CHAPTER 02

ENERGY, WATER, AND THE BUILT ENVIRONMENT

THE CITY OF LAKEWOOD and its residents recognize the role of energy, water, and the built environment in fostering a vibrant and sustainable community. Lakewood's residents envision a collective future where low-impact development, renewable energy sources, and resource-efficient buildings protect local ecosystems, enhance water quality, reduce man-made greenhouse gas emissions, and ensure energy availability and affordability.

GOALS

- Ensure affordable energy for Lakewood while transitioning to renewable energy sources.
- Significantly enhance resource efficiency in Lakewood buildings.
- Encourage development in Lakewood that values the natural environment and supports public health and community cohesion.

TARGETS

- Generate 45 percent of municipal energy from renewable sources by 2025.
- Generate 45 percent of residential energy from renewable sources by 2025.
- Generate 45 percent of commercial and industrial energy from renewable sources by 2025.
- Reduce municipal building and facility energy use intensity by 30 percent by 2025.*
- Reduce citywide building** energy use intensity by 20 percent by 2025†.
- Reduce citywide water use by 20 percent by 2025†.
- Increase the percentage of certified†† green buildings (new construction and renovations receiving occupancy permits) each year from 2015 to 2025.

* Baseline: 2008–2010 normalized data
** Includes resource use for the entire site
† Baseline: 2007
†† Certifications systems include Green Globes, USGBC LEED, and Living Building Challenge

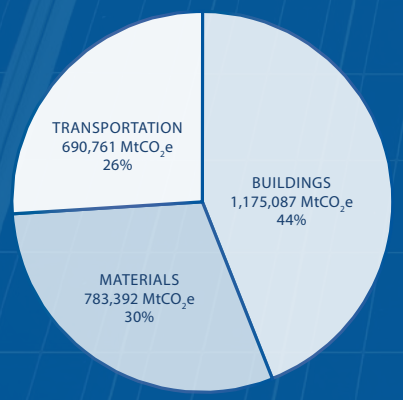
ENERGY, WATER, THE BUILT ENVIRONMENT: GREENHOUSE GAS EMISSIONS REDUCTION POTENTIAL

BASELINE		
EMISSIONS BY SECTOR – MT CO_2E		
BUILDINGS	1,175,087	44%
MATERIALS	783,392	30%
TRANSPORTATION	690,761	26%
TOTAL GHG	**2,649,240**	**100%**

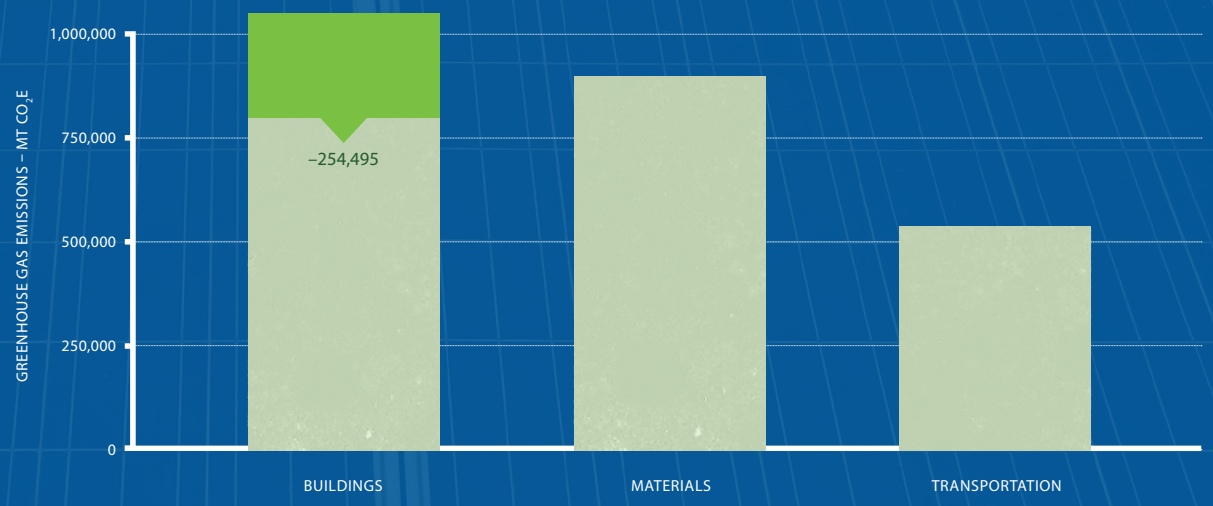
2025 BUSINESS AS USUAL (BAU)			
EMISSIONS BY SECTOR – MT CO_2E			CHANGE
BUILDINGS	1,053,368	42%	– 121,719
MATERIALS	903,600	36%	+ 120,209
TRANSPORTATION	539,165	22%	– 151,596
TOTAL GHG	**2,496,133**	**100%**	**–153,107**

2025 AFTER ENERGY, WATER, AND THE BUILT ENVIRONMENT STRATEGIES ARE IMPLEMENTED			
EMISSIONS BY SECTOR – MT CO_2E			CHANGE
BUILDINGS	798,873	36%	– 254,495
MATERIALS	903,600	40%	0
TRANSPORTATION	539,165	24%	0
TOTAL GHG	**2,241,638**	**100%**	**– 254,495**

2007 BASELINE EMISSION BREAKDOWN



IMPACT OF ENERGY, WATER, AND THE BUILT ENVIRONMENT STRATEGIES ON 2025 BUSINESS AS USUAL (BAU)



ENERGY AFFECTS EVERYONE.

IT POWERS OVER 65,000 Lakewood homes and 14,000 Lakewood businesses.[1] As Lakewood continues to grow, so does our reliance on nonrenewable resources. Currently, our nation gets 90 percent of its energy from nonrenewable sources. Over 80 percent of those are fossil fuels,[2] which include petroleum, natural gas, and coal. In Colorado, 56 percent of our energy comes from coal, which releases CO_2 emissions, smog, acid rain, and other toxic air pollutions.

Conserving energy and transitioning to renewable energy sources provide an enormous opportunity for reducing greenhouse gas emissions. The energy supply sector is the largest contributor to global emissions, comprising 35 percent[3] of total man-made emissions, and is the main contributor to the growth of emissions over the past 20 years due to increasing demands of energy use and the high share of fossil fuels in global and local fuel mixes.

