City of Greenfield
Energy Action Strategy

Local Actions and Policies for Reducing Community-wide Energy Consumption in the City of Greenfield

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DRAFT

CITY OF GREENFIELD ENERGY ACTION STRATEGY

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EXECUTIVE SUMMARY

With the unprecedented energy challenges resulting from concerns about the limited supply of fossil fuels globally and our overall energy delivery infrastructure, coupled with an emerging public interest in energy conservation and sustainability, it is clear that action must be taken in communities throughout California. In order to address these concerns, Greenfield is committed to reducing community-wide energy use through the enactment of policies, strategies, and actions that are both cost-effective and environmentally sound.

The purpose of this Energy Action Strategy is to provide guidance for Greenfield to establish and achieve energy efficiency and conservation goals that may also significantly reduce the negative impacts of high energy costs and greenhouse gas emissions within the community.

The goals contained in this standalone draft energy efficiency and conservation strategy are consistent with the State-recommended goal for local governments to reduce greenhouse gas emissions by 15% below 2005 baseline levels by 2020. Implementing the energy policies and actions outlined in this plan will support Greenfield's efforts to meet that goal, while also helping create and retain local energy service industry jobs and improving the economic resilience of the community though reduced energy bills.

This Energy Action Strategy identifies potential energy measures that could yield an estimated total annual energy savings of approximately 14,976 MBtu, with an associated cost savings of approximately $449,027 annually. Together these measures can also help the community of Greenfield reduce its annual energy-related greenhouse gas emissions by more than 6,565 metric tons by 2020, approximately 32% below projected business as usual levels and only 8% above 2005 levels.

The Energy Action Strategy is intended to guide Greenfield in making meaningful, cost-effective energy decisions between now and 2020. Municipal implementers should keep in mind that the plan is predicated on a number of estimates and assumptions; it lays out projections, not certainties.

With ongoing support from AMBAG Energy Watch staff, Greenfield is encouraged to use the Statewide Energy Efficiency Collaborative Climate and Energy Management Suite platform to update the plan as necessary, and to further develop the Energy Action Strategy before, during and after implementation of the plan.

INTRODUCTION

Energy is a vital resource. This Draft Energy Action Strategy explains the fiscal and environmental implications of responsible stewardship of this resource in Greenfield. Developing and implementing effective policies, programs and measures that reduce the use of energy in existing residences, businesses and municipal facilities while using the most cost effective solutions is the emphasis of the work in this strategy. This document also addresses how the community of Greenfield can grow in a way that strategically reduces the energy consumption of new development.

To complete this draft, AMBAG Energy Watch staff worked with staff from Greenfield and with ICLEI- Local Governments for Sustainability (ICLEI) using the platform of climate and energy action planning tools tool developed by ICLEI to calculate the energy reduction measures. The energy reduction measures in this analysis include measures for both existing and new residential, commercial, and municipal facilities. Staff from Pacific Gas and Electric (PG&E) worked closely with staff from AMBAG Energy Watch to provide energy usage data in formats that supported the analysis completed in this draft.

VISION

Recognizing the increasing costs, the increasing demand, and the greenhouse gas impacts of energy use, Greenfield is committed to reducing energy use and promoting positive change in the way our citizen's, businesses and local government use energy.

Along with other cities and counties across the State of California, we share the vision of reducing energy use as stated in the California Public Utility Commission's California Long Term Energy Efficiency Strategic Plan. Guiding specific market sector plans, California regulated and voluntary energy codes are described as *"A broad range of aggressive and continually improving minimum and higher voluntary sets of energy codes and standards will be adopted to greatly accelerate the wide-spread deployment of zero-net energy and highly efficient buildings and equipment. The effectiveness of codes and standards will be enhanced by improved code compliance as well as coordinated voluntary efficiency activities."*

The long-term vision of this plan is in alignment with the statewide strategic energy plans, as defined for each market sector below:

Residential Sector

Residential energy use will be transformed to ultra-high levels of energy efficiency resulting in Zero Net Energy new buildings by 2020. All cost effective potential for energy efficiency, demand response and clean energy production will be routinely realized for all dwellings on a fully integrated, site specific basis.

By 2020, 100 percent of eligible and willing customers will have received cost-effective Low Income Energy Efficiency measures.

Commercial Sector

Commercial buildings will be put on a path to zero net energy by 2030 for all new and a substantial portion of existing buildings. Innovative technologies and enhanced building design and operation practices will dramatically grow in use in the coming years through a combination of comprehensive whole building energy retrofit programs, technology development, market pull, professional education, targeted financing and incentives, and codes and standards.

Agricultural Sector & Industrial Sector

Energy efficiency will support the long-term and environmental success of agriculture.

Industry will be vibrant, profitable and exceed national benchmarks for energy efficiency and resource management.

Local Government Sector

By 2020, the Greenfield and all California's local governments will be leaders in using energy efficiency to reduce energy use and global warming emissions both in their own facilities and throughout their communities.

THE ENERGY ACTION STRATEGY PLANNING PROCESS

As stated in the introduction the emphasis of this Draft EAS is focused on identifying actions and policies that can be developed and implemented to produce quantifiable energy efficiency savings. There are many steps that go into ultimately achieving the goals of such an effort which will be discussed in greater detail, but in summary they are:

1. Measure and Analyze	•Community-wide Energy Consumption Profiles and Trends •Community-wide GHG Emissions Inventory and Forecast
2. Establish Goals	•Energy Consumption Reduction Targets •GHG Emission Reduction Targets
3. Develop Strategy for Achieving Goals	•Identify Appropriate Reduction Measures •Estimate Impacts and Benefits of Selected Measures
4. Implement Strategy	•Build Leadership and Stakeholder Support for the Strategy •Implement Energy Actions and Policies
5. Monitor Progress and Refine Strategy	•Track and Report Measure Outcomes •Update and Refine the Energy Actions and Policies

STEP 1- MEASURE AND ANALYZE

OVERVIEW

This section provides detailed analysis of three distinct datasets for the City of Greenfield: 1) PG&E Annual Energy Consumption Data (2005 through 2011), 2) Results of the AMBAG Energy Watch Municipal Facility Benchmarking Project (2012 data from the United States Environmental Protection Agency's Energy Star Portfolio Manager System), and 3) Results of the AMBAG Energy Watch Community-wide Greenhouse Gas Inventories (2005 Baseline, and 2010 Update). This quantitative analysis provides actionable insights and information regarding energy consumption and greenhouse gas (GHG) emissions in the City of Greenfield, as well as the opportunities for cost-effective strategies for GHG reducing energy efficiency and conservation. This provides a solid foundation for the subsequent sections of the EAS.

