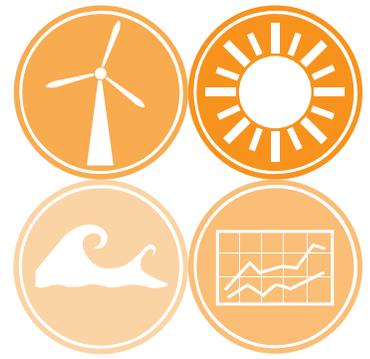




ENERGY PRODUCTION

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Energy Production



The use of fossil fuels, including coal, oil, and gas, for energy production contributes significantly to greenhouse gas emissions. In Benicia, these traditional energy sources represent 51 percent of the City Government’s total emissions. Reductions in the emissions from energy production and consumption can be achieved by increasing the efficiency of traditional energy sources and increasing the overall share of renewable energy.

This focus was limited to energy production. Measures that focus on energy efficiency are included in subsequent focus areas.

Adaptation

Climate change could threaten the reliability of Benicia’s energy supply, increase energy demand and operational costs, and cause damage to energy infrastructure. Increasing temperatures and extreme heat will heighten electricity demand during peak hours.

Benicia receives its electricity and gas from Pacific Gas & Electric (PG&E); PG&E generates 17 percent of its electricity from hydropower, produced at Hetch-Hetchy Dam (Pacific Gas & Electric [PG&E]). Drought and a reduced snowpack could decrease power output at Hetch-Hetchy and other hydroelectric facilities. Flooding could damage pipelines and petroleum wells.

Long-term climate change could potentially alter Benicia’s available renewable energy supply. Daily wind patterns may be disrupted, and an expected increase in cloud cover over the Western United States may alter solar and wind energy potential in Benicia. However, even with the potential constraints, Benicia should continue to pursue moving from nonrenewable energy sources to renewable energy sources.

Co-Benefits of Energy Production Objectives

- Create jobs
- Reduce energy costs
- Streamline the regulatory process
- Foster and develop new markets

Energy Production Objective Table	Emissions Reduction Type	Emissions Reduction
Objective E-1: Increase Power Plant Efficiency 10% by 2020	Community & City	
Objective E-2: Increase Amount of Renewable Energy in Benicia	Community & City	
Objective E-3: Increase Amount of Solar Energy Production in Benicia	Community & City	
Objective E-4: Increase Amount of Wind Energy Production in Benicia to 15% by 2020	Community & City	
Objective E-5: Assess and Conduct a Feasibility Study for Use of Tidal and Geothermal Power by 2020	Community & City	n/a
Objective E-6: Conduct a Smart Grid Feasibility Study by 2020	Community & City	n/a

Did you know?



Pacific Gas and Electric (PG&E) provides power to the City of Benicia. PG&E's energy portfolio includes natural gas (47%), nuclear (23%), large hydro (17%), renewable (13%), coal (4%), and other sources (1%) (PG&E, 2007). Natural gas is less carbon intensive than coal or oil.

Objective E-2: Increase Amount of Renewable Energy in Benicia



TRADITIONAL ENERGY SOURCES

As a result of cost and accessibility, coal, oil, and gas have been the primary sources of raw material for energy production. The combustion of these resources is the leading cause of climate change, which is forcing us to rethink our use of these traditional fuel sources and look for more efficient means of energy.

Objective E-1: Increase Power Plant Efficiency 10% by 2020



◆ Strategy E-1.1. Join the Local Government Sustainable Energy Coalition (LGSEC)

The LGSEC is a branch of the Local Government Commission that represents local government interests at the State level. While the Coalition's focus is on larger municipalities, it has considerable influence that could benefit the City in terms of power plant efficiency and minimum renewable energy portfolio standards.

Implementation Action

- Pass a resolution and identify funding source to join the Local Government Sustainable Energy Coalition.

CO2EMT Reduction Range

- 100% of Objective E-1.

RENEWABLE ENERGY

Renewable energy is energy generated from naturally replenishing resources, such as sunlight, wind, tides, geothermal heat, and biomass. The use of renewable energy sources in place of fossil fuels substantially reduces greenhouse gas emissions. Solar, wind, biomass, geothermal, and tidal energy are all potential renewable energy sources for Benicia. Increasing Benicia's renewable energy generation requires coordination with PG&E and other third party entities, development of a variety of funding mechanisms, and collaboration with State and regional agencies.

