# ENERGY

## INTRODUCTION

Energy consumption (including electricity natural gas, and propane) generated 21% of Yolo County's GHG emissions in 1990 (131,652 MT $CO_2e$/yr). Since 1990, building energy-related emissions have grown by 38% to 181,447 MT $CO_2e$/yr in 2008. Current emissions are projected to grow to 404,929 MT $CO_2e$/yr by 2020 and 628,444 MT $CO_2e$/yr by 2030.

### Background

#### Energy Sources

Pacific Gas and Electric (PG&E) provides both natural gas and electricity to unincorporated Yolo County. PG&E generates electricity at hydroelectric (16%), nuclear (22%), renewable solar, geothermal and biomass (14%), natural gas (39%), and coal (8%) facilities. In 2010, 52% of the unincorporated county's electricity use was GHG-free.

Under California's Renewable Portfolio Standard (RPS) discussed in Chapter 2, PG&E will be required to generate 20% of their retail electricity using qualified renewable energy technologies by the end of 2010. To comply with this mandate, PG&E will increase the percentage of its energy portfolio met through renewable sources by 6%. Regulations for a Renewable Electricity Standard were adopted in 2010 and increased the renewable generation goal to 33% by 2020.

#### Building Stock

In 1978, California established a set of energy efficiency standards for residential and non-residential units. These standards, referred to as the California Energy Code, or Title 24, Part 6 of the California Code of Regulations, are updated periodically to incorporate new energy efficiency technologies and methods. As a result of these standards, homes built within the last decade are approximately 4.5 times more efficient per square foot than homes built prior to 1960. For this reason, the age of a community's building stock has important implications for both building energy consumption and GHG emissions.

#### Residential

U.S. Census data shows that 45% of unincorporated Yolo County's residential housing stock was constructed prior to the 1978 Title 24 standards. One in ten homes was constructed prior to 1950. Homes of this vintage frequently have minimal insulation, antiquated furnace systems, single-pane windows, and drafty construction. While a portion of the housing stock has been retrofitted to include energy efficiency improvements, there is still a large potential for energy savings in most homes in the County.

#### Commercial

Similar to residential units, much of unincorporated Yolo County's non-residential building stock was constructed prior to Title 24. Commercial buildings built prior to 1980 often have inefficient heating, ventilation and air conditioning units. Additionally, lighting systems and major appliances such as refrigeration units can often be significantly improved.

Yolo County has a high potential for both photovoltaic and solar hot water heating systems; even in the winter, there is moderate potential for solar energy.

Yolo County has improved the energy efficiency of its own public facilities considerably through lighting, HVAC and appliance upgrades.

Consequently, the building stock offers considerable opportunity for cost-effective energy efficiency retrofits to decrease the use of both electricity and natural gas. The County plans to achieve building energy efficiency improvements in both existing and new residential units and commercial buildings through a combination of education, incentives, and regulation (see measure E-2).

**Renewable Energy**

Renewable energy can be produced using distributed generation facilities such as rooftop solar systems, or can be purchased through the utility grid from remote generation facilities. Presently, a limited number of renewable energy generation systems are located within Yolo County. As of 2010, approximately 194 buildings in the unincorporated county have installed solar photovoltaic systems totaling over 2 MW of capacity. Several solar facilities have been approved or are under preliminary consideration in locations throughout the county. Increasing local renewable energy generation and grid content will reduce communitywide GHG emissions.

**Solar Energy Potential**

National Renewable Energy Laboratory (NREL) data indicates that solar energy is the most promising option for future renewable energy generation. Yolo County receives enough energy from the sun to produce approximately 5.0 to 5.5 kilowatt hours per square meter per day ($kWh/m^2/day$). This level of solar insolation (i.e., the measure of solar radiation energy received on a given surface area in a given time) suggests a high potential for both photovoltaic and solar hot water heating systems in the county. Insolation levels fluctuate between summer and winter. However, during most of the year, solar energy potential is considered good to excellent. Even in the winter, Yolo County has moderate, but still acceptable, potential for solar energy.

To increase the portion of Yolo County's energy portfolio met through renewable sources, the County will require the installation of solar photovoltaic and solar hot water systems, both of which are effective technologies in the sunny climate of Yolo County (see measure E-7).

**Water**

*Groundwater.* Aquifers beneath Yolo County are essentially contained within two stratigraphic units: (1) the older thick alluvial and river sediments of the Tehama formation, and (2) the younger sediments of the Red Bluff formation, floodplain deposits, and stream channel deposits that overlie the Tehama formation. The aquifers are recharged by runoff and groundwater from the east-facing foothills, by percolation of precipitation, and by infiltration of surface water. Surface water infiltration is provided by the creeks and streams that flow from the Coast Ranges into the County; from delivered and applied irrigation water; from Sacramento and Feather River flood waters diverted to the Yolo Bypass; from the Sacramento River; and from the Sacramento River Deep

Water Ship Channel that extends south from West Sacramento.

*Surface water.* Most runoff that affects Yolo County originates outside of the County. Yolo County is a small portion, 3.8% (1,034 square miles) of the large Sacramento Hydrologic Region or watershed, which covers 26,960 square miles of land. The principal watersheds that affect Yolo County are the Sacramento River, Yolo Bypass, Colusa Basin Drain, Cache Creek, Willow Slough, and Putah Creek.

Energy is required to pump, transport, and treat potable water and wastewater, as well as to heat and cool it. These emissions are embedded within the energy emissions inventory. With water supplies expected to continue declining in coming decades, water conservation strategies have a double benefit of reducing emissions and aligning demand with future water availability. Emission reductions in the water sector are, in great part, driven by State legislation. Senate Bill (SB) 7 (2009), requires a reduction in per capita water consumption by 2020. The reduction must meet either the "standard target" (a 20% reduction from the average water demand between 1994 and 2004), or an "alternative minimum" target (a 5% reduction from the average water demand between 2003 and 2007). Thus, the water districts in Yolo County (i.e., Dunnigan Water District, Colusa Basin Drainage District, Yolo County Flood Control & Water Conservation District, Yolo-Zamora Water District, Reclamation Districts) have two paths from which to choose, which will have ramifications for the amount of water reduction that the county will need to achieve in order to comply with SB 7.