COMMUNITY-WIDE ENERGY CONSUMPTION

Establishing a community-wide energy consumption baseline against which future energy reductions will be measured is a key step in tracking energy usage and quantifying savings from reduction efforts. This section provides an overview of Greenfield's overall annual energy consumption and year-to-year consumption trends, including profiles of the Residential, Non-Residential, and Government sectors of the community.

For the purposes of this planning document, the Baseline Year for energy consumption and GHG emissions is 2005, and all trends and changes in energy consumption patterns will be measured against the Baseline Year in order to track and report progress.

Note- Color coding is used in charts, tables, and other graphics throughout this document to help the reader distinguish between Non-residential data (**Purple**), Residential data (**Orange**), Natural Gas data (**Green**), and Electricity data (**Blue**).

Community-wide Annual Energy Usage Summary

In 2005 the total aggregated energy consumption for the Greenfield community was 225,491 MBtu (Note- kWh of electricity consumption and therms of natural gas consumption have been converted to British Thermal Units to allow for summing and comparison purposes). The Residential sector accounts for 77% of the overall annual energy consumption, and the Non-Residential sector accounted for 23%. Natural gas consumption was 65% of the total energy load, while electricity represented the remaining 35%. Overall energy consumption has increased by 24.7% between 2005 and 2011.

Figures 1 and 2 provide graphical representations of this summary, as well as year-to-year trending data.

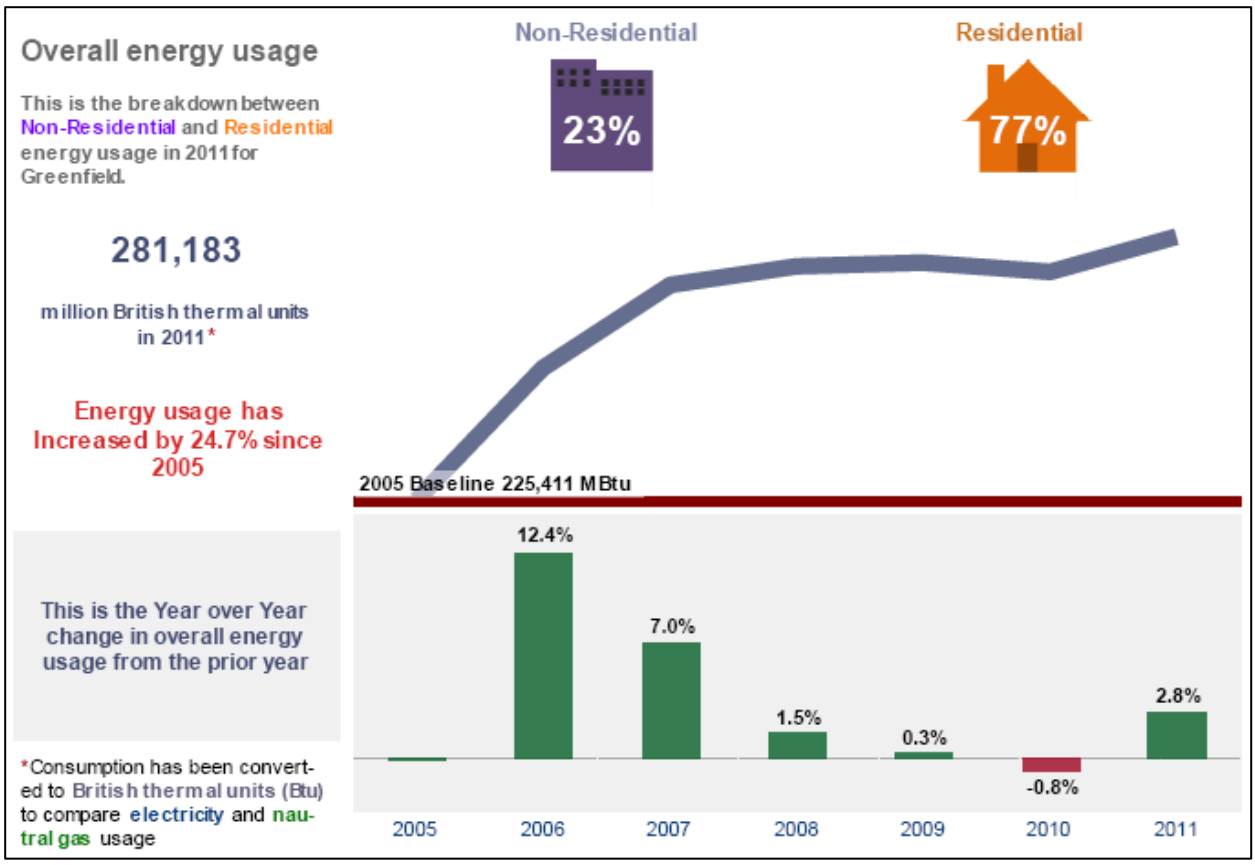


Figure 1- Overall Community-wide Annual Energy Usage Overview ***(Source: PG&E Energy Summary for the City of Greenfield 2005-2011)***

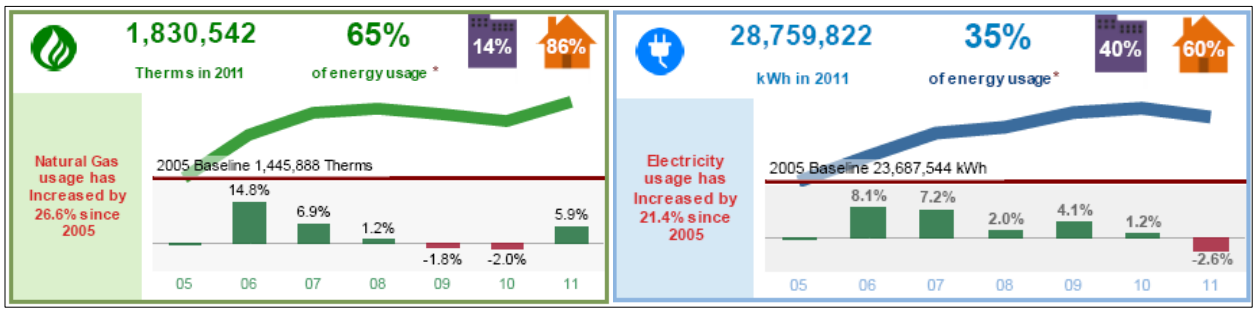


Figure 2- Natural Gas (Left) and Electricity (Right) Consumption Trends ***(Source: PG&E Energy Summary for the City of Greenfield 2005-2011)***

ENERGY USE PROFILES

The analysis in this section of the EAS provides information on how the energy consumption in Greenfield is distributed between the Residential, Non-Residential, and Government sectors, as well as year-to-year trends in those consumption patterns.

