that physical venues are accessible for all participants.
- Use real-time feedback opportunities during key project phases, such as construction and post-occupancy evaluations. Establish continuous, open feedback loops to promote long-term community involvement in building operations.
- Build trust by regularly demonstrating how community feedback has influenced decisions. Publish summaries, reports, or visual dashboards that highlight key insights and outline specific actions taken as a result of input received.
- Conduct targeted outreach to engage historically underrepresented groups, including low-income residents, youth, and minority communities, to ensure diverse perspectives are reflected in sustainability planning and outcomes.

ECE4: Public Art with Sustainability Themes

Strategy: Integrate public art installations that convey sustainability themes and inspire environmental stewardship.

Guidance:

- Encourage art installations that communicate pressing environmental issues such as climate change, biodiversity loss, pollution, and energy conservation. These can raise public awareness and inspire action toward sustainability.
- Develop art that resonates with the local community by integrating regional environmental concerns, cultural heritage, or prominent natural features. This ensures relevance and fosters a stronger connection between the public and the artwork.
- Promote art pieces that serve both aesthetic and practical purposes. Examples include sculptures that harvest rainwater, solar-powered kinetic art, or interactive installations that demonstrate renewable energy principles.
- Include plants, moss, or other living components in public art to promote biodiversity, improve air quality, and create visually engaging green spaces within urban environments.

- Partner with local artists, community organizations, and businesses that prioritize sustainability to co-sponsor and co-create art installations. This fosters broad community engagement and ensures long-term stewardship of the art.
- Design installations that provide educational opportunities, such as accompanying interpretive signage, digital guides, or augmented reality experiences. These elements can help the public learn about sustainability concepts in an engaging way.

3. Implementation Process

This section details the SDS implementation process and builds on section 2.4 Governance. The implementation of the standards follows a process across **three key phases:**

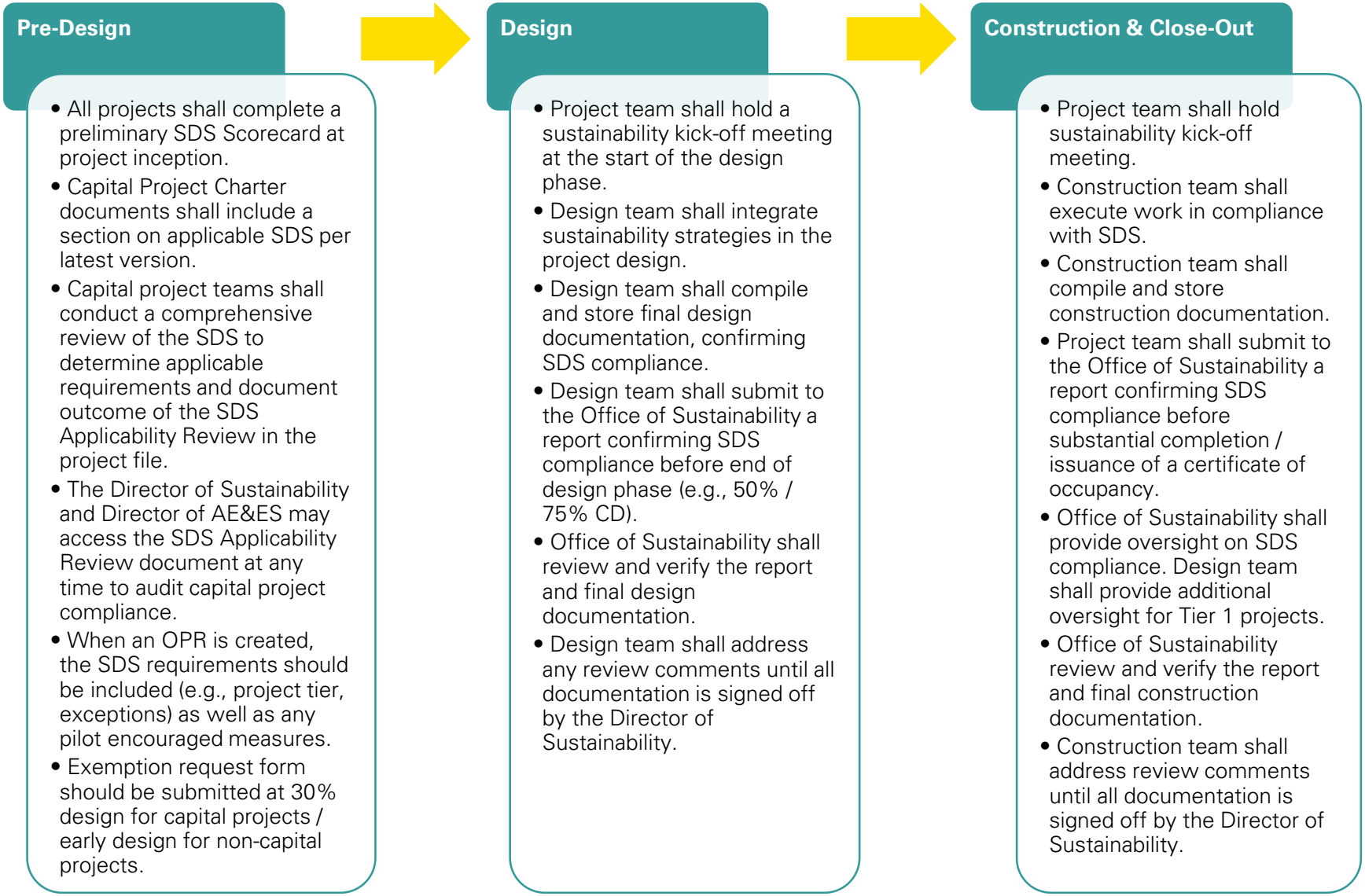
1. **Pre-Design**
2. **Design**
3. **Construction and Close-Out**

