



# BUILDINGS

(Municipal, Residential + Historic)

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Building related greenhouse gas emissions are largely attributed to indoor heating, ventilation and air conditioning (HVAC) as well as the efficiency of appliances and other mechanical systems. This includes hot water heaters, dishwashers, washers and dryers, and plumbing fixtures. Consequently, a large portion of the total emissions for both the community and City government can be attributed to the built environment.

The City of Benicia is nearing build-out, limiting opportunities for large residential and commercial development projects. Opportunities for reducing greenhouse gas emissions related to buildings include upgrades and retrofits of the existing building stock. Strategies for increasing building efficiency and reducing emissions related to buildings within Benicia are separated into municipal, residential, and historic buildings.

Green building practices incorporate materials and construction practices that reduce a building's energy consumption. Two widely used green building criteria are the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) and Build It Green's GreenPoint Rated System. Build It Green's GreenPoint Rated System is used for residential construction while the LEED criteria is primarily used for nonresidential construction.

The 2008 California Green Building Standards Code, as Part 11 (Title 24) of the California Standards Code, is a collection of green building "best practices." By mandating these practices, California will become the first state to adopt statewide green building standards that focus on planning and design, water efficiency and conservation, material conservation and resource efficiency, and air quality. The California Building Standards Commission encourages local governments to exceed these standards. As of August, 2009, these practices are voluntary. Select practices, such as diverting 50% of Construction and Demolition Waste from the waste stream will become mandatory in 2010.

Strategies for reducing emissions from industrial and commercial buildings and operations are located in the Industrial and Commercial section of this plan and are consistent with the implementation and phasing of strategies identified in this section.

### Adaptation

The anticipated impacts of climate change include frequent and intense heat waves as well as sea level rise. An increased number of summer heat waves will result in increased demand to cool homes and businesses. A rise in sea level will increase flooding of homes and businesses in low-lying areas along the Carquinez shoreline.

Buildings Objective Table	Emissions Reduction Type	Emissions Reduction
Objective B-1: Increase Building and Energy Efficiency in Municipal Buildings by 10% by 2020	City	
Objective B-2: Increase Building Efficiency by 20% in New Residential Construction by 2020	Community	
Objective B-3: Reduce Energy Use by 20% in Single & Multifamily Residential by 2020	Community	
Objective B-4: Green 30% of Historic Structures by 2020	Community	

## Co-Benefits of Building Objectives

- Increase in indoor and outdoor air quality
- Reduced operational and maintenance costs
- Increase in building re-sale value

## MUNICIPAL BUILDINGS

It is important that the City take a leadership role in meeting the emission reduction targets. Promoting and demonstrating green building practices for new and existing structures are important strategies to reduce greenhouse gas emissions and to educate the public.



Benicia Fire Department (2009).

## Existing Actions

Since 2000, the City of Benicia has continued to upgrade outdated equipment with high efficiency equipment as it becomes functionally obsolete. Equipment upgrades include the replacement of boilers and HVAC systems in City owned and maintained facilities. The Capital Improvement Program outlines projects that the City has completed or is expected to complete to increase building and equipment efficiency. These projects include upgrades and improvements to the City Gym, City Hall, Corporation Yard, Senior Center, and the Clocktower. The City has also replaced all lighting within municipal buildings with more efficient T8 and Super T8 lighting fixtures.

In December 2008, the Parks and Community Services Department registered the Benicia Community Center, formerly Mills Elementary School, with the USGBC for potential LEED certification under the Commercial Interiors (CI) designation. The project is currently being re-designed to meet LEED CI certification requirements.

## Objective B-1: Increase Building and Energy Efficiency in Municipal Buildings by 10% by 2020



### ◆ Strategy B-1.1. LEED Certification for Municipal Projects



Municipal buildings should be held to a higher standard than residential, nonresidential, and historic structures as a demonstration of community-wide leadership. New construction of municipal buildings under 5,000 square feet should be LEED Certified (excluding minor construction projects), and structures over 5,000 square feet should be required to obtain LEED Silver certification. In addition, the ordinance should identify standards and definitions for City tenant improvements and minor construction projects.

#### Implementation Action

- Adopt green building standards for municipal projects as part of the tiered Green Building Ordinance.

#### CO2EMT Reduction Range

- Unknown.

### ◆ Strategy B-1.2. Solar Thermal Energy for Municipal Buildings



Integrating solar thermal systems into municipal buildings will decrease emissions and reduce costs associated with heating water. Solar thermal systems utilize solar energy to heat water, thereby avoiding the use of non-renewable fuel sources.