In order to address energy, we must turn our focus to the built environment. Buildings are responsible for 44 percent of Lakewood's greenhouses gases, making it the largest contributing sector. If business continues as usual, with minor increases in building efficiency, U.S. building energy use is projected to increase by 30 percent.[3] By investing in a resource-efficient built environment with clean energy sources, we can reduce greenhouse gas emissions, increase our energy security, and add high-quality buildings to our community.

Our built environment also plays a large role in water use and water quality. The building sector is responsible for 12 percent of total water use in the U.S.,[4] widening the gap between our water supply and water demand. In Colorado, even with the completion of proposed water projects, projected 2050 shortfalls could total more than 500,000 acre-feet statewide.[5]

By investing in a resource efficient built environment with clean energy sources, we can reduce greenhouse gas emissions and add high-quality buildings to our community.

[1] U.S. Census Bureau. "State and County QuickFacts." Last Revised: December 4, 2014. http://quickfacts.census.gov/qfd/states/08/0843000.html.

[2] U.S. Energy Information Administration. "What are the major sources and users of energy in the United States?" Last Updated: May 30, 2014. http://www.eia.gov/energy_in_brief/article/major_energy_sources_and_users.cfm.

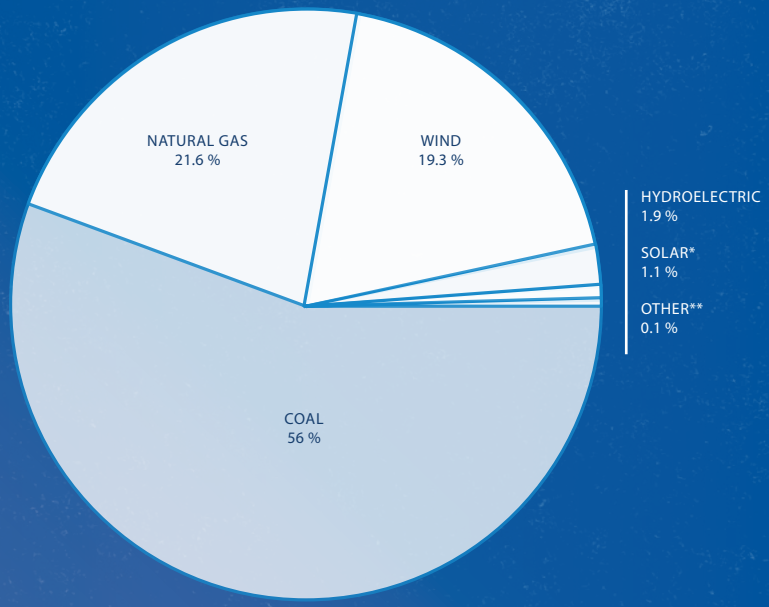
[3] U.S. Energy Information Administration. Annual Energy Outlook. Washington DC: U.S. Energy Information Adminstration.

[4] McGraw Hill Construction. "Green Outlook 2011: Green Trends Diving Growth. 2010." http://aiacc.org/wp-content/uploads/2011/06/greenoutlook2011.pdf.

[5] Colorado Water Conservation Board. "SWSI 2010 Mission Statement, Key Findings, and Recommendations. 2011." http://cwcb.state.co.us/water-management/water-supply-planning/documents/swsi2010/swsi2010factsheet.pdf.

WHERE DOES LAKEWOOD GET ITS ENERGY?

Public Service Company of Colorado (Xcel) Energy Mix



*Includes solar energy generated by customer-owned systems through Solar Rewards.
**Includes purchased biomass, oil, and nuclear power.

Our existing built environment also affects water quality. As our city developed and natural landscapes were replaced with buildings and pavements, the ability of our landscapes to absorb rainwater decreased, increasing demand for irrigation and vulnerability to flooding.

These issues are further exacerbated by our changing climate. Future warming is projected to cause early snowmelt and runoff and increase water demand for irrigation of crops, landscaping, and natural vegetation.[6] These changes not only affect water availability, but could also increase the concentration of pollutants flowing through our water. Moving forward we need to design and construct our built environment to reduce consumption, protect water quality, and reduce our vulnerability to climate change.

TRENDS AND OPPORTUNITIES

RENEWABLE ENERGY

Renewable energy opportunities are exploding across the nation. New technology and policies are enabling the construction of renewable energy generation facilities, including solar, wind, hydropower, biomass, and geothermal. In addition, many industries are transitioning to the use of natural gas, which produces half as much[7] carbon dioxide as coal-fired generation.

In order to keep up with this development, we must ensure our infrastructure has the capacity for alternative energy generation and transmission. A 2008 study from the National Renewable Energy Laboratory found that only 22–27 percent of residential rooftop area is suitable for hosting an on-site solar photovoltaic system. This has two implications: First, we must ensure future buildings and sites are capable of hosting and advancing renewable energy generation and distribution. Second, we must find alternative options for those who cannot access renewable

[6] Jeff Lukas, et al. "Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation." University of Colorado Boulder, 2014. http://wwa.colorado.edu/climate/co2014report/Exec_Summary_Climate_Change_CO_Report_2014_FINAL.pdf.

[7] U.S. Environmental Protection Agency. "Natural Gas." Last Updated: September 25, 2013. http://www.epa.gov/cleanenergy/energy-and-you/affect/natural-gas.html.

SUSTAINABLE BUILT ENVIRONMENT

Eighty percent of Lakewood homes were built before 2000, presenting an enormous opportunity for energy and cost savings through retrofits.

energy. One alternative is a community sharing model, which allows people to pool their resources into a shared system that delivers financial payback and educational value.

RESOURCE EFFICIENCY

Energy and water efficiency upgrades are one of the simplest and most effective ways to conserve resources, save money, and reduce greenhouse gas emissions. New resource-efficient building techniques have decreased energy consumption dramatically. Although newer U.S. homes are 30 percent larger,[8] they consume about as much energy as older homes. These improvements ensure higher efficiency for new construction, but it means that our older buildings have a lot of catching up to do. According to the 2010 U.S. Census, 80 percent of Lakewood homes were built before 2000, presenting an enormous opportunity for energy and cost savings through retrofits.