**The Energy Strategy**

Energy emissions can be reduced by lowering energy demand, improving water and energy efficiency, and increasing the amount of electricity and heat generated from renewable energy sources. The strategy proposed in this section consists of voluntary programs, County Code revisions, and mandatory ordinances. As outlined in the CAP, there are simple, cost-effective energy and water conservation strategies that residents, businesses, farmers, and local government can implement. The County is anticipating that these measures will have a net-positive economic effect, in addition to preparing county residents, businesses, and farms for a future with potentially more restricted and expensive energy and water resources.

The total GHG emission reduction potential of the Energy Strategy is estimated to be 180,425 MT $CO_2$e/yr in 2020 and 283,033 MT $CO_2$e/yr in 2030, or approximately 47% and 30% of the total GHG reductions achieved across both State and County GHG reduction measures in 2020 and 2030, respectively.

# MEASURE E-1:
# PURSUE A COMMUNITY CHOICE AGGREGATION PROGRAM

## Measure Description

Assembly Bill 117 (2002) enables California cities and counties, either individually or collectively, to supply electricity to customers within their jurisdiction by establishing a community choice aggregation (CCA) program. Unlike a municipal utility, a CCA does not own transmission and delivery systems, but is responsible for providing electricity to residents and businesses. The CCA may own electric generating facilities, but more often, it purchases electricity from private electricity generators. Marin, Sonoma, Humboldt, and San Francisco Counties are in various stages of implementing a CCA.

The primary benefits offered by a CCA are local control over the energy sources used within the community, the ability to provide electricity to customers at lower overall cost, and greater use of renewable energy. Cost savings can accrue to customers through lower electric bills or can be used by the CCA entity (in this case, Yolo County) to provide enhanced services to its constituents. Cost savings are primarily attributed to:

- Lower financing costs for generation (e.g., tax-free revenue bonds),
- No stockholders and/or investors to pay, unlike the investor-owned utilities, and
- No income taxes, unlike the utilities.

Through a CCA, Yolo County can choose to structure a supply portfolio that achieves cost efficiencies, fuel and technological diversity, environmental improvements, and/or cost stability. The County can also choose to develop its own energy resources, consistent with the 2030 Yolo County General Plan. The provision of local sustainable energy projects would improve energy transmission efficiency, provide greater control over the energy portfolio, and would create economic development. The 2030 General Plan contains several policies and actions that require streamlined permitting and reduced fees for alternative energy development.

A CCA would facilitate implementation of an aggressive program to increase use of renewable energy resources and promote improved energy efficiency. As a reflection of these opportunities, the CAP assumes that the County will set the following 2020 targets for the CCA:

- 25% of consumers use PG&E's portfolio (0% by 2030)
- 50% of consumers purchase a "light green" portfolio comprised of 50% renewable sources (75% by 2030)
- 25% of consumers purchase a "deep green" portfolio comprised of 100% renewable sources (assumed to include a 10% cost premium) (25% by 2030)

Developing a CCA will require a detailed analysis of energy demand, efficiency opportunities, and renewable generation opportunities in the unincorporated area. Building on existing models from other counties is likely to reduce initial program design costs. The program would be most effective if the County partnered with cities and other jurisdictions and established a stakeholder advisory group.

The County will develop a detailed business plan that identifies organization, governance, rate structure, enrollment, electric resources, a financial plan, and an implementation strategy and schedule for the CCA.

The County will work with PG&E to ensure that implementation and roll-out of the CCA program establishes a clear division of procedures, responsibilities, and rights. For the ratepayer, all customers in a CCA program's service area automatically become customers of that CCA program unless they actively opt out of the CCA program. Ratepayers have the right to opt out of CCA procurement service during the CCA program's two 60-day formal notification periods. If the ratepayer opts out, PG&E would continue to procure electricity. In either event, PG&E would continue to manage the transmission, distribution, and delivery of the CCA's electricity, including providing meter reading, billing, and maintenance and outage response services. Additional PG&E services, including energy efficiency, California Alternate Rates for Energy, balanced payment plans, net metering, California Solar Initiative, other solar programs, the ClimateSmart™ program and some demand response programs, as well as programs such as eBills and Automated Payment Services would still be available to CCA customers in the county.

**2020 GHG Reduction Potential:**
**117,285 MT $CO_2e$ (45%)**

**2030 GHG Reduction Potential:**
**145,884 MT $CO_2e$ (30%)**

**Community Co-Benefits:**
Improve Air Quality
Reduce Energy Consumption

**Applicability:**
Countywide

| ACTION | | RESPONSIBILITY | TIMEFRAME |
|---|---|---|---|
| A | Prepare a preliminary feasibility study to determine the potential for and benefits of a community choice aggregation program in the County. Analyze energy production costs and establish a stakeholder advisory group. To the extent feasible, the CCA program shall be designed to prioritize the development of local energy projects. | County Administrator | Short-Term |
| B | Identify partners among Yolo County cities and other jurisdictions to participate in the Countywide CCA program. | County Administrator | Short-Term |
| C | Develop a detailed business plan that identifies organization, governance, rate structure, enrollment, electric resources, a financial plan, and implementation schedule for the proposed CCA. | County Administrator | Medium-Term |
| D | Develop a CCA implementation plan and submit to the California Public Utilities Commission as required by AB 117. | County Administrator | Medium-Term |

| PROGRESS INDICATORS | | TARGET YEAR |
|---|---|---|
| A | Develop a CCA feasibility study and identify partner jurisdictions. | 2012 |
| B | Develop a business plan and implementation strategy for the CCA. | 2015 |
| C | 50% of consumers purchase "light green" portfolio comprised of 50% renewable sources; 25% of consumers purchase "deep green" portfolio comprised of 100% renewable sources; 25% of consumers stay with PG&E portfolio. | 2020 |
| D | 75% of consumers purchase "light green" portfolio comprised of 50% renewable sources; 25% of consumers purchase "deep green" portfolio comprised of 100% renewable sources. | 2030 |