#### Implementation Actions

- Identify appropriate City facilities;
- Install solar thermal systems.

#### CO2EMT Reduction Range

- 38-40% of Objective B1.

### ◆ Strategy B-1.3. Upgrade City Hall HVAC System



The California Energy Commission recommends a heat thermostat threshold of 68 degrees and an air conditioning threshold of 75 degrees. At this time, mandating these thresholds is not a reasonable requirement at City Hall because the existing HVAC system's climate zones are too large to accommodate the variety of building conditions and office configurations. The HVAC system should be upgraded to include the highest levels of efficiency, including microclimate thermostat controls, ideally for each office. After appropriate upgrades are made, it would be reasonable to ban personal space heaters.

#### Implementation Actions

- Upgrade HVAC systems to include smaller heating and cooling zones for greater flexibility and increased comfort;
- Ban personal space heaters, (after HVAC upgrades are made);
- Regulate thermostats in City owned and operated buildings to comply with CEC.

#### CO<sub>2</sub>EMT Reduction Range

- 63-65% of Objective B1.



City Hall (2009).

### Objective B-2: Increase Building Efficiency by 20% in New Single and Multifamily Residential Construction by 2020



#### **RESIDENTIAL BUILDINGS**

Green building practices maximize efficiency of buildings and their mechanical systems. In addition, green building practices can increase home values, reduce energy costs, and improve indoor air quality.

Build It Green's GreenPoint Rated System was designed specifically to increase residential building efficiency in California by supplementing existing California energy codes and has become a regional and State standard.

In addition to increasing building energy efficiency standards, incentives and outreach are key strategies for promoting the benefits of green building practices.

#### **Existing Actions**

The City of Benicia Building Division distributes information on green buildings, home weatherization, and other energy conservation methods. The City also encourages developers to implement energy conservation measures in projects through building orientation, landscaping, and solar access.

In July 2008, the Bay Area Air Quality Management District adopted a resolution prohibiting wood burning during curtailment periods or Spare the Air days in the Bay Area. BAAQMD has identified wood smoke as being the Bay Area's largest stationary source of particulate matter. The resolution requires that all stoves and inserts used in new construction be EPA certified.

◆ **Strategy B-2.1. Adopt a Tiered Green Building Ordinance**



The City’s green building ordinance will incorporate 2008 California Green Building Standards Code (California Code of Regulations Title 24, Part 11) and 2008 Building Energy Efficiency Standards for Residential and Nonresidential Buildings. While these codes provide a minimum baseline, the City should require more stringent tiered standards similar to Build-It-Green’s Green Point Rated System.

Implementation Action

- Prepare, adopt, and implement a detailed tiered rating system similar to Build-It-Green’s Green Point Rated System.

CO2EMT Reduction Range

- 100% of Objective B2.

◆ **Strategy B-2.2. Promote Local Green Building Projects**



Develop a marketing program to promote green buildings and developments in Benicia including a program logo that could be incorporated on yard signs for residences, and window decals for businesses. Distribute promotional kits to homes and businesses that meet green building standards.

Implementation Actions

- Work with local contractors and homeowners to develop a marketing campaign;
- Develop logo, yard signs, window decals, etc;
- Distribute promotional kits.

CO2EMT Reduction Range

- This strategy supports B-2.1. All reductions for this strategy have been included in B-2.1.

**Objective B-3: Reduce Energy Use by 20% in Existing Single and Multifamily Residential by 2020**



◆ **Strategy B-3.1. Residential Energy Conservation Ordinance**



Require residential structures to undergo minimum energy efficiency/weatherization upgrades at the time of major renovation. The definition of major renovation should be established by determining a minimum construction valuation threshold. Other cities have adopted a threshold of \$50,000.

Implementation Actions

- Establish program parameters and definitions;
- Adopt a residential energy conservation ordinance.

CO2EMT Reduction Range

- 11%-15% of Objective B3.

◆ **Strategy B-3.2. Adopt Build It Green’s Home Remodel Standards or Equivalent**



Adopt a tiered green remodel requirement as part of the green building ordinance, utilizing Build It Green’s home remodel standards.

Implementation Action

- Incorporate a tiered green remodel requirement into the green building ordinance.

CO2EMT Reduction Range

- 11%-15% of Objective B3.

### ◆ Strategy B-3.3. Home Energy and Water Audits



Offer energy and water audits free of cost to Benicia residents. Energy and water audits identify efficiency opportunities and provide residents with conservation recommendations.