Residential Energy Use Profile

In 2005 the Residential sector of Greenfield consumed 167,082 MBtu (electricity and natural gas combined). Between 2005 and 2011, Residential energy usage accounted for 77% of the overall community-wide annual energy consumption. Approximately 27% of that consumption was electricity usage, and 73% was natural gas. The average monthly household usage in 2005 was 28 therms and 219 kWh per month for Multi-family homes, and 34 therms and 375 kWh per month for Single Family homes. Overall Residential sector energy consumption (electricity and natural gas) has increased by 29.5% between 2005 and 2011. During that same period of time, Residential electricity usage increased by 31.9%, while Residential natural gas usage increased by 28.7%.

Figures 3 and 4 below provide a graphical representation of this summary, as well as year-to-year trending data.

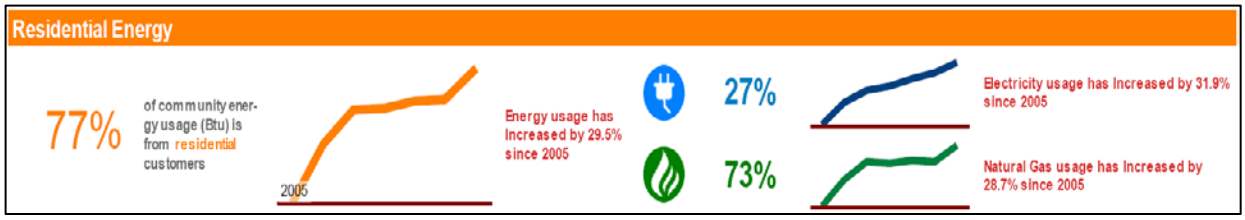


Figure 3- Residential Energy Use Snapshot ***(Source: PG&E Residential Energy Overview for the City of Greenfield 2005-2011)***

Avg Monthly Household Usage (therms)						
2005	2006	2007	2008	2009	2010	2011
28	24	29	28	28	26	27
34	35	35	35	34	34	35
Avg Monthly Household Usage (kWh)						
2005	2006	2007	2008	2009	2010	2011
219	180	202	218	227	272	232
375	378	375	372	381	382	386

Figure 4- Annual Residential Energy Use Trends ***(Note: = Multi Family, = Single Family; Source: PG&E Residential Energy Overview for the City of Greenfield 2005-2011)***

Non-Residential Energy Use Profile

In 2005 the Non-Residential sector of Greenfield consumed 58,329 MBtu (electricity and natural gas combined). Between 2005 and 2011, Non-Residential energy usage accounted

for 23% of the overall community-wide annual energy consumption. 60% of that consumption was electricity usage, and 40% was natural gas. Overall Non-Residential energy consumption increased by 11% between 2005 and 2011. During that same period of time, Non-Residential electricity usage increased by 8.3%, while Non-Residential natural gas usage increased by 15.3%.

The top 5 Non-Residential sector market segments (in terms of Annual Energy Usage) accounted for more than 80% Total Annual Energy Usage in Greenfield, those segments are: 1) Retail, 2) Schools, 3) Hospitality, 4) Offices, and 5) Food Processing.

Figure 5 provides a graphical representation of this summary.

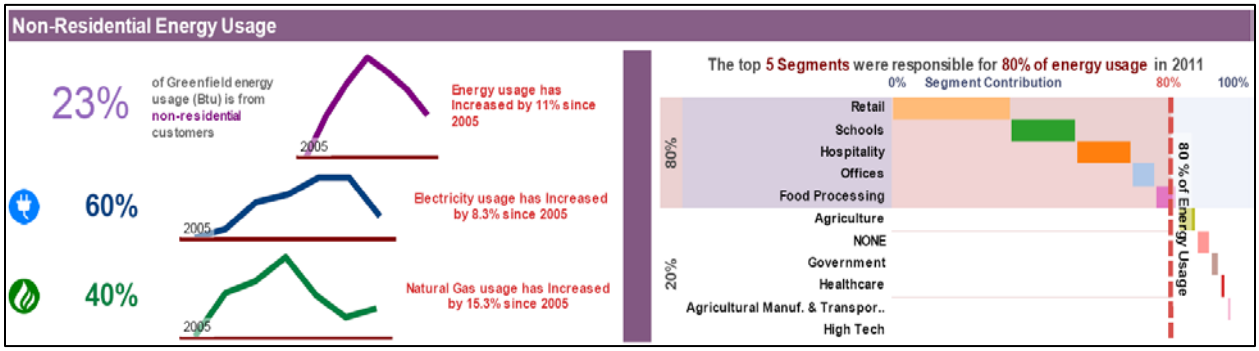


Figure 5- Non-Residential Energy Use Snapshot ***(Source: PG&E Non-Residential Energy Overview for the City of Greenfield 2005-2011)***

Government Energy Use Profile

City and county government can be a significant user of energy in its own buildings, facilities, and equipment. Government employees also play a role, through their day-to-day actions and choices. These and other energy-using activities required to operate city or county government provide government agencies an opportunity to lead by example. Government can improve energy efficiency, and in the process, spend fewer taxpayer dollars on utilities, contribute to cleaner air, and reduce climate change emissions. City or county government can also develop staff knowledge of energy efficiency and use its operations to showcase emerging energy-efficient technologies.

It is important to note here that Government energy consumption is a subset (or "Market Segment") of the Non-Residential sector detailed above.

In 2005 the Government sector of Greenfield consumed 4,826 Mbtu of energy (electricity and natural gas usage combined), which accounted for approximately 8% of the annual Non-Residential energy usage and 2% overall annual energy consumption. 86% of the Government sector energy consumption was electricity usage (1,219,393 kWh), and 14% was natural gas (6,685 therms).

Benchmarking Key Government Facilities- Energy Star Portfolio Manager

Energy use in government operated buildings and facilities is a significant operating cost for all local governments. By evaluating energy usage in government buildings and facilities and identifying energy-saving opportunities, Greenfield can reduce its energy-related operating costs and devote the dollars saved to other essential government services.