Existing Actions

In 2008 and 2009, the City conducted feasibility studies on potential wind and solar power sources for the water and wastewater facilities and solar potential at the future Benicia Community Center. In 2009, the City received \$75,000 in Valero Improvement Project settlement funds to provide additional staff resources for sustainability initiatives, including renewable energy development. In May 2009, the City issued a comprehensive Renewable Energy Request for Proposals (RFP) to solicit ideas on transitioning the City from non-renewable to renewable energy sources, including potential development of a renewable energy micro-utility north of Lake Herman Road.

◆ Strategy E-2.1. Renewable Energy Project Manager



Hire or contract with a renewable energy project manager who is familiar with local, State, and federal energy policies. The manager would be responsible for developing energy efficiency and renewable energy technologies, educating City officials, community members, and City commissions; providing technical expertise; and, obtaining grants for the City to increase renewable energy production.

Implementation Actions

- Outline tasks and workload, and identify funding source for the Renewable Energy Project Manager;
- Hire or contract a Renewable Energy Project Manager.

CO2EMT Reduction Range

- Not Applicable.

◆ Strategy E-2.2. Property Assessed Clean Energy (PACE) Program



Similar to the BerkeleyFIRST program, a property assessed clean energy program enables private residential, commercial, and industrial property owners to install solar, wind and energy efficiency projects by financing the upfront capital through an additional property tax assessment. The capital cost is amortized over a fixed time period, typically 20 years, through an annual 'special assessment tax'. The debt burden stays with the property rather than the owner, if the property changes hands.

Implementation Actions

- Adopt a resolution to establish PACE program;
- Design the program and determine what kind of projects are eligible for funding and select funding mechanism (Statewide program, private firm, general fund, enterprise fund, bond issuance, etc.);
- Establish a voluntary tax assessment district, allowing interested property owners to 'opt-in' or join a Statewide Joint Powers Authority;
- Set up outreach channels, including a web portal;
- Roll out pilot program;
- Make necessary program improvements

CO2EMT Reduction Range

- 4%-5% of Objective E2.

◆ Strategy E-2.3. Renewable Energy For City Facilities



Transition City procured energy from non-renewable to renewable energy sources by implementing the following options:

Option 1: City-owned Generation Systems - Develop solar, wind, cogeneration, and biomass generation systems. Offset capital costs via PG&E's Self Generation Incentive Program (SGIP)¹⁸, which provides financial incentives for installations of new, qualifying wind or fuel cell self-generation equipment.

Option 2: Green Power Purchase Agreements - Enter into Power Purchase Agreements (PPAs) that license third party providers to build, own, and operate generating systems (solar, wind, biomass, or cogeneration) on City owned building roofs, parking structures, parking lots, or other land. The City would receive income from a lease agreement and would be able to purchase the energy produced at a fixed cost, at or below utility rates.

Green Power Purchasing Agreements are a way for the City to demonstrate its leadership and commitment to green power by using City roofs and land for power generation, with no upfront capital costs.

Option 3: Technical Assistance - Work with third party energy providers and State regulatory agencies to provide technical assistance to the public.

Implementation Action

- Solicit landowner participation and create landowner database.

CO2EMT Reduction Range

- 96%-100% of Objective E2 when combined with E-2.4.

18) Pacific Gas & Electric Company. (2009). Local Government Renewable Energy Self Generation Program (AB 2466). Retrieved March 9, 2009, from Web site: <http://www.pge.com/mybusiness/customerservice/nonpgeutility/generateownpower/ab2466/>

◆ **Strategy E-2.4. Renewable Energy Fund**



Develop a renewable energy fund to provide capital incentives for renewable energy technologies, and/or a revolving loan program.

Option 1: Cash incentives – Develop a cash incentive program for solar and wind generation systems.

Option 2: Revolving loan program – Create a revolving loan program to offer micro-loans for projects that are deemed appropriate by City established guidelines.

Implementation Actions

- Secure funding for cash incentive program;
- Develop program guidelines;
- Assess the feasibility of developing a revolving loan program. If feasible, develop program and define eligible projects;
- Secure funding for revolving loan program.

CO2EMT Reduction Range

- 96%-100% of Objective E2 when combined with E-2.3.

◆ **Strategy E-2.5. Citywide Renewable Energy Mapping and Database**



Develop a citywide database identifying existing and potential renewable energy sites, such as building rooftops, parking and vacant lots. This database could include wind, solar, and other sources citywide.

Implementation Actions

- Secure funding for renewable energy mapping;
- Consult with the CEC and EPA to create wind and solar feasibility maps that identify the renewable energy potential of individual parcels;
- Make database available to public.

CO2EMT Reduction Range

- Not Applicable.