#### Implementation Actions

- Establish a City/school (BUSD) partnership to train high school students to provide residential energy and water audits;
- Work with BUSD students, teachers, and administrators to design and implement such program.

#### CO2EMT Reduction Range

- 12%-15% of Objective B3.

### ◆ Strategy B-3.4. Energy Efficiency Rebates



Partner with local utility providers and other local and regional agencies to provide rebates and/or promote existing rebates for energy efficient appliances. Projects that may qualify for rebates include radiant roof barriers, home weatherization projects, HVAC systems, water heaters and lights.

#### Implementation Actions

- Promote existing rebate programs;
- Establish rebates for other energy intensive appliances that are not addressed by existing rebate programs.

#### CO2EMT Reduction Range

- 76%-80% of Objective B3.

### ◆ Strategy B-3.5. Ban Wood Burning

A ban on wood burning would improve air quality during the winter months as well as reduce of greenhouse gas emissions. Solano County has the highest asthma symptom rate in the State, with over 14 percent of its residents exhibiting symptoms. Smoke from wood burning contains Particulate Matter (PM)<sup>26</sup>, which is known to trigger asthma attacks. Natural gas burning fireplaces produce more heat while emitting less carbon dioxide compared with wood burning devices. Such a measure would place a de facto ban on wood burning fireplaces and stoves.

26) Solano County, (2009) Solano County Public Health - Asthma Education. Retrieved July 23, 2009, from [http://www.co.solano.ca.us/depts/ph/hp\\_n\\_e/programs/asthma\\_education.asp](http://www.co.solano.ca.us/depts/ph/hp_n_e/programs/asthma_education.asp)

#### Implementation Action

- Adopt an ordinance to ban wood burning.

#### CO2EMT Reduction Range

- Not Applicable. CO2EMT emissions from wood burning were not accounted for in the greenhouse emissions inventory.

### ◆ Strategy B-3.6. Wood Fireplace Change-Out/Removal Program



Provide financial assistance to homeowners to change out their existing wood burning fireplaces for natural gas devices, or completely remove existing wood fireplaces. Such a measure would support residents to comply with the ban on wood burning.

#### Implementation Action

- Develop and fund a wood fireplace change-out/removal program.

#### CO2EMT Reduction Range

- Not Applicable. CO2EMT emissions from wood burning were not accounted for in the greenhouse emissions inventory.

### ◆ Strategy B-3.7. Change a Light Campaign



Switching to Compact Fluorescent Light bulbs (CFL) is a low cost way to reduce energy consumption. The City could distribute these light bulbs as part of a larger education and outreach campaign. The program would include an educational component to promote proper disposal of CFL bulbs.

#### Implementation Action

- Distribute free CFLs.

#### CO2EMT Reduction Range

- 1%-2% of Objective B3.

## Objective B-4: Green 30% of Historic Structures by 2020



### HISTORIC BUILDINGS

Benicia has a large number of historically significant structures in the Downtown and Arsenal districts. In addition, the City owns, operates and maintains historic buildings, including City Hall, the Camel Barn complex, Commanding Officer's Quarters and the SP Depot. The California State Office of Historic Preservation states, "older and historic buildings comprise more than half of the existing buildings in the United States. Retention and adaptive reuse of these buildings preserves the materials, embodied energy, and human capital already expended in their construction. The recycling of buildings is one of the most beneficial 'green' practices, and stresses the importance and value of historic preservation in the overall promotion of sustainability."<sup>27</sup>

The Secretary of the Interior's Standards for the Treatment of Historic Properties provides the framework for local historic conservation plans, which restrict the design and construction activities of designated historic structures in order to preserve the integrity of the buildings and the districts that they are located in. Energy efficiency and green building techniques can be successfully integrated into historic buildings in ways that do not affect the character defining features of the buildings.

Examples include:

- Undoing inappropriate alterations that restrict air flow and block natural light;
- Sealing of air leaks, which can waste 20-50% of energy spent on heating and cooling;
- Repair or replacement of inefficient heating and cooling units;
- On-site energy generation;
- Window efficiency through weather-stripping and caulking;
- Efficient interior and exterior lighting.

<sup>27</sup>) Greening Main Street Buildings, by Kennedy Smith, from Main Street News, April 2009 found at [www.preservationnation.org/main-street/main-street-news/pdfs/msnews-2009-04.pdf](http://www.preservationnation.org/main-street/main-street-news/pdfs/msnews-2009-04.pdf)

<sup>28</sup>) The Secretary of the Interior's Standards are the national standards for historic preservation. They were developed to administer Federal tax credits and have since been adopted by state and local agencies as a set of guiding principles to protect features of a property which are significant to its historic, architectural, and cultural values.