# MEASURE E-2:
# REDUCE ENERGY CONSUMPTION IN EXISTING RESIDENTIAL AND NON-RESIDENTIAL UNITS

## Measure Description

The County will develop a comprehensive program that encourages home and building owners to complete energy efficiency retrofits. Many residences (approximately 54%) in unincorporated Yolo County are owner–occupied, and thus the financial savings of home energy efficiency retrofits are in the long-term economic interest of the homeowner. Similar to the residential housing stock, a large number of industrial and commercial buildings were constructed prior to Title 24.

### Voluntary Programs

The County conducted an energy conservation retrofit program for its own buildings in 2004, resulting in retrofitted light packages, boilers, economizers, chillers, fans, water heaters, motors, and HVAC systems, increasing energy efficiency and yielding a projected savings of $500,000 dollars annually over 15 years.

The County will build on these successes by emphasizing voluntary participation in countywide energy efficiency retrofit programs. To encourage participation from home and building owners, the County will leverage Energy Upgrade California's educational materials and online platform to provide access to incentives, technical assistance, and qualified contractors. The County will also promote resources to link home and building owners to educational and financial resources. Such programs include, but are not limited to:

- Yolo Energy Watch,
- California Flex Your Power,
- Department of Energy Weatherization Assistance Program (WAP),
- Utility programs such as free energy audits and building energy efficiency rebates and incentives; and
- EPA Portfolio Manager

The County will place particular emphasis on outreach to mobile home residents and owners and low-income households. This outreach will promote the WAP and other technical and financial assistance programs that could enable homeowners and residents to lower energy bills through no- to low-cost investments in energy efficiency retrofits.

### Financing

Financing is critical to the success of the energy efficiency program. The County will continue to implement its Property Assessed Clean Energy (PACE) program to promote energy efficiency retrofits. This program allows qualified residential property owners to repay the cost of energy efficiency retrofits on their property tax bill.[1] Other low cost financing programs are available such as the Department of Housing and Urban Development PowerSaver program, which offers low interest loans for energy efficiency retrofits. Conventional means, such as home equity loans, are also available to finance energy efficiency.

[1] At the time of writing, the PACE program is being litigated in federal and state courts.

As part of this program, the County has established participation goals. For the 2020 planning horizon, 20% of residential units would complete an energy efficiency retrofit, with an average energy efficiency improvement of 15%; and 10% of non-residential buildings would complete an energy efficiency retrofit, with an average energy efficiency improvement of 20%. For 2030, participation rates increase to 70% of residential units and 30% of non-residential units.

**2020 GHG Reduction Potential:**
**3,948 MT $CO_2e$ (2%)**

**2030 GHG Reduction Potential:**
**12,322 MT $CO_2e$ (3%)**

**Community Co-Benefits:**
Improve Air Quality
Reduce Energy Consumption

**Applicability:**
Existing Development

| ACTION | | RESPONSIBILITY | TIMEFRAME |
|---|---|---|---|
| A | Promote the Energy Upgrade California Program, Yolo Energy Watch, and other incentive and technical assistance programs to residential and commercial property owners through County website. | Planning & Public Works | Short-Term |
| B | Implement the Property-Assessed-Clean-Energy (PACE) program, as adopted by the Board of Supervisors in January, 2010, as state and federal funds are available. | Planning & Public Works Buildings | Medium-Term |
| C | Amend the Yolo County Code to require that all residential and non-residential remodels/additions for homes, where the construction value exceeds 50% of the home/building value, improve overall energy efficiency by 15%. | Planning & Public Works Buildings | Long-Term |
| D | Work with Community Action Agencies (e.g., North Coast Energy Services) to increase participation by eligible low-income residents and mobile home owners in the WAP and the Low-Income Home Energy Assistance Program (LiHEAP). | Planning & Public Works | Short-Term |

| PROGRESS INDICATORS | | TARGET YEAR |
|---|---|---|
| A | 20% of residential units complete an energy efficiency retrofit, with an average energy efficiency improvement of 15%. | 2020 |
| B | 10% of non-residential buildings complete an energy efficiency retrofit, with an average energy efficiency improvement of 20%. | 2020 |
| C | 70% of residential units complete an energy efficiency retrofit, with an average energy efficiency improvement of 15%. | 2030 |
| D | 30% of non-residential buildings complete an energy efficiency retrofit, with an average energy efficiency improvement of 20%. | 2030 |

# MEASURE E-3:
# REDUCE ENERGY CONSUMPTION IN NEW RESIDENTIAL AND NON-RESIDENTIAL UNITS

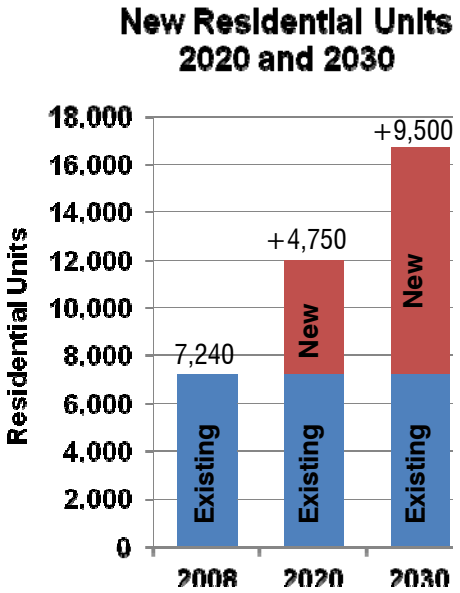
## Measure Description

The County's 2009 Building Code contains a list of basic energy conservation measures that new development must meet, however no specific energy performance standard is stipulated (Section 8.7.402). In contrast, the California Green Building Code (Part 11 of the California Building Standards Code in Title 24 of the California Code of Regulations), also known as the CalGreen standards, contain benchmarks for energy performance, as opposed to a prescriptive list of energy efficiency measures. The CalGreen standards went into effect statewide on January 1, 2011.