◆ **Strategy E-2.6. Community Choice Aggregation Feasibility Assessment**



Community Choice Aggregation (CCA), created by State Assembly Bill 117, provides communities with the opportunity to ‘opt-out’ of power purchase agreements with traditional energy utilities, such as PG&E. Under a CCA arrangement, the utility continues to own, operate and maintain the transmission lines; however, cities are free to purchase or generate power from sources of their own choosing. Cities can either build their own green energy infrastructure, purchase energy from energy service providers, and/or partner with private firms to develop such infrastructure. A CCA agreement allows all customers within the established CCA district to ‘opt-in’ to the program, providing customers with the ability to obtain locally produced green energy.

The City should consider a CCA feasibility study and financial analysis to determine viability. Economies of scale may require Benicia to partner with another local agency or jurisdiction.

Implementation Actions

- Secure funding for feasibility study;
- Commission feasibility study;
- Consider partnership opportunities with Solano County municipalities and public agencies;
- Initiate conversation with senior management and decision makers in neighboring jurisdictions;
- Implement CCA program.

CO2EMT Reduction Range

- Not Applicable.

Objective E-3: Increase Amount of Solar Energy Production in Benicia



SOLAR ENERGY

The sun's energy can be harnessed for heat and electricity production. Electricity is generated by 'solar cells,' also known as photovoltaic (PV) panels, which convert solar energy from the sunlight into electricity. The use of PV technology can be developed into large-scale plants or small-scale localized energy production facilities. In each case, it is essential that property owners be educated on the need to secure panels and related equipment from theft.

Existing Actions

In 2002 and 2003, the City commissioned ICF Consulting to conduct energy audits on City facilities. The facilities included City Hall, the Corporation Yard, Fire Station 11, Fire Station 12, the Gymnasium, the Library, the Senior Center, James Lemos Swim Center, and the Youth Center. The energy audit identified City Hall and the Corporation Yard as potential sites for PV panel placement.

In 2008, the City commissioned the consulting firm HDR to conduct a solar analysis for select water and wastewater treatment facilities. HDR identified three potential sites for photovoltaic panel placement at the City's wastewater treatment plant (WWTP). HDR's findings indicate that the potential exists to develop a total of 481 kW of solar energy. This includes constructing PV installations at the WWTP, Park Road lift station, Benicia Industrial lift station, water treatment plant, P-1 pump station, and P-2 pump stations. In addition, the City commissioned a Photovoltaic Feasibility Report for the future Benicia Community Center. The report indicates that there is significant solar potential at the site. In May 2009, the City issued a comprehensive renewable energy RFP, which included solar generation at various City facilities.

◆ Strategy E-3.1. Encourage Parking Lot Solar Photovoltaic Arrays



Photovoltaic arrays can be placed on shade structures above parking lots, providing a large area for photovoltaic panels. Such projects could be developed at large parking lot sites belonging to Amports, Benicia High School, Valero, and the City.

Implementation Actions

- Conduct an assessment of parking lots within the city suitable for installation of photovoltaic arrays;
- Act as a facilitator between third party energy providers and parking lot owners to encourage installation of photovoltaic equipment;
- Develop marketing materials promoting benefits of parking lot solar PV arrays to property owners.

CO2EMT Reduction Range

- 92%-100% of Objective E3.

◆ Strategy E-3.2. Solar Permitting Fee Waiver



Waive building permit fees for solar installations in order to reduce perceived financial barriers.

Implementation Actions

- Remove building permit fees for solar installation from fee schedule;
- Educate the public regarding the new program.

CO2EMT Reduction Range

- This strategy supports E-3.3. All reductions for this strategy have been included in E-3.3.

◆ **Strategy E-3.3. Promote California Solar Initiative and Other Applicable Incentive Programs**



The California Solar Initiative (CSI) is a partnership between the State of California and California’s investor-owned utilities, such as PG&E, and is responsible for offering statewide solar rebates. The City can help promote this program and other similar programs by creating an education outreach campaign familiarizing Benicia citizens with existing rebates and incentives. The campaign may include presentations and workshops for homeowners, as well as web-based resources.

Implementation Actions

- Develop education outreach campaign, targeted to solar installation contractors, residents, and business owners for existing incentive programs, including the CSI;
- Integrate resources into the City’s regularly maintained sustainable development website.

CO2EMT Reduction Range

- 8%-10% of Objective E3.



PV panels can help the City produce its own power.

Objective E-4: Increase Amount of Wind Energy Production in Benicia to 15% of Citywide Usage by 2020



WIND ENERGY

Wind is the fastest growing segment of the energy market. The City of Benicia has incredible wind resources that present a considerable opportunity. This opportunity should be seized to the largest extent practicable. New vertical axis wind turbines should be included as potential alternatives to traditional horizontal axis turbines.