In 2012 AMBAG Energy Watch staff coordinated an effort to benchmark the energy performance of the key government facilities throughout the Monterey Bay Region. Facility energy benchmarking is a useful tool to judge a site's energy performance compared to the national or state averages. To facilitate this effort, AMBAG Energy Watch staff utilized the U.S. Environmental Protection Agency's (EPA) Energy Star Portfolio Manager (ESPM) program, which is an industry standard web-based platform for benchmarking building energy performance.

ESPM is an interactive energy management tool that allows users to track and assess energy consumption across an entire portfolio of buildings. ESPM can also be used to identify under-performing buildings, set priorities, monitor progress and verify improvements. The ESPM platform allows for an "apples-to-apples" comparison of individual local facility performance with the performance of similar facilities in an extensive national database. The online tool also allows jurisdictional staff to track and assess energy consumption across an entire portfolio of buildings, as well as quantify and track the impacts of energy efficiency improvements made to each facility over time.

The AMBAG Energy Watch team worked closely with staff from Greenfield to collect the necessary data for key government facilities in the jurisdiction. Energy Watch staff then setup building profiles for each of the facilities and entered the collected data into the online Portfolio Manager tool, and used the tools analytical capabilities to prepare final building energy use reports.

Now that the Portfolio Manager system has been properly configured for these facilities the system will automatically update each month in perpetuity, providing a valuable and ongoing stream of actionable data and information about each facility. Energy Watch staff is currently working closely with jurisdictional staff to use the platform of tools collaboratively to identify the best opportunities to reduce energy costs and improve overall building energy performance.

Tables 1-4 below summarize the findings of the benchmarking effort. Note- key terms used in these tables are defined in the Glossary of Terms.

Table 1- Overall Building Performance Summary *(Source: AMBAG Energy Watch)*

	Year ending 4/2012
Total Number of Facilities	5
Total Floor Space (sq. ft.)	55,111
Total Annual Energy Use (kBtu)	9,767,395
Average Energy Use Intensity or EUI (kBtu/Sq. Ft.)	177
Total Annual Site Electric Use (kWh)	773,332
Total Annual Site Natural Gas Use (Therms)	9,705

Table 2- Poor Performing Facilities *(Source: AMBAG Energy Watch)*

Facility Name	Facility Address	Facility Floor Space	Site Electric Use (kWh)	Site Natural Gas Use (Therms)	Facility EUI (kBtu/Sq. Ft.)	Nat'l Median EUI (kBtu/Sq. Ft.)	% Difference
None	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table 3- Best Performing Facilities *(Source: AMBAG Energy Watch)*

Facility Name	Facility Address	Facility Floor Space	Site Electric Use (kWh)	Site Natural Gas Use (Therms)	Facility EUI (kBtu/Sq. Ft.)	Nat'l Median EUI (kBtu/Sq. Ft.)	% Difference
Old PD	213 El Camino Real	7,378	20,290	8	32	164	-87
Old City Hall	45 El Camino Real	5,808	16,738	107	35	164	-85
Community Center	1351 Oak Ave	8,268	11,982	462	22	100	-77
Child Development Center	131 13th St	2,820	12,817	648	73	100	-23

Table 4- Remaining Facilities *(Source: AMBAG Energy Watch)*

Facility Name	Facility Address	Facility Floor Space	Site Electric Use (kWh)	Site Natural Gas Use (Therms)	Facility EUI (kBtu/Sq. Ft.)	Nat'l Median EUI (kBtu/Sq. Ft.)	% Difference
City Hall/ Civic Center/PD	599 El Camino Real	24,957	182,271	7,672	113	164	-11

COMMUNITY-WIDE GREENHOUSE GAS INVENTORY AND FORECAST

GHG Inventories and Forecasts show the current and projected future contribution of community activities to GHG emissions. Greenfield completed a 2005 Baseline Greenhouse Gas (GHG) Inventory of municipal operations and community-wide emissions. A subsequent community-wide 2010 GHG Inventory Update and 2035 GHG Business As Usual Forecast (BAU) were also completed. Greenfield accomplished these important tasks by participating in the AMBAG Regional GHG Inventory Collaborative, in partnership with PG&E and ICLEI. The 2005 and 2010 GHG Inventories and 2035 Forecast were created using the industry-standard methodology and protocols for calculating community-wide GHG emissions that were developed by ICLEI and adopted by the State of California.

Greenhouse Gas Emissions Inventory

In 2005 Greenfield's total annual GHG emissions were 21,972 metric tons of carbon dioxide equivalent (MTCO2e). Approximately 59% of the total emissions (12,883 MTCO2e) came

from energy use in the built environment, meaning the emissions were the result of day-to-day activities in residential homes and commercial or industrial buildings in Greenfield. 9,483 MTCO2e (or approximately 43% of the total emissions) came from energy use in the Residential sector, while 3,400 MTCO2e (or approximately 16% of the total emissions) came from energy use in the Commercial/Industrial sector. The balance of the total annual emissions was a result of Transportation on local roads, Solid Waste Generation and Wastewater Treatment, which are included here to provide the reader context and to show the proportional contribution of each sector to the total community-wide GHG emissions.

In 2010 Greenfield's total annual GHG emissions were 22,672 MTCO2e, representing an increase of approximately 3% from 2005 levels. Residential sector emissions increased by approximately 18% to 11,165 MTCO2e, while Commercial/Industrial sector emissions decreased by approximately 13% to 2,943 MTCO2e.

It is important to note here that the GHG Emission Factor for electricity—the amount of CO2e per kWh or electricity consumed—changes from year to year depending on various external factors such as the amount of annual precipitation, which affects how much clean electricity is produced by the State's hydroelectric facilities, as well as PG&E's overall energy mix (i.e. the proportional amount of carbon-free renewable energy and fossil fuels used to generate the electricity provided by PG&E). This means that even though a community might reduce the amount of electricity it consumes during a given period of time, the actual electricity-related GHG emissions produced by the community may actually increase.

The results of the 2005 Baseline GHG Inventory and the subsequent 2010 GHG Inventory Update are summarized in Table 5 below.

Table 5- 2005 & 2010 GHG Inventory *(Source: AMBAG Energy Watch)*

Sector	2005	2010	Percent Change from 2005 Baseline
Residential	9,483	11,165	18%
Commercial / Industrial	3,400	2,943	-13%
Transportation	3,586	3,533	-1%
Wastewater Treatment	3,797	*3,797**	0%
Waste Generation	1,706	1,234	-28%
TOTAL	**21,972**	**22,672**	**3%**

*Note- 2010 Wastewater Treatment data was unavailable at this time, so 2005 data has been substituted as a placeholder.