Retrofits and upgrades provide opportunities to conserve water by fixing leaks, capturing rainwater, and using water-wise landscaping. Buildings account for 12 percent of all water use in the U.S., and heating water is responsible for 12 percent of a building's energy consumption. On average, water efficiency efforts decrease water use by 15 percent, energy use by 10–11 percent, and operating costs by 11–12 percent.[9]

GREEN BUILDINGS AND SUSTAINABLE SITE DESIGN

The demand for green buildings is increasing nationwide. Not only have green construction techniques been shown to save energy and water, they have also demonstrated improvements to the health and well-being of occupants. Certain building features, such as daylight, natural features, and spaces for social interaction and physical activity have positive psychological and social benefits. Other features, like improved ventilation and low-VOC furniture and paints enhance occupant health. The green building market demand is rapidly accelerating, and by 2035 approximately 75 percent[10] of the built environment will be either new or renovated. Now is the time to take advantage of the savings and benefits that green buildings can provide.

A sustainable built environment goes beyond buildings to encompass the entire building site. As we continue to develop and redevelop, we must do so in a way that honors and enhances our natural environment. This includes considering stormwater drainage, biodiversity, and microclimate regulation in order to ensure healthy functioning landscapes. Sustainable landscapes strengthen our ability to withstand and recover from floods, droughts, wildfires, and other climate threats. ■

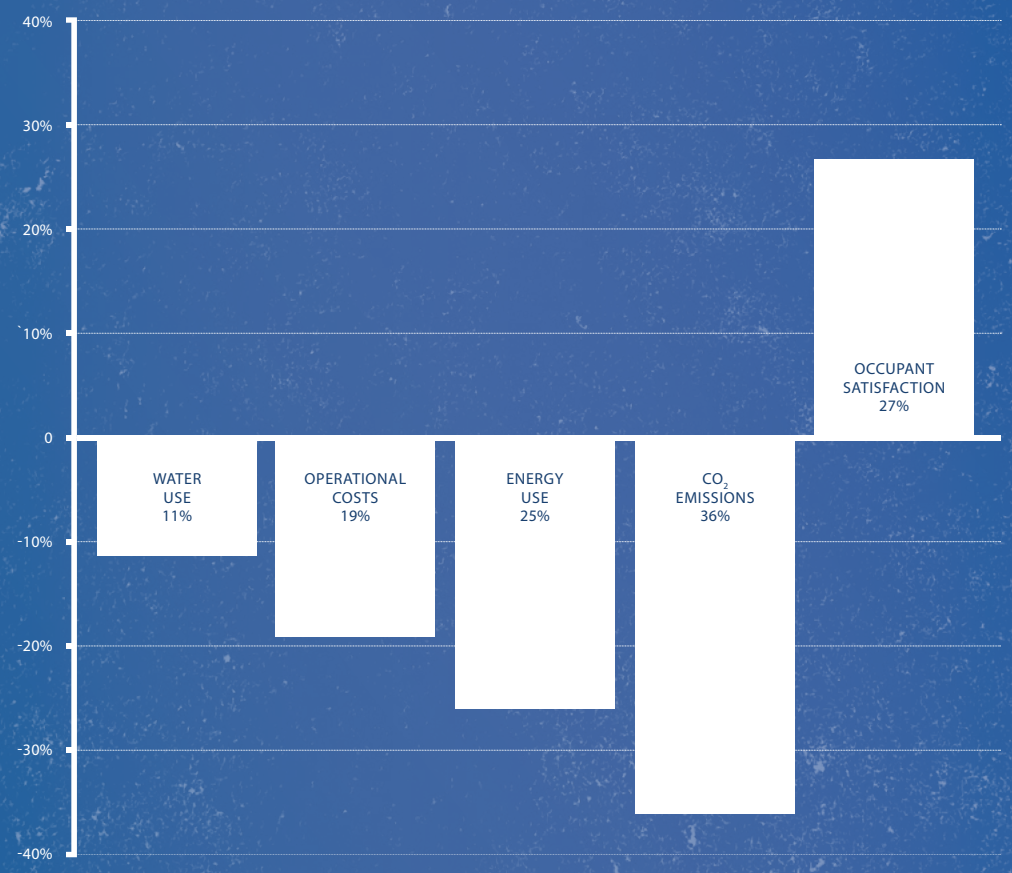
[8] U.S. Energy Information Administration. Residential Energy Consumption Survey 2009. http://www.eia.gov/consumption/residential/index.cfm.

[9] McGraw Hill Construction. "Green Outlook 2011: Green Trends Diving Growth." 2010. http://aiacc.org/wp-content/uploads/2011/06/greenoutlook2011.pdf.

[10] Architecture 2030. "A Historic Opportunity." 2011. http://architecture2030.org/the_solution/buildings_solution_how.

WHAT ARE THE BENEFITS OF GREEN BUILDINGS?

Compared with the average commercial buildings, LEED* certified buildings can offer considerable performance in terms of resource savings and positively affect the health of occupants.



*The Leadership in Energy & Environmental Design (LEED) building rating system was developed by the U.S. Green Building Council to recognize sustainable building strategies and practices. Learn more about the LEED system at http://www.usgbc.org/leed.

GOAL **BE1**

ENSURE AFFORDABLE ENERGY FOR LAKEWOOD WHILE TRANSITIONING TO RENEWABLE ENERGY SOURCES

TARGETS

- Generate 45 percent of municipal energy from renewable sources by 2025.
- Generate 45 percent of residential energy from renewable sources by 2025.
- Generate 45 percent of commercial and industrial energy from renewable sources by 2025.

OBJECTIVES & INDICATORS

- **OBJECTIVE:** Increase the ability of Lakewood's infrastructure to support the expanded use and transmission of renewable energy.
  - INDICATOR: Kilowatts of on-site solar energy installed

- **OBJECTIVE:** Ensure that all Lakewood residents have opportunities to access renewable and affordable energy.
  - INDICATOR: Number of residential subscribers to community solar projects and windsource
  - INDICATOR: Annual energy resource mix as reported by Xcel Energy
  - INDICATOR: Residential electricity and gas costs

- **OBJECTIVE:** Ensure that Lakewood businesses, industry, and institutions have opportunities to access renewable and affordable energy.
  - INDICATOR: Number of business subscribers to community solar projects and windsource
  - INDICATOR: Commercial electricity and gas costs

- **OBJECTIVE:** Expand the use of renewable and affordable energy in municipal buildings and infrastructure.
  - INDICATOR: Kilowatts of energy generated from on-site renewable energy systems
  - INDICATOR: Kilowatts of energy purchased from off-site renewable energy systems

IMPLEMENTATION STRATEGIES

BE1-A RENEWABLE ENERGY TRANSMISSION AND GENERATION

Expand renewable energy generation and access while ensuring necessary transmission infrastructure. Specifically:

- Work with Xcel to analyze existing infrastructure to understand capabilities and limitations;
- Identify potential opportunities for public and private renewable energy access and development, including on-site, community shared, and centralized systems;
- Assess public policies to identify barriers and facilitate implementation;
- Actively encourage residents and businesses to install renewable energy systems or to purchase shares or credits in off-site renewable energy projects; and
- Prioritize future investments for municipal generation and transmission.