Existing Actions

In 2008, the City commissioned the consulting firm HDR to conduct a wind analysis for select water and wastewater treatment facilities. The study concluded that a 250 kW turbine at the water treatment plant could supply 37 percent of the plant’s annual electricity demand. In addition, the study found that two pump stations are potentially viable sites for wind turbines, although a detailed analysis of these sites was not included in the scope of this study.

◆ **Strategy E-4.1. Increase Wind Energy Generation within City Limits**



Encourage property owners to install vertical axis wind turbines by creating and adopting an overlay zone that streamlines the permit process of wind energy collection systems in particular zoning districts. Allowed height, size, and noise thresholds would be established through design guidelines, which would need to be developed in conjunction with the overlay district.

Implementation Actions

- Sponsor community workshops to educate the community about wind energy collection technology;
- Create and adopt an overlay zone that streamlines the permitting process of wind energy systems in designated areas deemed to be suitable for such use. Allowed height, size, and noise level would be established through design guidelines;

- Develop design guidelines specifying the allowed size, height, and maximum noise thresholds of wind collection systems in appropriate zoning designations.

CO2EMT Reduction Range

- 100% of Objective E4.



Horizontal-axis wind turbines are considered to be the best available technology for large-scale generation.

Objective E-5: Assess and Conduct a Feasibility Study for Use of Tidal and Geothermal Power by 2020

CO2EMT estimate not applicable

EMERGING RENEWABLE ENERGY SOURCES

As new renewable energy technologies are continually being developed, efficiency will increase, cost will decrease, and demonstrated effectiveness of renewable energies will promote wide spread use. Emerging renewable energy sources, such as biomass residue capture, methane gas capture, tidal power, and geothermal power may become more viable sources of energy for Benicia. Continued monitoring of research and development projects will ensure that Benicia is familiar with the latest technologies. Because the potential of using these technologies is uncertain, **emissions reductions were not estimated.**

Existing Actions

The wastewater treatment plant currently utilizes methane gas (aka biogas) generated from anaerobic digesters as the fuel source for boilers that heat the digesters. The anaerobic digesters produce enough methane gas to run the boilers over 97 percent of the time. Natural gas is used as an alternative fuel source when necessary.

◆ Strategy E-5.1. Investigate Tidal Power

Investigate the feasibility of forming a joint powers agreement for tidal power production. Coordination with other Bay Area municipalities and public agencies is necessary due to constraints associated with local water resources, including the narrow width and protected status of the Carquinez Strait.

Implementation Action

- Form a partnership with other municipalities and public agencies to explore the feasibility of a demonstration project.

CO2EMT Reduction Range

- Not Applicable.

◆ Strategy E-5.2: Geothermal Energy Procurement

Identify and assess viable sites for geothermal resources. Geothermal resources use heat from the earth to generate energy.

Implementation Actions

- Investigate local and regional sources of geothermal power;
- Determine feasibility of acquiring the rights to identified geothermal power sources.

CO2EMT Reduction Range

- Not Applicable.

Objective E-6: Conduct a Smart Grid Feasibility Study by 2020

CO2EMT estimate not applicable

GRID IMPROVEMENTS

Like most cities in the United States, Benicia has outdated power delivery infrastructure. Impacts associated with climate change could damage and over-load power lines. The grid is designed for one-way inputs from large-scale power providers making distributed generation very difficult, expensive and unreliable. With an increase in distributed energy generation, the power grid will need to be updated. Distributed generation is defined as any small scale electric generation that is located at or near the point of end use.

Existing Actions

The PG&E SmartMetering program provides customers with a two-way communication system that shows their gas and electricity consumption in real time. This raises consumer awareness, allows for a better assessment of demand for power production and reduces wasteful energy generation. PG&E plans to install SmartMeters for all account customers in Benicia starting in October 2009 and finishing by July 2010.

◆ Strategy E-6.1. Smart Grid Feasibility Study



Investigate the feasibility of building a smart grid infrastructure and identify partners such as PG&E. Smart grids allow for two-way electrical exchange, which is essential for distributed power production. The network provides feedback of real-time electricity consumption and production trends.

Implementation Actions

- Partner with PG&E to commission a feasibility study to identify necessary improvements, cost estimates, and the technical requirements of a smart grid retrofit;
- Secure local, State, and federal funding to install smart grid infrastructure.

CO2EMT Reduction Range

- Not Applicable.