The CalGreen standards also provide the County an option to adopt energy efficiency standards that surpass basic State requirements. CalGreen contains two options for energy performance in new construction: Tier 1 requires a building's energy performance to exceed Title 24 requirements by 15%, while Tier 2 increases this standard to 30%. The County will amend the Building Code to set an energy performance standard of 15% above Title 24 baseline for new residential development (excluding affordable housing) equivalent to Tier 1. All new homes over 3,500 square feet would be *required* to achieve or exceed the Tier 2 CalGreen standard (30% above Title 24 baseline). Due to the current business climate, commercial and industrial development would be required to meet the new standard of 15% above Title 24 in 2013.

The CalGreen standards are performance-based, allowing the builder to achieve enhanced efficiency by incorporating a variety of building practices and materials. Increasing the energy efficiency of new residential units and commercial buildings should not only reduce energy consumption in the community, but could also considerably reduce homeowner and business energy bills.

The County will also develop a program that encourages exemplary performance in new residential and commercial development. Buildings achieving Tier 2 performance or better would be able to sell credit for the emission reductions or energy savings that exceed 15% to other developers within Yolo County. As part of the exemplary performance program, the County expects that 2% of both new residential (under 3,500 sq. ft.) and non-residential units will achieve exemplary



performance (Tier 2) and 0.5% of new buildings will achieve zero-net energy demand by 2020. By 2030, these participation rates increase to 12% of new residential and non-residential units achieving exemplary performance and 2% of new buildings achieving zero-net energy demand.

A range of incentives and technical assistance are provided by federal and state agencies, and well as the energy utility that can help new developments meet these standards.These programs can be leveraged to encourage high-performance new building design and construction within commercial buildings. These programs offer building owners and design teams a wide range of services, such as design assistance; design team incentives; owner incentives; and an educational resource.

**2020 GHG Reduction Potential:**
**31,852 MT $CO_2e$ (12%)**

**2030 GHG Reduction Potential:**
**67,200 MT $CO_2e$ (14%)**

**Community Co-Benefits:**
Improve Air Quality
Reduce Energy Consumption

**Applicability:**
New Development

| ACTION | | RESPONSIBILITY | TIMEFRAME |
|---|---|---|---|
| A | Amend the Yolo County Code to require that all new residential construction (excluding affordable housing) exceed the California Energy Code 2008 Energy Efficiency standards (Title 24) by 15% (consistent with CalGreen Tier 1 standards). | Planning & Public Works | Short-Term |
| B | Amend the Yolo County Code to require that all new homes with over 3,500 square feet of livable space exceed the California Energy Code 2008 Energy Efficiency standards (Title 24) by 30% (consistent with CalGreen Tier 2 standards). | Planning & Public Works | Short-Term |
| C | Amend the County Code to require all new non-residential construction to exceed the California Energy Code 2008 Energy Efficiency Standards (Title 24) by 15% beginning in 2013. | Planning & Public Works | Short-Term |
| D | Create a program to allow commercial builders who exceed the California Energy Code Energy Efficiency standards (Title 24) by 30% (consistent with CalGreen Tier 2 standards) or more to sell credit for emission reductions or energy savings exceeding 15% to other developers within Yolo County. | Planning & Public Works | Medium-Term |

| PROGRESS INDICATORS | | TARGET YEAR |
|---|---|---|
| A | 97.5% of new buildings (residential over 3,500 square feet of livable space and non-residential) achieve Tier 1 energy performance. | 2020 |
| B | 2% of new buildings (residential and non-residential) achieve exemplary performance (Tier 2) and 0.5% of new buildings achieve zero-net energy demand. | 2020 |
| C | 86% of new buildings (residential over 3,500 square feet of livable space and non-residential) achieve Tier 1 energy performance. | 2030 |
| D | 12% of new buildings (residential and non-residential) achieve exemplary performance (Tier 2) and 2% of new buildings achieve zero-net energy demand. | 2030 |

# MEASURE E-4:
# INCREASE ON-SITE RENEWABLE ENERGY GENERATION TO REDUCE DEMAND FOR GRID ENERGY

## Measure Description

On-site renewable energy generation is an effective way to reduce demand for grid energy. With the combination of available rebates, tax incentives, and financing programs, climate- and region-appropriate technologies such as solar hot water heating and solar photovoltaic systems have become a cost-effective means to increase renewable energy generation capacity in Yolo County. Other technologies should also be pursued and encouraged, including but not limited to heat capture, methane capture, and anaerobic waste digesters. Facilities and operations that can demonstrate equivalent reductions to solar systems using alternative on-site renewable energy generation technologies are in compliance with this measure.

### Solar Hot Water

Solar hot water systems offer a simple and reliable way to harness the sun's energy to provide hot water. Solar collectors, absorb the sun's energy to heat water stored in a tank.

The State has recognized the value of solar hot water heaters. Assembly Bill (AB) 1470 (2007) created a 10-year program to support installation of solar water heaters in homes and businesses. AB 1470 was designed to lower the initial costs of purchasing a system, which average $3,000 to $6,000.
With available incentives, solar hot water systems can also be a cost-effective replacement for inefficient water heaters. According to the California Solar Initiative (CSI), solar hot water systems can lower energy bills by meeting 50% to 80% of hot water needs annually. Though the high capital cost of solar water heaters can present a financial burden to homeowners, a range of financing and rebate options are available to offset initial investments.