COMMUNITY SPOTLIGHT

RENEWABLE ENERGY FOR EVERYONE

BY GRID ALTERNATIVES

GRID ALTERNATIVES, a nonprofit solar installer, brings together community partners, volunteers, and job trainees to implement solar power and energy efficiency for families that need it most, providing energy cost savings, valuable hands-on job training experience, and a source of clean, local energy that benefits us all.

GRID Alternatives' Colorado office opened its doors officially in January 2013, after a 2012 kickoff event in Lakewood that included installations for 12 local families. Since then, GRID has installed solar electric systems for another five Lakewood families. These 17 installations will produce over two million kWh of clean solar energy over the solar systems' lifetimes, saving these Lakewood families over $350,000 in electricity costs and mitigating over 2,000 tons of greenhouse gas emissions. The installations also have provided more than 700 hours of job training opportunities for students, job trainees, and community volunteers looking for experience in the solar industry.

GRID Alternatives plans to complete more solar installations in Lakewood as it expands its Colorado program services and is also piloting community solar projects in 2015 in order to reach renters and other qualified clients that may not have suitable roofs for residential solar. ■

CONCEPT

DISTRICT-SCALE SUSTAINABILITY

DISTRICT-SCALE SUSTAINABILITY is an innovative concept that applies the latest sustainable technologies and best practices in a specific geographic area. New technologies and creative solutions are constantly emerging in the field of sustainability. However, it is not often economically or politically feasible to implement these strategies across the entire city. For example, the FortZED initiative in Ft. Collins, Colo., is piloting crowdsourced thermostats to increase energy efficiency through slight, automated adjustments to HVAC controls in residences. Although it would be impractical to fund this type of technology replacement for all households, testing it in a unique district could demonstrate the effectiveness of the device to justify a rebate program or other funding mechanism.

Although the leadership, strategies, and funding varies from project to project, one characteristic remains: The level of implementation is a defined district, rather than the entire city. This enables experimentation and testing of the latest and greatest sustainability concepts to identify what works best for the broader community.

Approaches to district-scale sustainability are in development and implementation in cities across the country. Some use certifications to prescribe specific elements, and others provide a broader framework that lay out goals, principles, or guidelines that could be implemented at various stages in the project's development. In Oberlin, Ohio, public and private partners joined together to develop a Green Arts Zone (GAZ), which meets LEED-ND Platinum standards, commits to carbon neutrality, and aims to source 70 percent of its food from local sources. These ambitious goals have already spread in the community, where surrounding properties are already planning projects to expand the GAZ impact. ■

> The FortZED initiative in Ft. Collins, Colo., is piloting crowdsourced thermostats to increase energy efficiency through slight, automated adjustments to HVAC controls in residences.

LEARN MORE ABOUT DISTRICT-SCALE SUSTAINABILITY:

http://ecodistricts.org
http://fortzed.com
http://www.oberlinproject.org

BE1-B DISTRICT-SCALE SUSTAINABILITY

Establish unique districts within Lakewood where community sustainability goals are achieved through customizable guidelines. Specifically:

- Assess and identify potential locations and appropriate district-scale models;
- Develop location-specific guidelines around green building, district energy and microgrid projects, transportation infrastructure, natural resource and ecosystem protection, waste diversion, and community cohesion and wellness; and
- Transfer lessons learned and successful practices from district-scale sustainability projects into citywide policies.

BE1-C SUSTAINABLE ENERGY AND WATER RESOURCE CENTER CROSSCUTTING STRATEGY

Establish a resource center to provide information and consulting services to residents and businesses related to energy and water conservation and renewable energy generation. Specifically:

- Gather and distribute information on available educational resources, assessments and audits, technical and design support, rebates, tax incentives, and financing mechanisms;
- Provide supportive services to facilitate use of resources; and
- Use the resource center to incorporate specific strategies from other Sustainability Plan goals. These can be found throughout the Sustainability Plan under "Crosscutting Strategies."

BE1-D MUNICIPAL RENEWABLE ENERGY GENERATION

Develop a municipal renewable energy generation strategy to increase the percentage of municipal energy and fuel generated from renewable sources such as wind, solar, advanced biofuels, and other alternatives to fossil fuels.

CITY SPOTLIGHT

COMMUNITY SOLAR

IN 2014, after years of evaluating the feasibility of solar on top of municipal buildings and parking structures, the City of Lakewood found a new and creative way to increase renewable energy usage and save money. The City purchased 40 percent of a community-owned solar garden developed by Clean Energy Collective. The City will purchase 274 kilowatts of solar energy over a 20-year period, after which the contract can be renewed.

The purchase was the result of a thorough assessment and strategic planning by City staff, who identified the project as a way to meet the City's financial and sustainability goals. The City is able to apply solar energy credits from the project to peak energy times when electricity rates are higher because of the demand. This opportunity for savings will enable the City to repay its loan for the panels in only 10 years. After the repayment, the City will be generating savings from the solar energy credits and renewable energy certificate payments.

This success story accounts for 2.3 percent of the City's total power usage, leaving the City eager for more opportunities to invest in renewable energy. As community solar gardens continue to develop across Colorado, both the City and its residents will be able to participate in the clean energy revolution. ■

SUPPORTING STRATEGIES

COLLABORATION	▪ Work with Front Range communities in Xcel territory to increase collaboration and stay informed about energy regulatory issues and opportunities, share best practices, speak with a unified voice (when applicable), and reduce energy costs.
EDUCATION & PROMOTION	▪ Promote the benefits of renewable and affordable energy and provide information and resources to support access. ▪ Educate residents and businesses on energy issues including where and how energy is generated and how regional and state policies impact energy systems and costs.
TOOLS & TECHNOLOGY	▪ Develop an interactive sustainability dashboard that demonstrates progress toward goals and provides real time data, including renewable energy generation. Identify opportunities to provide interactive displays in public buildings.
RESEARCH & TRACKING	▪ Monitor communitywide energy data including overall energy use, renewable energy generation, participation in demand-side management programs, and energy costs. ▪ Research the impact of renewable energy systems and energy-efficiency upgrades on property values. ▪ Monitor policies, requirements, fees, and obligations included in Lakewood's franchise agreement with Xcel Energy.

