

# Sustainable Infrastructure and Climate Resilience Initiative

**Applicant Organization:** Metro Regional Planning Authority

**Funding Request:** \$5,000,000

**Project Period:** 48 months

## Executive Summary

Metro Regional Planning Authority proposes a comprehensive sustainable infrastructure program to retrofit 15 public facilities with green building technologies, enhance climate resilience, and reduce greenhouse gas emissions by 45% across our municipal portfolio.

This initiative directly responds to Executive Order 14102 requirements for sustainable infrastructure development, incorporating climate risk assessments, energy efficiency measures, and environmental justice considerations. Our program will serve as a regional model for climate adaptation while creating 250 green jobs and providing workforce training opportunities.

Project outcomes include: net-zero energy consumption in 10 facilities, 35% water use reduction, 3 million gallons annual stormwater capture, and improved air quality benefiting 45,000 residents in disadvantaged communities.

## Climate Resilience Assessment

**Regional Climate Vulnerabilities:** - Increased frequency of extreme heat events (15 days above 100°F annually, up from 3 days historically) - Intensified storm events with 40% increase in 100-year flood zone areas - Projected 25% reduction in water supply reliability by 2040 - Urban heat island effect raising temperatures 8-12°F in disadvantaged communities

**Climate Risk Analysis:** We conducted comprehensive climate modeling using NOAA and state climate data, projecting impacts through 2050. Key findings: - Current facilities at risk: 8 in flood zones, 12 lacking adequate cooling capacity - Infrastructure damage costs from extreme weather: \$2.3M in past 5 years - Energy costs increased 35% due to cooling demands - Water scarcity threatening facility operations

Adaptation Strategies: - Passive cooling design reducing heat exposure - Elevated infrastructure in flood-prone areas - Rainwater harvesting and storage systems - Drought-resistant landscaping and bioswales - Backup power systems with renewable energy integration

All design modifications align with latest climate science and regional adaptation plans.

## Energy Efficiency and Renewable Energy Plan

Baseline and Targets: Current annual energy consumption: 25 million kWh Target reduction: 45% (exceeding EO 14102 requirement of 30%) Projected post-retrofit consumption: 13.75 million kWh Net-zero facilities: 10 of 15 buildings

Energy Efficiency Measures:

1. Building Envelope Improvements - High-performance insulation (R-38 roof, R-21 walls) - Triple-pane windows with low-E coating - Air sealing reducing infiltration by 60% - Cool roof technology reflecting 85% of solar radiation Estimated savings: 8 million kWh annually
2. HVAC System Upgrades - High-efficiency heat pumps (SEER 20+) - Advanced building automation systems - Demand-controlled ventilation - Energy recovery ventilators Estimated savings: 5 million kWh annually
3. Lighting and Controls - LED lighting throughout (95% of fixtures) - Occupancy sensors and daylight harvesting - Smart controls with scheduling Estimated savings: 2.5 million kWh annually
4. Renewable Energy Generation - Solar PV arrays (2.5 MW total capacity) - Battery storage systems (1.5 MWh) - Grid-tied with net metering - Microgrids for critical facilities Generation offset: 3.25 million kWh annually

Energy modeling completed using DOE-2 software, certified by licensed engineers.

## Sustainable Materials and Construction

Material Selection Criteria: - Recycled content minimum 30% - Regional materials within 500 miles (75% by value) - Low-VOC emissions meeting SCAQMD standards - FSC-certified wood products - Rapidly renewable materials where feasible

Construction Waste Management: - Diversion target: 85% from landfills - On-site sorting and separation - Material reuse prioritized over recycling - Deconstruction rather than demolition where feasible

Circular Economy Approach: - Material life-cycle assessments - Design for disassembly principles - Salvaged materials integration - Regional material exchange partnerships

Carbon Footprint: - Embodied carbon assessment for all major materials - Low-carbon concrete (40% Portland cement replacement) - Steel with minimum 90% recycled content - Avoided emissions: 12,000 metric tons CO<sub>2</sub>e

Green Building Certification: Targeting LEED Gold minimum for all facilities, with 5 facilities pursuing LEED Platinum.