### Solar Photovoltaics (PV)

Solar photovoltaic (PV) systems generate electrical power by converting solar radiation into direct current electricity using semiconductors. PV power generation uses solar panels comprised of cells containing photovoltaic material. PV systems can be retrofitted into existing buildings, usually by mounting them on an existing roof structure or wall. Yolo County has an excellent solar potential of between 5.0 and 5.5 $kWh/m^2/day$, which is sufficient to support solar PV installations that would cover a large percentage of an average home's electricity demand. To date, CSI has facilitated the installation of 16.7 Megawatts (MW) of solar PV in Yolo County, including within incorporated cities. Approximately 194 buildings have installed solar PV systems in the unincorporated areas, costing just under $8 per watt-installed.

### Renewable Energy Program

The County will develop a comprehensive solar program that encourages home and building owners to install solar hot water and PV systems. The County will aim to maximize community participation, and encourage homeowners to leverage the Energy Upgrade California program. The County can use CSI materials to encourage home and building owners to request free audits provided by private solar financing and installation companies.

As part of this program, the County anticipates that by 2020, 90% of new residential units (excluding affordable housing) and 15% of existing residential units

will install solar hot water heaters. Due to the current business climate, new commercial development would be required to install solar hot water heaters beginning in 2013. As a result the CAP assumes that 100% of new and 5% of existing commercial buildings after 2013, will install solar hot water heaters. The County expects that participation in the solar PV program will be smaller relative to the solar hot water program due to the higher system cost of solar PV. Expected participation rates for the solar PV program are as follows: 90% of new residential units (excluding affordable housing) and 5% of existing residential units; 100% of new commercial buildings (beginning in 2013); and 200,000 square feet of existing commercial rooftops. In addition, by 2030 the County anticipates that 40% of existing residential and 10% of existing commercial will install solar hot water heaters, and 10% of existing residential and 300,000 square feet of existing commercial rooftops will install solar PV.

A number of financing options may be used to reduce upfront costs, such as the

**2020 GHG Reduction Potential:**
**24,870 MT $CO_2e$ (10%)**

**2030 GHG Reduction Potential:**
**52,032 MT $CO_2e$ (11%)**

**Community Co-Benefits:**
Improve Air Quality
Reduce Energy Consumption

**Applicability:**
New and Existing Development

| ACTION | | RESPONSIBILITY | TIMEFRAME |
|---|---|---|---|
| A | Develop an outreach program to promote the Energy Upgrade California program for residential property owners. | Planning & Public Works | Medium-Term |
| B | Implement the PACE program, as state and federal funds are available. | Planning & Public Works | Medium-Term |
| C | Develop an outreach program to promote financial incentives available through CSI for installing solar hot water systems. | Planning & Public Works | Medium-Term |
| D | Amend the County Code to require all new residential (excluding affordable housing) and commercial development (beginning in 2013) to install solar hot water systems. | Planning & Public Works | Short-Term |
| E | Amend the County Code to require all new residential development of four units or more and non-residential development to install solar photovoltaic systems capable of providing 10% or more of the development's total projected electricity consumption. | Planning & Public Works | Short-Term |

| PROGRESS INDICATORS | | TARGET YEAR |
|---|---|---|
| A | Complete County Code amendments. | 2012 |
| B | 90% of new and 15% of existing residential units and 100% of new and 5% of existing commercial buildings install solar hot water heaters. | 2020 |
| C | 90% of new residential units (excluding affordable housing) and 5% of existing residential units and 100% of new commercial buildings (beginning in 2013) and 200,000 sq ft of existing commercial rooftops install solar PV. | 2020 |
| D | 100% of new and 40% of existing residential units and 100% of new and 10% of existing commercial buildings install solar hot water heaters. | 2030 |
| E | 100% of new and 10% of existing residential units and 100% of new commercial buildings and 300,000 sq ft of existing commercial rooftop install solar PV. | 2030 |

County's PACE program, low cost financing programs such as HUD PowerSaver, federal tax incentives through the Energy Policy Act of 2005, and financial incentives through AB 1470. The County will continue to implement its PACE program, which allows qualified property owners to repay the cost of renewable energy systems on their property tax bill. Other financing models, such as power purchase agreements (PPAs), can be used to offset the initial capital cost of installing a solar PV system. Home and building owners can finance renewable systems by accessing a variety of financing programs, and will also be able to capitalize on additional rebates through CSI.

# MEASURE E-5:
# PROMOTE ON-FARM RENEWABLE ENERGY FACILITIES

## Measure Description

Biomass energy is generated from plant-materials, including sources such as food crops and agriculture and forestry residues. A number of technologies are available to convert biomass into renewable energy. The facilities may generate energy directly, in the form of heat or electricity, or may convert it to biofuel or combustible biogas. Yolo County produces a substantial quantity of agricultural residues, which could serve as a fuel source to create renewable energy.

Dixon Ridge Farms, located in the City of Winters, has developed a 50-kW biogas powered generator that converts walnut shell refuse into energy. The CEC provided a grant for the generator and the farm owner paid for construction. These costs were recouped through energy savings. The energy is used to fuel drying facilities, heat buildings, and generate electricity.

In recognition of this opportunity, the County will develop a farmer-to-farmer workshop program promoting opportunities for on-farm renewable energy generation. Yolo Energy Watch can assist in arranging training for the workshop. The County anticipates that 1 MW of renewable energy will be generated on farms in the unincorporated County (excluding solar water pumps) by 2020. By 2030, this is anticipated to increase to 2 MW.