CROSSCUTTING STRATEGIES

SUSTAINABLE BUSINESS HUB SE1-E | P. 61	▪ Explore opportunities to integrate energy and water systems and upgrades into appraisal, assessments, inspections, and property listings. ▪ Utilize the hub network to support successful district-scale sustainability efforts and share district scale sustainability guidelines and successful practices. ▪ Collaborate with the Sustainable Energy and Water Resource Center BE1-C | P. 39 to share information and available resources.
SUSTAINABLE NEIGHBORHOODS CC1-D | P. 102	▪ Solicit recommendations and ongoing feedback from participating neighborhoods to strengthen the Sustainable Energy and Water Resource Center BE1-C | P. 39 ▪ Recognize the role of the Sustainable Neighborhoods Program as a district-scale sustainability program and work to enhance the program in order to realize outcomes that support community sustainability goals. ▪ Share the Sustainable Neighborhoods Program model with other communities interested in adopting resident-driven district-scale sustainability programs.

TABLE BE1-1: STRATEGY BENEFITS

STRATEGY	ENVIRONMENTAL BENEFITS		ECONOMIC BENEFITS		SOCIAL BENEFITS	
	GHG REDUCTION POTENTIAL	ECOSYSTEM HEALTH	SELF-RELIANCE	HOUSEHOLD BENEFITS	COMMUNITY COHESION	PUBLIC HEALTH
BE1-A: Renewable Energy Transmission and Generation	🍃🍃🍃🍃🍃🍃🍃🍃🍃🍃🍃🍃	■	■	■	⊘	■
BE1-B: District-Scale Sustainability	🍃🍃	■■■	■■■	■■■	■■■	■■■
BE1-C: Sustainable Energy and Water Resource Center	🍃🍃🍃🍃🍃	■■	■■	■■	⊘	■
BE1-D: Municipal Renewable Energy Generation	🍃	■	■■	⊘	⊘	■

🍃 <5,000 $MtCO_2e$ Greenhouse Gas Emissions 🍃 ~10,000 $MtCO_2e$ Greenhouse Gas Emissions

■■■ High ■■ Medium ■ Low ⊘ Does Not Apply

TABLE BE1-2: STRATEGY FEASIBILITY

STRATEGY	CITY OF LAKEWOOD			COMMUNITY	
	UPFRONT COSTS	ONGOING COSTS	PAYBACK / REVENUE POTENTIAL	FINANCIAL BENEFIT FOR RESIDENTS	FINANCIAL BENEFIT FOR BUSINESSES
BE1-A: Renewable Energy Transmission and Generation	$$	–	✓	✓	✓
BE1-B: District-Scale Sustainability	$$$$	–	✓	✓	✓
BE1-C: Sustainable Energy and Water Resource Center	$	✓	–	✓	✓
BE1-D: Municipal Renewable Energy Generation	$$$$	✓	✓	–	–

$** < 50,000 **$$** = 50,000–100,000 **$$$** = 100,000–1,000,000 **$$$$ > 1,000,000

GOAL **BE2**

SIGNIFICANTLY ENHANCE RESOURCE EFFICIENCY IN LAKEWOOD BUILDINGS.

TARGETS

- Reduce municipal building and facility energy use intensity by 30 percent by 2025.*
- Reduce citywide building** energy use intensity by 20 percent by 2025.†
- Reduce citywide water use by 20 percent by 2025.†

OBJECTIVES & INDICATORS

- **OBJECTIVE:** Enhance citywide building energy efficiency.
  - INDICATOR: Energy use intensity by sector
  - INDICATOR: Municipal energy use intensity
- **OBJECTIVE:** Enhance citywide building water efficiency.
  - INDICATOR: Water use by sector
  - INDICATOR: Municipal water use

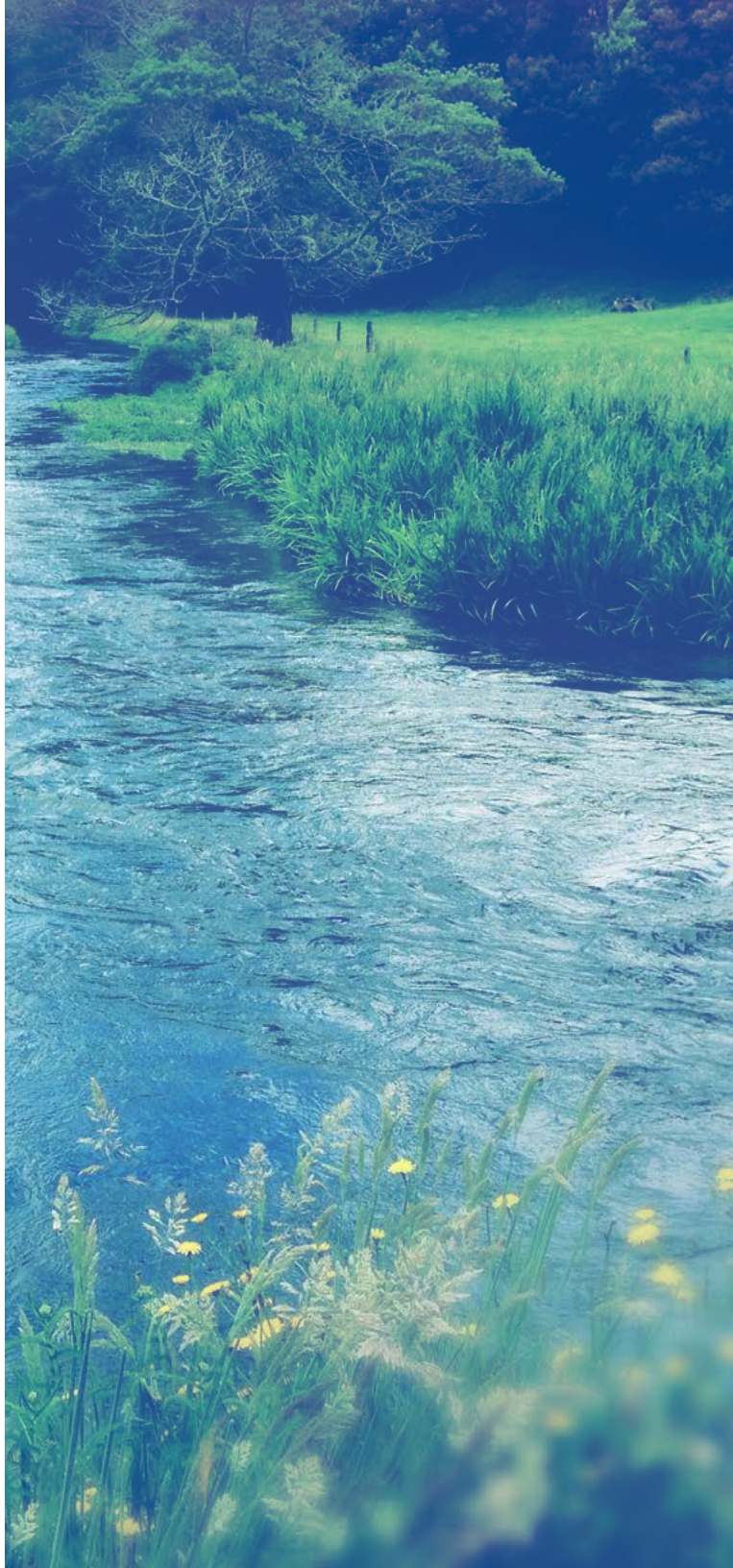
* Baseline: 2008–2010 normalized data
** Includes resource use for entire site
† Baseline: 2007