2035 Business As Usual Greenhouse Gas Emissions Forecast

In order to plan for GHG emission reductions strategies jurisdictions must estimate (or "forecast") future emissions under a Business As Usual (BAU) scenario, which assumes no policies or actions are implemented to curb GHG emissions. GHG Forecasting takes into account historical emission levels established in the Baseline year, as well as expected

growth or changes in conditions within the jurisdiction (i.e. - changes in population, expected new development in the Residential and/or Commercial/Industrial sectors, etc.).

As the federally designated Metropolitan Planning Organization (MPO), AMBAG creates and publishes the Regional Forecast periodically. This Regional Forecast estimates future changes in Population, Housing Units, and Employment patterns for each jurisdiction in the AMBAG territory. The most recently published Regional Forecast was adopted in 2008, and estimates growth in these three important metrics out to the year 2035. The 2008 AMBAG Regional Forecast provides Compound Annual Growth Rates (CAGR), which have been applied to the appropriate sectors of the 2005 Baseline GHG Inventory to create the 2035 BAU GHG Forecast for Greenfield.

Greenfield's overall annual GHG emissions would increase by approximately 157% over 2005 levels by the year 2035 under a business as usual scenario. During that same period of time emissions resulting from energy use in the Residential sector would increase by 198% while emissions from energy use in the Commercial/Industrial sector would increase by 44%

The results of the 2035 BAU GHG Forecast are summarized in Table 6.

Table 6-2035 Business As Usual GHG Forecast *(Source: AMBAG Energy Watch)*

Sector	2005	CAGR	2035 Forecast	Percent Change from 2005 Baseline
Residential	9,483	3.71%	28,286	198%
Commercial / Industrial	3,400	1.22%	4,892	44%
Transportation	3,586	3.71%	10,696	198%
Wastewater Treatment	3,797	2.77%	8,618	127%
Waste Generation	1,706	2.77%	3,872	127%
TOTAL	**21,972**	**n/a**	**56,364**	**157%**

For the purposes of this strategic planning document, which is intended to assist the City of Greenfield in reducing community-wide energy consumption (and the related GHG emissions), it is helpful to focus specifically on the energy-related GHG emissions. Figure 6 provides a visual representation of the 2035 BAU Energy-related GHG Forecast, which excludes the emissions from Transportation and Waste Generation.

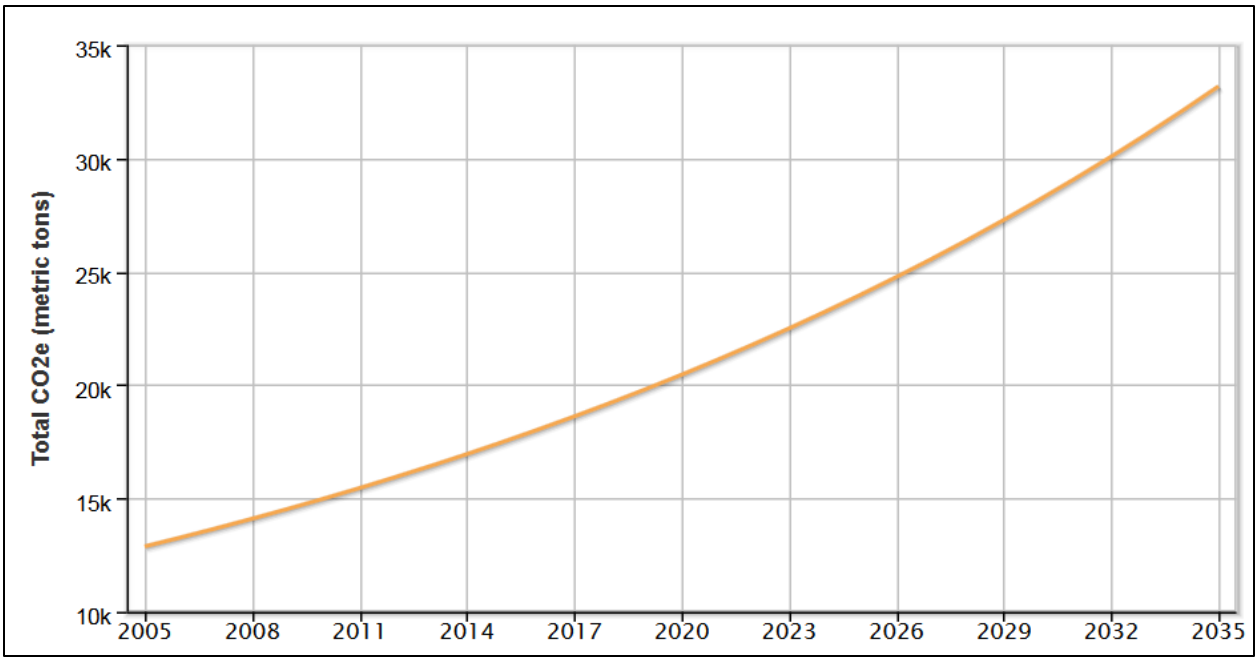


Figure 6- 2035 Business As Usual Energy-related GHG Emissions Forecast *(Source: AMBAG Energy Watch)*

STEP 2- ESTABLISH GOALS

Official energy consumption and GHG emission reduction targets have not yet been established or adopted by Greenfield. For the purposes of this initial Draft of the Energy Action Strategy, Energy Watch staff suggests the following statement as a placeholder goal until official energy and GHG reduction targets are adopted:

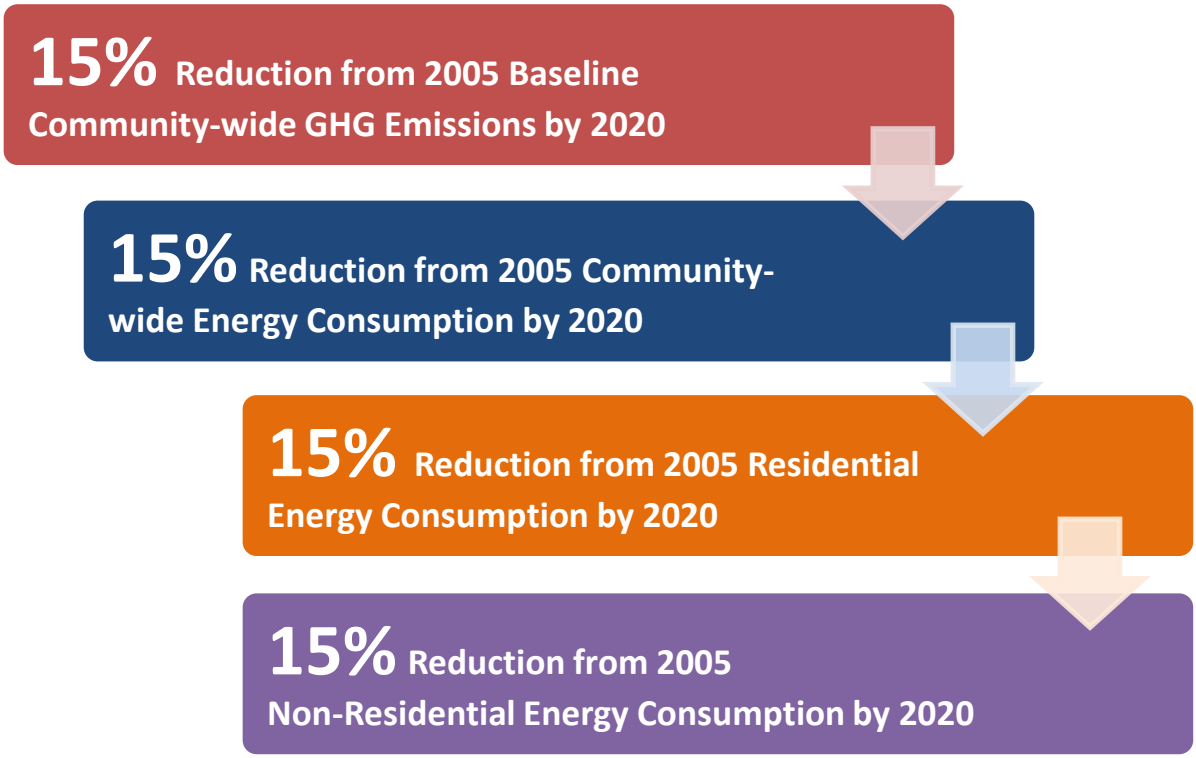
> *Support achievement of a 15% reduction below 2005 baseline community-wide GHG emissions levels by 2020—consistent with the State-recommended reduction targets identified by AB 32—through implementation of cost-saving energy efficiency and conservation measures included in this Energy Action Strategy.*

While the 15% reduction is not a state requirement, it is consistent with state guidance established by AB 32 and supports local compliance with the California Environmental Quality Act (CEQA) Guidelines for GHG emissions. This approach provides a foundation for Greenfield staff and elected officials to understand the relative potential contribution of energy efficiency to compliance with the evolving regulatory framework related to GHG emissions.

In addition to the State-recommended GHG emission reduction target of 15% below baseline GHG emissions, this chapter of the EAS also presents reduction targets—15% below baseline energy consumption levels—for overall Community-wide, Residential sector, and Non-Residential energy consumption.

Figure 7 provides a summary of these interrelated reduction targets.

Figure 7- Draft Community-wide GHG and Energy Reduction Targets



STEP 3- DEVELOP STRATEGY FOR ACHIEVING GOALS

This Draft EAS is a standalone document that meets multiple objectives of Greenfield, and the State of California. In addition, the EAS represents the equivalent of an energy efficiency and conservation chapter of a climate action plan, as the included energy measures are also effective GHG emission reduction initiatives. Therefore, the EAS has been designed to be easily integrated into a climate action plan, if the Greenfield decides to develop a more comprehensive plan to address the reduction of GHG emissions from electricity, natural gas, waste, transportation, and other sectors.

The Draft EAS is an interim step, which was designed to be easily adopted and less resource-intensive to implement and manage. If implemented, the EAS has the potential create and retain local energy service industry jobs, save Greenfield residents and businesses money on utility bills through reduced energy consumption, and significantly reduce local GHG emissions. These measures can help increase the Greenfield community's economic and environmental resilience, while increasing energy security and independence and helping Greenfield achieve its goals and mandates.

This EAS identifies municipal and community-wide strategies to achieve Greenfield's longer-term energy efficiency goals. This integration of municipal and community-wide strategies allows Greenfield to lead by example, while also spurring action in the Residential and Non-Residential sectors of the community. The EAS helps Greenfield create

a long-term vision for energy efficiency and conservation, while providing a framework for implementing policies and actions and evaluating progress toward stated goals.

Greenfield can use the EAS as a tool to coordinate energy efficiency efforts throughout the community, while simultaneously supporting the achievement of other important local economic and planning objectives. The EAS is an analytical tool that allows municipal staff to monitor progress toward energy efficiency and GHG emission reduction goals and evaluate the effectiveness of various reduction measures included in the plan. While the primary focus of this EAS is energy efficiency, the GHG emissions inventories and future forecast included in this plan also provides Greenfield with an understanding of how various energy efficiency and conservation measures support the achievement of local GHG reduction targets. Greenfield will revise and update the EAS document as programs are implemented and tested over time.

Evaluating and Selecting Energy Measures

AMBAG Energy Watch staff worked closely with municipal staff from Greenfield, as well as staff from our partners PG&E and ICLEI, to identify existing local energy-related programs and select new energy efficiency and conservation measures that are feasible within the unique context of the Greenfield community. Data regarding existing energy use patterns as well as planned or expected residential and commercial developments within Greenfield's boundaries was collected and analyzed. This provided insights into what specific energy efficiency and conservation measures were most likely to a) be cost-effective and b) yield significant economic and/or environmental benefits.

Based on this analysis, an initial set of energy measures were selected for inclusion in Greenfield's EAS. The potential energy and cost savings and GHG emission reductions for each selected measure were calculated using the Statewide Energy Efficiency Collaborative (SEEC) Climate and Energy Management Suite (CEMS) suite of tools developed by ICLEI. The SEEC CEMS tools were created to provide California jurisdictions a no-cost, high-caliber mechanism for developing climate and energy action plans, as well as GHG Inventories and Forecasts.

The SEEC CEMS tools provide a broad palette of off-the-shelf energy efficiency and conservation measures to select from, each with a corresponding calculator designed to estimate the potential benefits of the measure based on existing and planned conditions within a specific community. Users may also define their own measures, and are able to input the related projections and calculations for those measures, so any quantifiable policy or action can be included in the overall plan.

Policies and actions were modeled using the SEEC CEMS calculators and data provided by Greenfield and PG&E. Each of the policies and actions considered were assessed based on their estimated potential for energy savings, cost savings, and GHG reductions. The measures that were selected for inclusion in this EAS were found to be the most effective and beneficial given Greenfield's historical energy consumption patterns and other existing conditions within the community.