**2020 GHG Reduction Potential:**
**316 MT $CO_2e$ (<1%)**

**2030 GHG Reduction Potential:**
**632 MT $CO_2e$ (<1%)**

**Community Co-Benefits:**
Reduce Energy Use
Support Agriculture

**Applicability:**
New and Existing Agriculture

| ACTION | | RESPONSIBILITY | TIMEFRAME |
|---|---|---|---|
| A | Develop a farmer-to-farmer workshop program that promotes opportunities for on-farm renewable energy generation facilities through demonstration projects. | Planning & Public Works | Medium-Term |
| B | Identify funding sources to finance investments in renewable energy for agricultural operations. | Planning & Public Works | Short-Term |

| PROGRESS INDICATORS | | TARGET YEAR |
|---|---|---|
| A | Identify funding sources to finance investments in renewable energy for agricultural operations. | 2012 |
| B | Develop a farmer-to-farmer workshop program. | 2014 |
| C | 1 MW of renewable energy generated on farms in the unincorporated County (excluding solar water pumps). | 2020 |
| D | 2 MW of renewable energy generated on farms in the unincorporated County (excluding solar water pumps). | 2030 |

# **MEASURE E-6:** REDUCE WATER CONSUMPTION IN EXISTING BUILDINGS THROUGH INCREASED PLUMBING FIXTURE EFFICIENCY

## Measure Description

Many residential units and commercial buildings in the unincorporated county are more than 30 years old. The efficiency of water fixtures and appliances has improved since that time, and replacing antiquated equipment would create valuable water conservation benefits.

The partnership will provide technical assistance, free water audits, and rebate incentives. To improve indoor water efficiency, programs will focus on upgrading water fixtures and fixture fittings, repairing leaks, and new appliances.

This measure will help the water districts to comply with the SB 7 mandated reduction in per capita urban water consumption (20% reduction by 2020). The measure will also support the implementation of SB 407, which establishes requirements for residential units and commercial buildings constructed and occupied before 1994 to replace water inefficient plumbing fixtures. The County expects that 100% of residential units built prior to 1994 will improve fixtures and fixture fitting water efficiency by 15% by 2020 and by 20% by 2030. Leak repair is expected to reduce 6% or water use in 40% of existing residential units and commercial buildings.

**2020 GHG Reduction Potential:**
**2,103 MT $CO_2e$ (1%)**

**2030 GHG Reduction Potential:**
**4,100 MT $CO_2e$ (1%)**

**Community Co-Benefits:**
Reduce Water Use

**Applicability:**
New and Existing Development

| ACTION | | RESPONSIBILITY | TIMEFRAME |
|---|---|---|---|
| A | Amend the County Code to require that residences built prior to 1994 be retrofitted with water efficient fixtures prior to resale. | Planning & Public Works | Short-Term |
| B | Develop a program in coordination with Yolo County water districts to promote voluntary water efficiency retrofits for existing buildings through technical assistance, free water efficiency audits and rebate incentives. | Planning & Public Works | Short-Term |

| PROGRESS INDICATORS | | TARGET YEAR |
|---|---|---|
| A | 100% of residential units built prior to 1994 improve fixture and fixture fitting water efficiency by 15%. | 2020 |
| B | 40% of existing residential units and commercial buildings reduce water consumption by 6% through water leak repair. | 2020 |
| C | 100% of residential units built prior to 1994 improve fixture and fixture fitting water efficiency by 20%. | 2030 |

# MEASURE E-7:
# PROMOTE WEATHER-BASED IRRIGATION SYSTEMS AND WATER EFFICIENT TURF MANAGEMENT

## Measure Description

After agricultural irrigation, landscape irrigation is one of the largest uses of potable water in Yolo County. A typical home or business with landscaping may use half or more of its total potable water demand for irrigation. Thus, designing landscapes to favor low-water demand plants adapted to the local climate is one of the most cost-effective ways to reduce potable water use. To complement plant selection, installing weather-based irrigation controllers that adjust irrigation in response to weather and soil moisture conditions and employing more water-efficient turf management practices can further reduce water use.

### Weather-based Irrigation Controllers

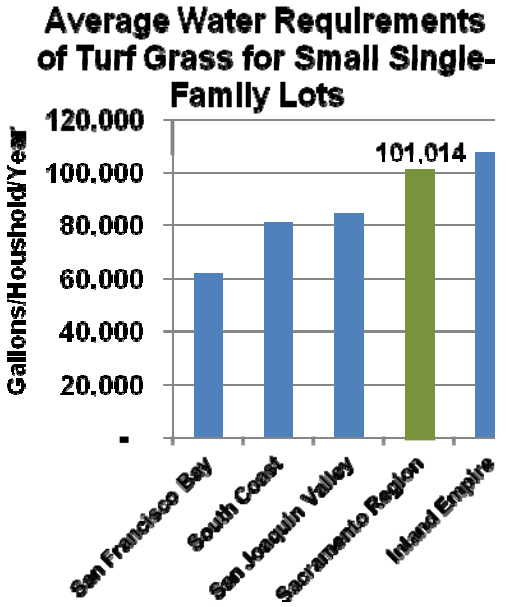
To maximize water efficiency in turf and other grasses, irrigation programs should be based on cumulative evapotranspiration losses, soil moisture retention, effective root depth, infiltration rates, and the type of turf being irrigated. An irrigation program set up on a calendar basis is much less efficient than one based on these criteria. Daily water use can be estimated using pan evaporation measurements available from weather stations.

Weather-based irrigation controllers (WBICs) work on a simple principle: they provide an appropriate watering schedule, adjust for weather changes, and irrigate based on landscape needs. A smart controller automatically reduces watering times as weather gets cooler and less water is needed. As the weather begins to warm, the controller adds more watering time. The controller is typically set for a default maximum watering time, based on the hottest time of year. The controller then reduces that time when less water is needed.

By allowing for more accurate, customized irrigation, WBICs save water by reducing demand and allow irrigation to be tailored to a landscape's specific plant and climate needs. To support WBIC use, the County will include information on the benefits of WBICs in current outreach efforts to private landscape owners and managers. To raise standards for future development, the County will also amend the County Code to require new residential and commercial development to install weather-based irrigation controller systems.

### Turf Management

Turf management practices affect water resources, property values, and the safety of youth and adult sports participants.