### Existing Actions

The City of Benicia has taken steps to preserve and protect its historic resources. The Benicia General Plan includes policies to encourage the reuse, rehabilitation and restoration of historic buildings. In 1990 and 1993, the City adopted the Downtown Historic and Arsenal Conservation Plans to promote the conservation, preservation, protection and enhancement of the two historic districts. The City has undertaken projects to rehabilitate and preserve its own historic resources, including City Hall, the Southern Pacific Railroad Depot and the Commanding Officer's Quarters.

#### ◆ Strategy B-4.1. Encourage Energy Efficient Upgrades in Historic Structures



The Downtown Historic Conservation Plan emphasizes the importance of the integrity of historic structures. Retrofitting the interior of existing structures to increase efficiency will reduce energy demand and lower maintenance and operating costs, while staying within the Secretary of the Interior's Standards.<sup>28</sup> The City can encourage energy efficiency retrofits by conducting educational workshops and by providing informational handouts and web-based resources.

#### Implementation Action

- Adopt energy efficiency standards for historic structures as part of green building ordinance.

#### CO<sub>2</sub>EMT Reduction Range

- 96%-100% of Objective B3.



Landmark building located in the Arsenal Historic District (2009).

### ◆ Strategy B-4.2. Amend the Downtown and Arsenal Historic Conservation Plans



Amending the Historic Conservation Plans to include policies that encourage greening of historic structures will reduce conflicts between historic preservation, renewable energy, and energy efficiency upgrades. This may include suggested locations for solar photovoltaic panels; however, the Solar Rights Act of 1976 requires cities and counties to “administratively” approve applications to install solar energy systems by issuing a building permit or other non-discretionary permit, based strictly on health and safety.<sup>28</sup> Therefore, design review cannot be required for the panels themselves or their location; however, if the panels require an additional structure to be constructed the City could require design review for the structure itself.

#### Implementation Action

- Amend the Historic Conservation Plans to include policies that encourage the greening of historic structures.

#### CO2EMT Reduction Range

- Unknown.

### ◆ Strategy B-4.3. Encourage LEED certification and/or Build It Green’s GreenPoint Rated certification for Historic Structures



The benefits of retrofitting a historic structure to achieve LEED certification (for non-residential projects) or GreenPoint Rated certification (for residential projects) include reduced energy consumption and lower maintenance costs. Building owners should be encouraged to rehabilitate their structures to these standards.

#### Implementation Action

- Encourage green retrofits through education outreach programs and demonstration projects (see strategies B-4.5 and B-4.6).

#### CO2EMT Reduction Range

- 3%-5% of Objective B4.

### ◆ Strategy B-4.4. Educate Property Owners, City Commissions, Local Contractors, and Suppliers



Educating property owners, Planning Commissioners, Historic Preservation Review Commissioners, local contractors, and suppliers about the benefits of greening historic structures, will help strengthen public support and supply chains to encourage green building practices in historic retrofits.

#### Implementation Action

- Organize workshops and presentations about historic preservation and green building practices.

#### CO2EMT Reduction Range

- Unknown Reductions.

### ◆ Strategy B-4.5. Retrofit the Clocktower to Achieve LEED Certification



Retrofit the Clocktower to achieve LEED Certification to demonstrate the City’s commitment to sustainable building practices in historic structures. Adding capacity to open and close the windows, among other appropriate rehabilitation measures will reduce energy consumption and maintenance costs, improve indoor air quality, and serve to educate the public about the positive relationship between sustainable building practices and the Secretary of the Interior’s Standards for historic preservation.

#### Implementation Action

- Pursue funding and conduct Clocktower retrofit.

#### CO2EMT Reduction Range

- Unknown Reductions.

28) California Solar Rights Act, a Review of the Statutes and Relevant Cases, January 2007, Energy Policy Initiatives Center, University of San Diego School of Law, [www.sandiego.edu/epic/publications/documents/070123\\_RightsActFinal.PDF](http://www.sandiego.edu/epic/publications/documents/070123_RightsActFinal.PDF)

◆ **Strategy B-4.6. Energy Efficiency  
Demonstration Projects at City Hall**



Perform energy efficiency upgrades at City Hall that are in compliance with the Secretary of the Interior’s Standards for historic preservation. These upgrades can serve as demonstration projects for the historic preservation community.

Implementation Actions

- Perform a comprehensive energy audit with accompanying recommendations;
- Make recommended efficiency upgrades.

CO<sub>2</sub>EMT Reduction Range

- Unknown reductions.