Project teams are expected to ensure the standards are implemented through each phase, with each phase including specific actions and documentation requirements to ensure full compliance with the standards. The standards are designed to be a living document, evolving over time to reflect new developments and insights. An implementation workflow diagram is provided on the next page to outline the required actions at each project stage, helping project teams effectively integrate the standards.

In addition to these steps, the SDS will be piloted on the County's Investing in Justice: Courthouse Complex (IJCC) project, which is currently in the early design phase. This pilot project will serve as a testing ground for refining and enhancing the standards as they are implemented on future County projects.

This structured process ensures that sustainability is prioritized at each stage, with ongoing review and verification to ensure full compliance with the County's sustainability goals.

Figure 2. Implementation Workflow



4. Vision Forward

The vision for sustainability in Milwaukee County will continue to evolve as the County strengthens its commitment to building a healthier, more sustainable community in the years ahead. In alignment with the County's broader sustainability and climate goals, future initiatives will focus on further integrating sustainability into both the built environment and County operations. This includes enhancing the SDS to incorporate emerging best practices, innovative technologies, and the latest climate science to support the County's ambitious goal of achieving net zero carbon emissions by 2050. Encouraged measures (Better / Best) will be piloted to help the County test applicability and lessons learned for potential incorporation in future versions of the standards.

The County will also prioritize ongoing stakeholder engagement to ensure the SDS remains responsive to community needs and evolving sustainability priorities. To maintain the relevance and effectiveness of the standards, the SDS will be reviewed and updated regularly, with formal revisions planned at a minimum every four years. The process will include a cycle of performance evaluations, feedback loops, and stakeholder reporting, ensuring continuous improvement. This evaluation process will assess the success of sustainability strategies and compliance, integrating feedback to refine standards, track progress, and identify opportunities for further innovation.

In the coming years, Milwaukee County will continue to lead by example, strengthening its sustainability vision and working collaboratively with its stakeholders to foster a thriving, resilient, and equitable community. The ongoing evolution of the SDS will help to ensure that the County's projects and initiatives remain aligned with its sustainability objectives, contribute to environmental justice, and support the health and well-being of all residents.

The Sustainable Design Standards were prepared by AECOM (NYSE: ACM), the global infrastructure leader, committed to delivering a better world.

AECOM

Appendix A. **Exemption Request** Form

Sustainable Design Standards Scorecard (SDS) - Exemption Request Form

To be used in conjunction with the Milwaukee County Sustainable Design Standards (SDS)

Project:	
Project Address:	
Project #:	
Project Size (ft^2):	
Project Cost ($):	
Date Created:	
Completed By (include email):	

The Sustainable Design Standards (SDS) include minimum requirements which are applicable for all County new construction, renovation, and replacement projects unless specific exception request is granted. This form shall be submitted to the Office of Sustainability as a request to deviate from the SDS.