This assessment recognizes the broad value of energy efficiency for the Greenfield community. Not only will energy efficiency actions reduce consumer utility bills, but they

also provide an opportunity to improve the quality of homes and businesses, improve the indoor comfort of buildings, and reduce ongoing maintenance costs. Through energy efficiency projects such as improvements to insulation or heating and cooling system upgrades, property owners will be able to improve building quality. Large-scale energy efficiency projects also have the potential to increase property and resale value. Actions in government facilities also contribute to responsible fiscal stewardship of public funds and demonstrate leadership by example.

Overview of Selected Energy Efficiency and Conservation Measures

This section provides an overview of all of the included energy measures and their estimated impacts, as well as specific information about what each measure is designed to accomplish and how.

Table 7 below lists the selected energy efficiency and conservation measures and the estimated benefits associated with each measure. The measures appear in Table 7 in order of greatest estimated benefit, with the measures that are expected to yield the greatest energy use and GHG emission reductions appearing at the top of the list. Measure Reference Numbers are provided for each measure and detailed information for each measure is provided in the corresponding sections below.

The 2005 Baseline GHG inventory, the 2035 BAU GHG Forecast, and the Community-wide Energy Usage analysis provide the basis for gauging the impact of the energy actions and policies that make up the EAS.

Table 7- Overview of All Included Energy Measures *(Source: AMBAG Energy Watch)*

Measure Reference Number	Energy Measure	Estimated Annual Reduction in CO2e	Estimated 1st Year Energy Savings in mmbtu*	Estimated 1st Year Utility Cost Savings*
CW-1	Energy Watch (2006 thru Q2 of 2012)	308	3,624	$132,853
	Energy Watch (Future)	47	557	$20,439
NR-1	Green Business Certification Program	292	n/a	n/a
CW-2	PG&E EE Programs (2006 thru Q2 of 2012)	160	2,086	$55,915
	PG&E EE Programs (Future)	25	321	$8,602
NR-2	Right Lights (2006 thru Q2 of 2012)	126	1,475	$54,082
	Right Lights (Future)	19	227	$8,320
CW-3	Energy/Transportation - Provide Electric Vehicle Charging	141	-595	-$21,798
CW-4	Renewable Energy - Solar Power (Installed To-date)	114	1,339	$49,085
	Renewable Energy - Solar Power (Future Growth)	24	280	$10,269
CW-5	Beyond Title 24 - Commercial	44	590	$16,800
	Beyond Title 24 - Residential	43	730	$10,520
NR-3	School EE Campaign	66	827	$26,820
NR-4	Retail EE Campaign	49	396	$14,478
RES-1	Energy Efficiency Retrofits at Time of Sale	49	852	$11,500
CW-6	Renewable Energy - Wind Power	44	518	$19,000
NR-5	Building Energy - 3rd Party Commissioning	36	547	$11,375
RES-2	Energy Upgrade CA Whole Home Retrofit Program	26	471	$5,388
NR-6	Hospitality EE Campaign	19	276	$6,765
RES-3	Building Energy - Weatherization Programs	12	203	$2,647
RES-4	Lighting - Multi Family Housing Retrofits	10	119	$4,375
CW-7	Renewable Energy - Solar Water Heaters	7	133	$1,594
MEASURE REFERENCE KEY: **CW = Community-wide Measure** **NR = Non-Residential Measure** **RES = Residential Measure**		**TOTALS**	**14,976**	**$449,027**

*Notes- Due to current limitations with the SEEC CEMS tools used to calculate these estimates, the Annual Energy Savings and Annual Utility Cost Savings estimates are for the first year of implementation. While these benefits are likely to accumulate and increase for each subsequent year, the software does not currently provide an accurate way to estimate the cumulative energy reduction or cost saving impacts of the included measures. The 1st Year Energy and Utility Cost Savings estimates are for the 1st year after implementation begins, and the Cost Savings estimates are strictly utility bill savings (i.e.- do not include other savings such as avoided maintenance, etc.). The estimates are generated using the following average energy costs: $0.125/kWh for electricity, $1.00/therm for natural gas. A detailed summary of all of the data, assumptions, and calculations behind the projected benefits for each of the measures described in this section are provided in Appendix A.

COMMUNITY-WIDE STRATEGIES

Looking beyond its own operations, city and county governments can play an important role in influencing the energy perspectives and actions of its residents and businesses. Local governments have many opportunities to make a positive impact, from public education to adopting policies and implementing programs to save energy. Energy use can be a major expense for households and businesses, and it is a predominant source of air pollution and climate change emissions in most communities. Therefore, reducing energy consumption benefits the environment, helps keep money in the pockets of households and businesses alike, and also supports growing economic opportunities, including well-paying, green jobs.

Measure CW-1: AMBAG Energy Watch Program

The Association of Monterey Bay Area Government partners with PG&E to form a local government partnership that delivers additional support and resources to customers in the Monterey Bay region. AMBAG Energy Watch provides energy efficiency assistance, energy courses & training, and climate action planning to a variety of stakeholders and PG&E customers in the greater tri-county Monterey Bay region. AMBAG Energy Watch primarily supports local government customers, but also provides programs, training, and services to the following market sectors: special districts, school districts, residential, hospitality, and non-profits. An overview of these offerings is provided below.

Energy Watch Local Government Energy Efficiency Project Support

AMBAG Energy Watch staff helps local government entities identify and implement a variety of energy efficiency projects. Core to this project support is ensuring that local government customers receive energy efficiency rebates for implementing projects. Projects may include, but are not limited to the following types of upgrades: lighting, HVAC, motors, and energy controls. Secondary support functions include acquiring appropriate project financing, administrating grants or loans, working with contractors and providing technical energy efficiency assistance.

Energy Watch Hospitality

AMBAG Energy Watch's Hospitality program provides free facility assessments and deeply discounted installation of energy efficient equipment to lodging business within the Monterey Bay region. This unique hospitality program offers installation support and incentives for the following measures: PTAC HVAC control systems, energy efficient lighting, LED exit signs, refrigerator gaskets and seals, vending machine controllers, and occupancy sensors. This program offers a free, no-obligation energy survey and potential project report. If accepted, the hospitality program provides turnkey installation services with qualified contractors.