Professional turf managers are challenged to meet shifting customer demands while also meeting safety and quality standards and protecting the environment. Developing, communicating and adopting best management practices are critical steps to maintain the quantity and quality of golf courses and sports fields and can protect the integrity of the ecosystem. To support improved turf management practices, the County has recently amended the County Code to incorporate the State Model Water Efficient Landscape Ordinance. To raise standards for future development, the County will also amend the County Code to limit irrigated turf to no more than 25% of the front yard area in new residential development.

As part of this program, the County expects that 2% of residential (single-family and multi-family) and 5% of commercial buildings will reduce landscape water consumption by 20% using WBICs and water efficient turf management practices by 2020. For 2030, these participation rates increase to 25% for residential and 50% for commercial buildings.

**2020 GHG Reduction Potential:**

**51 MT $CO_2e$ (<1%)**

**2030 GHG Reduction Potential:**

**862 MT $CO_2e$ (<1%)**

**Community Co-Benefits:**

Reduce Water Use
Restore Natural Habitat

**Applicability:**

New and Existing Development

| ACTION | | RESPONSIBILITY | TIMEFRAME |
|---|---|---|---|
| A | Pursuant to the 2011 International Building Code, require that all automatic irrigation systems controllers be weather-based. | Planning & Public Works | Short-Term |
| B | Amend the County Code to limit turf to no more than 25% of the front yard area in new residential development. | Planning & Public Works | Short-Term |

| PROGRESS INDICATORS | | TARGET YEAR |
|---|---|---|
| A | Complete County Code amendments. | 2010 |
| B | 2% of residential (single-family and multi-family) units reduce landscape water consumption by 20% | 2020 |
| C | 5% of commercial buildings reduce landscape water consumption by 20% | 2020 |
| D | 25% of residential (single-family and multi-family) units reduce landscape water consumption by 20% | 2030 |
| E | 50% of commercial buildings reduce landscape water consumption by 20% | 2030 |

# SUPPORTING MEASURES FOR ENERGY

The County also considered the following additional measures as part of the Energy Strategy. The County will continue to monitor the feasibility of these supporting measures, and may employ one or more of these measures to achieve the 2030 GHG reduction target.

### Energy Efficient Appliances, Lighting, and Equipment in Existing Buildings

The energy efficiency programs described in Measure E-3 and the energy performance standards described in Measure E-6 focus on energy conservation measures for the building envelope (i.e., wall and loft insulation, high performance glazing, etc.) and critical building systems (i.e., HVAC, hot water heating, etc.). Appliances, equipment, indoor and outdoor lighting are also important components of building energy demand. The County will continue to work with Yolo Energy Watch to promote energy efficient appliances, and will develop a program to promote smart grid technologies.

#### Energy Efficient Appliances

Though many new technologies and equipment claim to be energy efficient, the only nationally recognized standard for energy efficient appliances and products is the EPA's Energy Star rating system. According to the EPA, devices that have an Energy Star certification, such as office equipment, home appliances, and lighting products, generally use 20% to 30% less energy than required by federal standards. By promoting Energy Star-rated home and business appliances, the County can reduce GHG emissions from lighting, refrigerators, dishwashers, clothes washers, wall air conditioning units, computers, photocopiers, and lights.

This measure is designed to encourage voluntary community participation to upgrade home and business appliances and lighting to Energy Star or other energy efficient models. Successful implementation relies on leveraging the Energy Upgrade California program materials and public platform through a public outreach campaign to increase community awareness regarding energy efficient appliance choices. The County will also partner with PG&E, Yolo Energy Watch, and other organizations to promote existing financial incentives and rebates for energy efficient appliance upgrades and replacements.

#### Smart Grid

The 'smart grid' is an emerging energy management system which uses

information technology to improve how electricity is managed and controlled. Smart meters link energy users to the smart grid.

As of October 2010, PG&E had installed SmartMeters™ in approximately 96% of the buildings in Yolo County. Current smart meters allow for frequent remote reading of energy use. However, the true value of the smart meter program will be fully realized when community residents and businesses are able to make more informed energy use decisions based on the future two-way communication capability expected from SmartMeters™, such as when a homeowner is able to program their washing machine to run when energy is cheapest to obtain.

When estimating the potential emission reductions associated with implementation of the smart grid, the County included the energy efficiency improvements gained from integrating smart grid energy management systems for control lighting, heating, ventilation, and air conditioning and other major appliances in residential units and commercial buildings.

To facilitate further use of energy efficient and smart grid-compliant appliances, lighting, and equipment, the County will amend the County Code to require that all major appliances and lighting be Energy Star-rated in any residential and/or non-residential remodels/additions that exceed 50% of the home or building value.

### Require Energy Efficient Appliances, Equipment, and Lighting in New Construction

This measure includes amendments to the County Code to mandate home appliance and lighting upgrades to Energy Star or other energy-efficient models in new construction. Successfully educating development contractors about these upgrades and the manner in which they can be financed relies on the County's effective use of Yolo Energy Watch programs to increase community awareness regarding energy efficient appliance choices.

Modern technology has contributed to the development of high-quality, energy efficient appliances. The Energy Star rating is an internationally recognized standard for energy efficient consumer products. According to the EPA, Energy Star-certified devices, such as office equipment, home appliances, and lighting products, generally use 20% to 30% less energy than required by federal standards. The County will partner with PG&E, Yolo Energy Watch, and other organizations to promote existing financial incentives and rebates for energy efficient appliance upgrades and replacements.

The County will amend the Code to require a) all new residential units and commercial buildings to use Energy Star-rated major appliances and lighting, b) new commercial and industrial buildings to incorporate high-efficiency (e.g., LED) exterior lighting, c) development using centralized lighting systems to include pre-programmed response strategies capable of reducing the total lighting load by at least 30% through dimming controls or bi-level switching. In addition, the County will

require all development in the Dunnigan Specific Plan to integrate smart grid technology into buildings and major appliances.