## Water Conservation and Management

Water Efficiency Targets: Baseline consumption: 15 million gallons annually Target reduction: 35% Projected consumption: 9.75 million gallons annually

Indoor Water Conservation: - High-efficiency toilets (1.28 gpf maximum) - Sensor-activated faucets (0.5 gpm) - Waterless urinals - Energy Star dishwashers and washing machines Indoor savings: 3.5 million gallons annually

Outdoor Water Conservation: - Drip irrigation systems with smart controllers - Native and drought-tolerant landscaping - Mulching and soil amendments - Turf reduction (60% across all sites) Outdoor savings: 1.75 million gallons annually

Stormwater Management: - Bioretention basins capturing first-flush runoff - Permeable paving (45,000 square feet) - Green roofs (25,000 square feet) - Rainwater harvesting (12 cisterns, 150,000-gallon total capacity) - Annual capture: 3 million gallons for irrigation reuse

Water Quality Benefits: - Reduced urban runoff pollution - Groundwater recharge enhancement - Stream temperature mitigation - Habitat improvement for local waterways

## Environmental Justice and Community Benefits

Disadvantaged Community Impact Analysis: Project area demographics: 65% low-income, 78% people of color Environmental burdens: Poor air quality (PM2.5 exceeding EPA standards 45 days/year), urban heat island, limited green space

Community Engagement Process: - 12 community meetings conducted in multiple languages - Youth advisory committee (25 high school students) - Door-to-door surveys (1,200 residents) - Partnership with 8 community-based organizations - Tribal consultation with local indigenous communities

Direct Community Benefits:

1. Air Quality Improvement - Reduced emissions equivalent to removing 450 vehicles - Enhanced urban tree canopy (500 trees planted) - VOC reduction from green materials - Projected health benefits: \$2.8M in avoided respiratory illness costs
2. Heat Island Mitigation - Cool roofs and surfaces reducing ambient temperature 3-5°F - Shade trees along pedestrian corridors - Community cooling centers in retrofitted facilities - Reduced heat-related emergency room visits (projected 35% decrease)
3. Green Space Access - Rain gardens and bioswales creating neighborhood amenities - Community gardens integrated into 4 sites - Educational programming on sustainable practices

4. Economic Benefits - 250 construction jobs (75% local hiring commitment) - 15 permanent facility operations positions - Workforce training in green building trades (150 participants) - Reduced utility costs allowing enhanced community services

Environmental Justice Commitments: - No displacement of current residents or businesses - Improved facility accessibility for disabled community members - Bilingual signage and educational materials - Community oversight committee throughout project

## Budget and Funding

Total Project Cost: \$5,000,000

Construction and Retrofit (72%): \$3,600,000 - Building envelope improvements: \$850,000 - HVAC system upgrades: \$925,000 - Lighting and controls: \$275,000 - Solar PV installation: \$875,000 - Battery storage: \$325,000 - Water conservation measures: \$350,000

Planning and Design (15%): \$750,000 - Architectural and engineering services - Energy modeling and analysis - Environmental assessments - Commissioning services - LEED certification fees

Community Benefits (10%): \$500,000 - Workforce training program - Community engagement and education - Green space enhancements - Public art integration

Project Management (3%): \$150,000 - Staff coordination - Monitoring and reporting - Quality assurance

Cost-Benefit Analysis: - Annual energy savings: \$465,000 - Annual water savings: \$87,000 - Avoided climate damage costs: \$325,000 - Total annual savings: \$877,000 - Simple payback period: 5.7 years - 30-year NPV (3% discount): \$18.2 million

Leveraged Funding: - State energy efficiency rebates: \$450,000 - Utility incentive programs: \$275,000 - Local matching funds: \$500,000 - In-kind contributions: \$125,000

## Monitoring and Verification

Performance Monitoring Systems:

1. Energy Management - Real-time building energy monitoring - Sub-metering by system and end-use - Automated fault detection and diagnostics - Monthly energy reports with variance analysis
2. Water Monitoring - Smart water meters with leak detection - Irrigation controller weather integration - Stormwater flow monitoring - Quarterly water audits
3. Indoor Environmental Quality - CO<sub>2</sub> sensors in occupied spaces - Temperature and humidity monitoring - Occupant comfort surveys (quarterly) - IAQ testing (semi-annual)
4. Renewable Energy Production - Solar generation tracking - Battery performance monitoring - Grid interaction analysis

Verification Protocols: - IPMVP (International Performance Measurement & Verification Protocol) compliance - Third-party commissioning for all major systems - Annual energy audits - LEED performance period documentation

Reporting: - Monthly dashboard updates (public-facing) - Quarterly reports to funding agency - Annual comprehensive performance report - Community presentations (bi-annual) - Case study development for regional replication

Adaptive Management: - Performance review meetings (quarterly) - Corrective action protocols - Continuous improvement process - Lessons learned documentation