IMPLEMENTATION STRATEGIES

BE2-A EFFICIENCY IN RESOURCE INTENSIVE BUILDINGS

Target resource intensive buildings for efficiency improvements. Specifically:

- Identify buildings likely to have high-intensity resource use based on available data, building age, type of construction, use, and occupancy;
- Assemble customized tools, resources, and financing mechanisms for energy and water efficiency upgrades; and
- Employ a targeted outreach strategy to engage facility managers and property owners.



CONCEPT

ENERGY STAR PORTFOLIO MANAGER

STRATEGIC ENERGY and water management starts with understanding current and past usage. Through benchmarking, organizations can identify opportunities for efficiency improvements and set goals that will save money and reduce their environmental impact. ENERGY STAR Portfolio Manager is an interactive energy management tool that enables users to track and assess energy and water consumption and greenhouse gas emissions across their entire portfolio of buildings. The U.S. Environmental Protection Agency (EPA) created the Portfolio Manager to be available at no cost to all users. Forty percent of U.S. commercial building space is already benchmarked in Portfolio Manager, making it easier to compare building performance, gain recognition, and share best practices.

Cities have used Portfolio Manager in a variety of ways. Over forty local governments currently use the tool to compete in the EPA ENERGY STAR National Building Competition. Others, such as Beaverton, Ore., and Atlanta, Ga., host a local buildings competition for their community. Boston, Seattle, and New York have passed mandatory benchmarking laws for buildings over a certain size and help organizations use Portfolio Manager through guides, checklists, and other supportive materials.

According to 2012 ENERGY STAR data trends, buildings that consistently benchmark energy performance experience an average annual 2.4 percent in energy savings. In fact, if all buildings in the U.S. participated, over 18 million metric tons of CO_2e could be saved each year. ■

According to 2012 ENERGY STAR data trends, buildings that consistently benchmark energy performance experience an average annual 2.4 percent in energy savings.

LEARN MORE ABOUT ENERGY STAR PORTFOLIO MANAGER:

http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager

BE2-B REPORTING & BENCHMARKING ENERGY AND WATER USE

Develop a campaign to encourage voluntary benchmarking of energy and water consumption at the building or site scale through the use of utility data tracking software.* Specifically:

- Assess existing utility data tracking software to identify preferred options;
- Employ a targeted outreach strategy to encourage participation by commercial and multifamily buildings;
- Encourage the use of submetering to more efficiently manage energy and water use; and
- Consider a building square footage threshold for required reporting and benchmarking.

* Potential utility data tracking software include Energy Star, Wegowise, Bright Power, and Scope 5.

BE2-C RESOURCE EFFICIENT MUNICIPAL FACILITIES

Effectively manage and reduce municipal energy and water use. Specifically:

- Collect and track energy and water use data for all municipal operations using utility data tracking software;
- Prioritize facilities for energy and water audits based on existing resource use data;
- Secure funding for facility improvements through the City budgeting process and grant programs, and consider utilizing performance-based programs where future cost savings fund efficiency improvements;
- Set facility-specific efficiency targets when appropriate;
- Implement facility audit recommendations with consideration of resource limitations and other constraints;
- Increase accountability for resource use through reporting mechanisms that attribute use to each building, City department or division; and
- Develop facility and job specific behavior modification strategies.

BE2-D RESOURCE EFFICIENT BUILDING CODES

Conduct a review of the newest edition of building and energy codes on a regular basis to ensure the best fit for protecting life and safety, economic climate, and support of City sustainability goals. Specifically:

- Include participation by the Sustainability Division during standard review process for energy related codes;
- Provide necessary resources to train staff; and
- Conduct community outreach on updated code requirements.

SUPPORTING STRATEGIES	
COLLABORATION	▪ Leverage programs and resources from state, federal, and nonprofit agencies, such as the Colorado Energy Office, the Department of Energy, and Environmental Protection Agency. ▪ Work with the state of Colorado to support the goals and strategies included in the Colorado State Water Plan. ▪ Work with Denver Water and Lakewood water and sewer providers to coordinate conservation efforts, programs, and policies.
EDUCATION & PROMOTION	▪ Promote the importance of conserving water resources and reducing energy consumption. Develop specific communication strategies for various audiences throughout the Lakewood community, specifically including educational institutions. ▪ Promote the importance of both efficiency retrofits and behavior modification strategies in achieving significant levels of resource conservation. ▪ Promote opportunities and strategies for energy and water efficiency to neighborhoods through workshops, neighbor-to-neighbor challenges, DIY classes, partnerships, and other assorted resources. ▪ Educate planners, plan reviewers, building inspectors, and developers on updates to building and energy codes and available design and green building resources.
TOOLS & TECHNOLOGY	▪ Develop an interactive sustainability dashboard that demonstrates progress toward goals and provides real-time data, including energy and water usage. Identify opportunities to provide interactive displays in public buildings. ▪ Utilize mobile and online technology to assist residents and property owners in tracking energy and water usage. ▪ Utilize behavior-learning smart control technologies to increase resource efficiency in buildings and landscapes.
RESEARCH & TRACKING	▪ Monitor communitywide energy data including overall energy use, renewable energy generation, participation in demand-side management programs, and energy costs. ▪ Research the impact of renewable energy systems and energy-efficiency upgrades on property values.