Certain energy efficient lights (i.e., compact fluorescent lights [CFLs]) contain hazardous materials which require proper handling and disposal. All households and businesses must collect CFLs and ship them, or take them to a proper facility where the materials are shipped to proper facilities for recycling/disposal. For Yolo County households and small businesses, this requires driving to the central landfill's hazardous waste facility to dispose of these materials. Additionally, proper disposal and recycling of the collected less energy efficient fluorescent lights represents a significant cost to the County.

### Pursue a District Energy Program in High Density, Mixed-Use Development

According to the International District Energy Association, the fundamental idea of district energy is simple but powerful: connect multiple heating and cooling energy users (buildings) through an underground piping network to environmentally responsible energy sources (central plants), such as combined heat and power (CHP), industrial waste heat, and renewable energy sources such as biomass, geothermal, and solar.

District energy systems produce and pipe steam, hot water or chilled water underground through a dedicated piping network to heat or cool buildings within a concentrated area. This program reduces energy costs and GHG emissions, while freeing up valuable space in customer buildings by centralizing production equipment. It also reduces costs through economies of scale and equipment management, and optimizing the use of fuels, power and resources. District energy systems in North America typically serve "clusters" of buildings, which are sometimes commonly owned, such as university campuses or hospitals. However, in urban systems, the customer buildings have distinct and separate owners; are generally located near each other in a central business district, and are interconnected individually to the distribution network. The number of customer buildings served by a typical district energy system may range from as few as three or four in the early stages of a new system to as many as 1,800+ customer buildings served by the Con Edison Steam Business Unit in Manhattan, the largest district steam system in the world.

**Principal Benefits of District Energy**

With district energy, building developers and owners would not have to determine specific heating and cooling equipment, nor would they need to dedicate significant

space within their buildings for boilers or cooling equipment. This difference could lead to improved efficiency, as individual developers and building owners often oversize their equipment and are reluctant to consider investments that have payback periods of more than three years.

District energy systems are also capable of accommodating improved energy technology over time. For instance, a district energy system can change equipment at the central plant as opposed to expensive retrofits within each building.

The Dunnigan Specific Plan represents the centerpiece of a new approach in Yolo County towards rural community development and sustainability, and would have sufficient density and mix of uses to utilize a district energy system. A district energy system would support the goal of the Dunnigan Specific Plan to incorporate green construction standards and energy efficiency measures throughout the entire community (including community design, infrastructure sizing, building construction, and landscaping).

## Encourage Industrial Process Energy Efficiency

The food processing industry in Yolo County is an important, diverse, and dynamic industrial sector in the County's overall economy. Over the past 20 years, increasing population and urbanization have brought on greater regulatory requirements and sharper competition among all industries for water and energy. Production of wastes and its associated liabilities has become a significant cost factor limiting the growth of operations. Increasing labor costs, high natural gas and electricity prices, the 2001-2002 energy reliability crises, environmental regulations, higher costs for operating older, inefficient factories, and global market competition have created a challenging economic environment for industrial and manufacturing firms throughout the state. In Yolo County, these factors have resulted in factory closures and consolidation of food processing facilities, including the Hunt-Wesson cannery and R.H. Phillips winery.

Industrial and manufacturing processes consume an enormous amount of energy. Some large, newly constructed factories (Cheese and Protein International, Tulare; Brawley Beef, Brawley) and pilot plants (ConAgra, Irvine; Creative Research Management, Stockton) have incorporated automated and energy efficient technologies to achieve economic advantages. Often, inefficiencies are due to operating and maintenance practices. Fortunately, making even small energy-efficient changes to manufacturing processes can save money.

State agencies (e.g., California Energy Comission) and utilities offer a range of technical assistance, free audits, and financial incentives to encourage agricultural processing and industrial facilities to evaluate and implement energy efficiency and conservation strategies in their facilities.

### Reduce Embodied Energy Content of Construction Materials

GHG emissions are created throughout the lifecycle of building materials, from resource extraction or excavation, through the production process, transportation, use of finished products, and disposal. By instituting a recycled, or locally made or locally extracted, materials requirement, the County can ensure that the building community is using best-available green building products during construction. This promotes good construction management by encouraging recycling of building materials, reusing salvaged products after demolition and using locally available and durable materials.

### Promote Greywater and Rainwater Collection and Non-Potable Water Systems

Reusing greywater and rainwater on-site is an effective way to reduce water demand. These systems collect water from buildings and landscapes, then reuse it for other indoor and outdoor applications that do not require water quality beyond a basic level of treatment. Greywater includes all non-toilet wastewater generated in a typical household from bathtubs, showers, bathroom sinks and washing machines. Rainwater can also be captured and used in the same fashion as greywater. With minimal treatment, rainwater and greywater can be reused to flush toilets and run washing machines (and outside for drip irrigation). This measure promotes indoor and outdoor reuse of greywater and rainwater.

Since this measure is not widely used in building and landscape construction currently (and was only recently made legal), it requires the County to promote new approaches to building and landscape plumbing. However, with the adoption of SB 1258 (2008), which directs the Department of Housing and Community Development to develop a more wide-ranging set of standards for residential greywater systems for both indoor and outdoor use, no additional policy changes are necessary for the County to proceed with a program to promote the use of greywater and rainwater within buildings. The program may include education about approved systems that follow current building code, installation and maintenance assistance, and support for demonstration projects.

To build on current County efforts and recent changes in State policy, the County will amend the County Code to explicitly allow the installation and use of greywater systems that conform to Title 24, Part 5 of

the California Plumbing Code, as well as to require use of rainwater collection or greywater irrigation systems in new residential and non-residential landscapes.

### Establish a Standard of No Net Increase In Water Demand For New Buildings

New development will create much of the expected growth in water demand in the next two decades. Fortunately, reducing water use in new development can be achieved in a cost-effective manner by investing in water-efficient fixtures and fixture fittings (see measure E-6), using weather-based irrigation control systems and turf management programs (see measure E-7), and non-potable water systems, among other water efficiency and conservation strategies.

Additionally, the County will amend the County Code to include specific requirements for water efficient technology in new residential construction, as well as a standard for reducing overall potable water use.