NOTE: Any deviation from the SDS will need written approval from Director of Sustainability, Director of AE&ES, Director of Facilities Management (FMD), and the Executive Director of the Department of Administrative Services (DAS).

Reference to Standard:

SDS version number referenced	
Section of SDS which exception is requested	
Brief explanation for standard deviations	

Description of Exemption Request / Proposed Alternative:

Provide detailed description below:

To be completed by requesting Department Director	
It is acknowledged that this exemption may affect the department's emissions reduction goals. However, the potential impact has been thoroughly assessed and deemed necessary.	
SIGNATURE / DATE	

To be completed by Office of Sustainability	
APPROVED / NOT APPROVED	
SIGNATURE / DATE (Director of Sustainability)	
SIGNATURE / DATE (Director of AE&ES)	
COMMENTS	

Appendix B. SDS Scorecards

Sustainable Design Standards (SDS) Scorecard - TIER 1

To be used in conjunction with the Milwaukee County Sustainable Design Standards (SDS)

Project Name:	
Project Address:	
Project #:	
Project Size (ft²):	
Project Cost ($):	
Project Stage:	
Completed by (include email):	
Date Completed:	
	Tier 1 Only: Building Energy Use Intensity (EUI) (kBtu/ft²/yr)
	Tier 1 Only: Solar PV Generation Capacity (kW)
	Tier 1 Only: Solar - Total Building Annual Energy (%)

Focus Area	Sustainability Strategy (see SDS for full requirements)	Required		Optional	N/A	Exempt	Compliance Narrative (include details of going beyond mandatory requirements such as best practices listed and N/A items)
		Mand.	Better	Best			
Energy Efficiency	High-Performance Building Envelope	☐	5% better ☐	☐	☐	☐	
	Energy-Efficient HVAC Systems	☐	5% better ☐	10% better ☐	☐	☐	
	Efficient Lighting Systems	☐	10% better ☐	15% better ☐	☐	☐	
Emissions and Pollution Control	Building Electrification	☐	☐	☐	☐	☐	
	Renewable Energy	☐	☐	Net-zero energy ☐	☐	☐	
	Embodied Carbon Assessment	☐	☐	☐	☐	☐	
	Electric Vehicles	☐	10% EV-ready ☐	10% EVSE ☐	☐	☐	
	Low-Carbon Construction Practices	☐	☐	☐	☐	☐	
	Construction Pollution Management	☐	☐	☐	☐	☐	
	Refrigerant Management	☐	☐	☐	☐	☐	
	Low-Emitting Materials	☐	20 materials ☐	All materials ☐	☐	☐	
Climate Resilience and Adaptation	Climate Change Vulnerability Assessment	☐	☐	☐	☐	☐	
	Resilient Site Design	☐	☐	☐	☐	☐	
	Climate-Adaptive Building Design	☐	☐	☐	☐	☐	
	Emergency Preparedness and Critical Buildings Redundancy	☐	☐	☐	☐	☐	
	Nature-Based Solutions for Resilience	☐	☐	☐	☐	☐	
Site	Context-Sensitive Site Planning	-	-	☐	-	-	
	Proximity to Public Transit and Active Transportation	-	-	☐	-	-	
	Enhanced Air Quality and Noise Management	-	-	☐	-	-	
	Urban Heat Island Mitigation	-	-	☐	-	-	
	Community Integration and Public Access	-	-	☐	-	-	
	Biodiversity and Habitat Preservation	-	-	☐	-	-	
Water Conservation and Stormwater Management	Water-Efficient Fixtures and Systems	-	-	☐	-	-	
	Smart Irrigation and Landscaping	-	-	☐	-	-	
	Alternative Water Use Systems	-	-	☐	-	-	
	Green Infrastructure for Stormwater Management	-	-	☐	-	-	
	Water Quality Protection Measures	-	-	☐	-	-	
Materials and Waste Management	Sustainable Materials Procurement	-	-	☐	-	-	
	Materials Reuse and Deconstruction	-	-	☐	-	-	
	Construction and Operational Waste Diversion	-	-	☐	-	-	
	On-Site Waste Management Systems	-	-	☐	-	-	
	Design for Adaptability and Circularity	-	-	☐	-	-	
Occupant Health and Wellbeing	Daylight and Views	-	-	☐	-	-	
	Access to Drinking Water	-	-	☐	-	-	
	Thermal Comfort and Zoning	-	-	☐	-	-	
	Enhanced Ventilation and Humidity Control	-	-	☐	-	-	
	Biophilic Design and Restorative Spaces	-	-	☐	-	-	
	Sound Quality and Acoustic Comfort	-	-	☐	-	-	
Education and Community Engagement	Interactive Signage and Displays	-	-	☐	-	-	
	Community Workshops and Tours	-	-	☐	-	-	
	Community Feedback Mechanisms	-	-	☐	-	-	
	Public Art with Sustainability Themes	-	-	☐	-	-	