CROSSCUTTING STRATEGIES	
SUSTAINABLE ENERGY & WATER RESOURCE CENTER BE1-C | P. 39	▪ Provide information on demand-side management programs from Denver Water and Xcel Energy. ▪ Provide information on financing mechanisms, low-interest loan programs, and fee incentives for resource efficiency retrofits. ▪ Provide tips and strategies for resource conservation through behavior modification. ▪ Provide consultation services for goal setting and tracking.
SUSTAINABLE BUSINESS HUB SE1-E | P. 61	▪ Celebrate and recognize achievements in resource efficiency. ▪ Provide technical assistance to businesses through the program's network.
SUSTAINABLE NEIGHBORHOODS CC1-D | P. 102	▪ Solicit recommendations and ongoing feedback on how to utilize resource-efficient technologies and practices in homes. ▪ Work with neighborhoods to pilot resource-efficiency programs.

TABLE BE2-1: STRATEGY BENEFITS

STRATEGY	ENVIRONMENTAL BENEFITS		ECONOMIC BENEFITS		SOCIAL BENEFITS	
	GHG REDUCTION POTENTIAL	ECOSYSTEM HEALTH	SELF-RELIANCE	HOUSEHOLD BENEFITS	COMMUNITY COHESION	PUBLIC HEALTH
BE2-A: Efficiency in Resource Intensive Buildings	🍃🍃🍃🍃🍃	■■	■■	■■	⊘	■
BE2-B: Reporting & Benchmarking Energy and Water Use	🍃	■	■■	■■	⊘	⊘
BE2-C: Resource Efficient Municipal Facilities	🍃	■■	■	⊘	⊘	■
BE2-D: Resource Efficient Building Codes	🍃	■■	■■	■■	⊘	■

🍃 <5,000 $MtCO_2e$ Greenhouse Gas Emissions 🍃 ~10,000 $MtCO_2e$ Greenhouse Gas Emissions

■■■ High ■■ Medium ■ Low ⊘ Does Not Apply

TABLE BE2-2: STRATEGY FEASIBILITY

STRATEGY	CITY OF LAKEWOOD			COMMUNITY	
	UPFRONT COSTS	ONGOING COSTS	PAYBACK / REVENUE POTENTIAL	FINANCIAL BENEFIT FOR RESIDENTS	FINANCIAL BENEFIT FOR BUSINESSES
BE2-A: Efficiency in Resource Intensive Buildings	$	✓	–	✓	✓
BE2-B: Reporting & Benchmarking Energy and Water Use	$	✓	–	✓	✓
BE2-C: Resource Efficient Municipal Facilities	$$$$	✓	✓	–	–
BE2-D: Resource Efficient Building Codes	$	✓	–	✓	✓

$** < 50,000 **$$** = 50,000–100,000 **$$$** = 100,000–1,000,000 **$$$$ > 1,000,000

GOAL **BE3**

ENCOURAGE DEVELOPMENT IN LAKEWOOD THAT VALUES THE NATURAL ENVIRONMENT AND SUPPORTS PUBLIC HEALTH AND COMMUNITY COHESION.

TARGET

- Increase the percentage of certified* green buildings (new construction and renovations receiving occupancy permits) each year from 2015 to 2025.

OBJECTIVES & INDICATORS

- **OBJECTIVE:** Promote green building construction and retrofits that use sustainable materials and enhance occupant well-being.
  - INDICATOR: Number of certified* green building projects
  - INDICATOR: Number of indoor air quality investigations and/or complaints filed with Jefferson County Public Health

- **OBJECTIVE:** Promote sustainable site design in order to create harmony between the built and natural environments.
  - INDICATOR: Number of certified sites through the Sustainable Sites Initiative

* Certifications systems include Green Globes, USGBC LEED, and Living Building Challenge

IMPLEMENTATION STRATEGIES

BE3-A LEED STANDARDS FOR MUNICIPAL BUILDINGS

Adopt an ordinance requiring that all newly constructed municipal buildings with year-round occupancy meet at least LEED Silver standards from the USGBC.†

BE3-B GREEN BUILDING CONSTRUCTION AND RETROFITS

Target significant developments for green building and sustainable site design support, including minimizing hazardous materials, creating healthy indoor spaces, using resource efficiency, and using locally and sustainably sourced materials. Specifically:

- Establish reporting and tracking mechanism for green building certifications;
- Train staff involved in the development process on the benefits and principles of green buildings practices and the resources available to applicants;
- Identify and secure funding and grant opportunities to be used to provide technical assistance to developers; and
- Employ a targeted outreach strategy to engage developers.

BE3-C SUSTAINABLE SITE PLANNING AND DEVELOPMENT

Integrate key elements of the Sustainable Sites Initiative (SSI) to integrate into the City's site planning standards. Specifically:

- Conduct a comprehensive assessment of the Sustainable Sites Initiative to identify key concepts and requirements applicable to Lakewood; and
- Incorporate sustainable site planning requirements and guidelines into the City's Zoning Ordinance with consideration of the benefits and costs.

† U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED)

CONCEPT

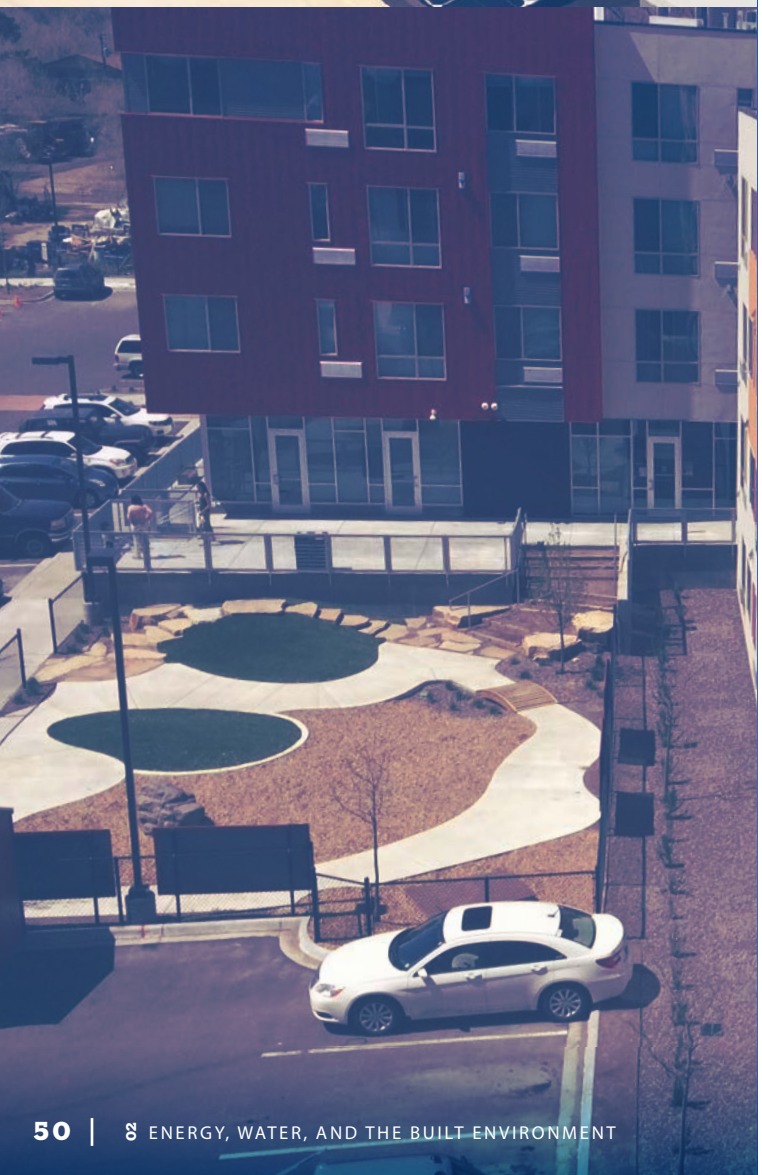
SUSTAINABLE SITES INITIATIVE

THE SUSTAINABLE SITES INITIATIVE™ (SITES™) is a program based on the understanding that built landscapes have the capacity to protect and restore our natural systems. Developed by the American Society of Landscape Architects, the United States Botanic Garden, and the Lady Bird Johnson Wildflower Center at the University of Texas at Austin, SITES offers a rating system and guidelines to define land development and management practices that complement the functions of healthy ecosystems. The program lays out requirements and recommended strategies to achieve sustainable concepts, such as reducing energy and water use, restoring native plant communities, reducing urban heat island effects, using recycled and regional materials, and supporting social connections.

The current rating system, SITES v2, was informed by the SITES Pilot Program, which certified 34 projects across the country, including the National Renewable Energy Lab (NREL) South Table Mountain campus, which is adjacent to the Lakewood community. The campus includes a 175-acre conservation easement to protect native habitats and provide a recreational amenity to staff and community members. It also incorporates natural drainage for stormwater and provides incentives for alternative commuting options. The project demonstrates the holistic approach that SITES uses to protect and leverage the benefits of nature. ■

LEARN MORE ABOUT THE SUSTAINABLE SITES INITIATIVE:

http://www.sustainablesites.org



SUPPORTING STRATEGIES

COLLABORATION	▪ Work with the American Society of Landscape Architects, U.S. Green Building Council, and other similar organizations that may be able to provide technical support for green building and sustainable site design. ▪ Work with the Urban Drainage and Flood Control District to coordinate water quality efforts, programs, and policies.
EDUCATION & PROMOTION	▪ Promote the benefits of green building and sustainable site design, including benefits to public health, community cohesion, and the natural environment.
TOOLS & TECHNOLOGY	▪ Monitor emerging technologies and best practices for green building and sustainable site development.
RESEARCH & TRACKING	▪ Research opportunities to develop financial incentives for sustainable site design, such as variable stormwater fees dependent on the type of landscaping and water quality features on-site.

CROSSCUTTING STRATEGIES

SUSTAINABLE ENERGY & WATER RESOURCE CENTER BE1-C | P. 39	▪ Provide information on green building and sustainable site design.
SUSTAINABLE BUSINESS HUB SE1-E | P. 61	▪ Recognize achievements in green building and sustainable site design. ▪ Provide technical assistance to businesses through the program's network.
SUSTAINABLE NEIGHBORHOODS CC1-D | P. 102	▪ Work with neighborhoods to identify public or private spaces in their neighborhoods suitable for sustainable site improvements.

TABLE BE3-1: STRATEGY BENEFITS

STRATEGY	ENVIRONMENTAL BENEFITS		ECONOMIC BENEFITS		SOCIAL BENEFITS	
	GHG REDUCTION POTENTIAL	ECOSYSTEM HEALTH	SELF-RELIANCE	HOUSEHOLD BENEFITS	COMMUNITY COHESION	PUBLIC HEALTH
BE3-A: LEED Standards for Municipal Buildings	🍃	■■■	■■	■	■■	■■■
BE3-B: Green Building Construction and Retrofits	🍃	■■■	■■■	■■	■	■■
BE3-C: Sustainable Site Planning and Development	🍃	■■■	■■	■	■■	■■■

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STRATEGY	CITY OF LAKEWOOD			COMMUNITY	
	UPFRONT COSTS	ONGOING COSTS	PAYBACK / REVENUE POTENTIAL	FINANCIAL BENEFIT FOR RESIDENTS	FINANCIAL BENEFIT FOR BUSINESSES
BE3-A: LEED Standards for Municipal Buildings	$$	–	✓	–	–
BE3-B: Green Building Construction and Retrofits	$$	✓	✓	✓	✓
BE3-C: Sustainable Site Planning and Development	$	–	✓	✓	✓

$** < 50,000 **$$** = 50,000–100,000 **$$$** = 100,000–1,000,000 **$$$$ > 1,000,000