Sustainable Design Standards (SDS) Scorecard - TIER 2

To be used in conjunction with the Milwaukee County Sustainable Design Standards (SDS)

Project Name:	
Project Address:	
Project #:	
Project Size (ft²):	
Project Cost ($):	
Project Stage:	
Completed by (include email):	
Date Completed:	

Focus Area	Sustainability Strategy (see SDS for full requirements)	Required	Optional		N/A	Exempt	Compliance Narrative (include details of going beyond mandatory requirements such as best practices listed and N/A items)
		Mand.	Better	Best			
Energy Efficiency	High-Performance Building Envelope	☐	5% better ☐	☐	☐	☐	
	Energy-Efficient HVAC Systems	☐	5% better ☐	10% better ☐	☐	☐	
	Efficient Lighting Systems	☐	10% better ☐	15% better ☐	☐	☐	
	Building Automation and Energy Management Systems	☐	☐	☐	☐	☐	
	High-Efficiency Equipment and Appliances	☐	☐	20% better ☐	☐	☐	
	Demand Response and Load Management	☐	☐	10% better ☐	☐	☐	
	Electric Vehicles	☐	10% EV-ready ☐	10% EVSE ☐	☐	☐	
	Low-Carbon Construction Practices	☐	☐	☐	☐	☐	
	Construction Pollution Management	☐	☐	☐	☐	☐	
	Refrigerant Management	☐	☐	☐	☐	☐	
	Low-Emitting Materials	☐	20 materials ☐	All materials ☐	☐	☐	
Climate Resilience and Adaptation	Climate Change Vulnerability Assessment	☐	☐	☐	☐	☐	
	Resilient Site Design	☐	☐	☐	☐	☐	
	Climate-Adaptive Building Design	☐	☐	☐	☐	☐	
	Emergency Preparedness and Critical Buildings Redundancy	☐	☐	☐	☐	☐	
	Nature-Based Solutions for Resilience	☐	☐	☐	☐	☐	
Site	Context-Sensitive Site Planning	-	-	☐	-	-	
	Proximity to Public Transit and Active Transportation	-	-	☐	-	-	
	Enhanced Air Quality and Noise Management	-	-	☐	-	-	
	Urban Heat Island Mitigation	-	-	☐	-	-	
	Community Integration and Public Access	-	-	☐	-	-	
	Biodiversity and Habitat Preservation	-	-	☐	-	-	
Water Conservation and Stormwater Management	Water-Efficient Fixtures and Systems	-	-	☐	-	-	
	Smart Irrigation and Landscaping	-	-	☐	-	-	
	Alternative Water Use Systems	-	-	☐	-	-	
	Green Infrastructure for Stormwater Management	-	-	☐	-	-	
	Water Quality Protection Measures	-	-	☐	-	-	
Materials and Waste Management	Sustainable Materials Procurement	-	-	☐	-	-	
	Materials Reuse and Deconstruction	-	-	☐	-	-	
	Construction and Operational Waste Diversion	-	-	☐	-	-	
	On-Site Waste Management Systems	-	-	☐	-	-	
	Design for Adaptability and Circularity	-	-	☐	-	-	
Occupant Health and Wellbeing	Daylight and Views	-	-	☐	-	-	
	Access to Drinking Water	-	-	☐	-	-	
	Thermal Comfort and Zoning	-	-	☐	-	-	
	Enhanced Ventilation and Humidity Control	-	-	☐	-	-	
	Biophilic Design and Restorative Spaces	-	-	☐	-	-	
	Sound Quality and Acoustic Comfort	-	-	☐	-	-	
Education and Community Engagement	Interactive Signage and Displays	-	-	☐	-	-	
	Community Workshops and Tours	-	-	☐	-	-	
	Community Feedback Mechanisms	-	-	☐	-	-	
	Public Art with Sustainability Themes	-	-	☐	-	-	