Energy Watch Lighting

AMBAG Energy Watch's Direct Install Lighting program serves local government, special district, non-profit, and school district customers. This program provides

subsidized energy efficiency lighting upgrades with free professional turnkey assistance. Prospective participants receive a no-cost lighting audit and a proposed scope of work that includes set project costs and potential energy savings. Participating customers receive high quality energy efficient lighting upgrades that reduce energy consumption and utility costs.

Energy Watch Agriculture Direct Install

AMBAG Energy Watch assists small and medium agriculture businesses with direct installation of energy efficiency measures. This program provides valuable energy efficiency assistance to agricultural firms in the Monterey Bay region to help them save money, save energy, and contribute more of their funds toward their business. This program offers a free, no-obligation energy survey and potential project report. If accepted, the program provides turnkey installation services with qualified contractors. The funding provided through the AMBAG Energy Watch program makes it possible to deeply discount the costs related to the installation of energy efficiency measures. Possible measures include: energy efficient lighting equipment, LED exit signs, occupancy sensors for lighting, refrigeration equipment, vending machine controllers, and heating/air conditioning equipment.

Middle Income Direct Install Residential Program

The Middle income Direct Install (MIDI) program is an existing PG&E administered program that is currently serving Greenfield, which is implemented by AMBAG Energy Watch. The program is targeted to those customers who are just above the low income thresholds but for whom energy efficiency improvements would not be possible. The program installs prescriptive measures including comprehensive lighting, attic and pipe insulation, low flow showerheads and faucet aerators at no cost to the customer. Contractors also conduct a home energy audit and provide education to program participants. The program targets single family, multifamily and manufactured homes, and in 2011 the MIDI program completed energy efficiency improvements in almost 1300 homes in a one year period.

The Energy Watch measure is broken into three distinct parts: 1) Savings Achieved by the Energy Watch Program between 2006 and the 2nd quarter of 2012, 2) Projected Savings from Current Projects that have not yet been completed, and 3) Projected Savings from Future Projects based upon historical program performance.

CW-1: AMBAG Energy Watch Program – *2006 thru Q2 of 2012*

Projected Annual Energy Savings:	3,624 Mmbtu
Projected Annual Cost Savings:	$132,853
Projected Annual GHG Reductions:	308 MTCO2e

CW-1: AMBAG Energy Watch Program – *Future*

Projected Annual Energy Savings:	557 Mmbtu
Projected Annual Cost Savings:	$20,439
Projected Annual GHG Reductions:	47 MTCO2e

Measure CW-2: Pacific Gas and Electric Energy Efficiency Programs

PG&E offers a wide variety of energy efficiency programs and measures for a broad cross section of industry and markets. These programs help customers identify and implement energy efficiency projects that will reduce energy consumption and utility costs. Over 50 programs target 12 different markets sectors. Many of these programs are managed by pre-qualified 3rd party entities that have specific market sector expertise in efficiency measure implementation. Additionally, these programs include financial incentives for encouraging energy reducing projects. PG&E also offers 0% financing for qualified customers implementing eligible efficiency measures. This 0% loan is paid off over time through the energy cost savings from the implemented project.

This measure is broken into two distinct parts: 1) Savings Achieved by PG&E Energy Efficiency programs between 2006 and Q2 of 2012, and 2) Projected Savings Resulting from Future PG&E Energy Efficiency programs (based upon historical participation and outcomes).

CW-2: PG&E Energy Efficiency Programs - *Q1 of 2006 thru Q2 of 2012*

Projected Annual Energy Savings:	2,086 Mmbtu
Projected Annual Cost Savings:	$55,915
Projected Annual GHG Reductions:	160 MTCO2e

CW-2: PG&E Energy Efficiency Programs – *Future Years*

Projected Annual Energy Savings:	227 Mmbtu
Projected Annual Cost Savings:	$8,320
Projected Annual GHG Reductions:	19 MTCO2e

Measure CW-3: Provide Electric Vehicle Charging Infrastructure

This measure is designed to increase electric vehicle use by removing the barrier to charging away from home. One way to encourage EV use is to construct parking spaces in large parking structures that are reserved for EVs and have a charging connection. When public chargers are installed at shopping centers, they become magnets for new business; the growing market of EV drivers – from out of town and local – will stop to shop in your community while waiting for their car to charge. By becoming PEV ready you are positioning your community to engage in opportunities to link with future alternative energy sources such as "vehicle-to-grid" and other distributed energy resources.

Greenfield can maximize the community's benefit from the emerging EV market by taking the following steps: updating zoning and parking policies, updating local building codes, streamlining permitting and inspection processes for installation of charging equipment, participating in training and education programs for local officials, and reaching out to local residents and businesses. For the purposes of this Draft EAS, it was assumed that 50 EV's will be put into service in Greenfield by 2020.

Monterey Bay communities are fortunate to have an active and effective EV advocacy organization, which can support the development and implementation of the strategies described above. The Monterey Bay Electric Vehicle Alliance (MBEVA, see: mbeva.org) is a California grass-roots, public-private partnership comprised of diverse stakeholders in the tri-county Monterey Bay Region whose overall goal is to assure the region is EV-ready. MBEVA is committed to working with the region to develop a network of EV charging stations that is strategically designed to relieve potential "range anxiety" that EV owners may experience and spur the adoption of electric vehicles. MBEVA's Policy Team is leading several efforts to support EV-friendly policies at the local and state level. MBEVA's Outreach Team also organizes communication and education initiatives to educate and involve a variety of audiences.

CW-3: Provide Electric Vehicle Charging Infrastructure

Projected Annual Energy Savings:	-595* Mmbtu
Projected Annual Cost Savings:	-$21,798*
Projected Annual GHG Reductions:	141 MTCO2e

*Note: This measure is unique in that in order to achieve GHG Emission reductions from Electric Vehicles, the vehicles must be charged using electricity from the grid. This means that this measure will result in increased electricity consumption, thus the negative Energy and Cost Savings figures.

Measure CW-4: Solar Photovoltaic Installations

This measure will explore harnessing the power of the sun for building energy instead of fossil fuels. Putting solar panels on city buildings is a good way to increase the visibility of solar energy in the community, while providing clean energy for building use. Many residents or businesses would like to use solar power, but the large up-front cost can be an obstacle. Local governments can help overcome this barrier by providing rebates or other incentives (i.e.- streamlined and/or subsidized permits), offering low-interest loans, or organizing group buying programs to negotiate lower prices. These programs are an effective way of leveraging public and private funds for renewable energy. State or federal incentives may also be available, and local governments can help individuals apply for these. Educational and technical assistance programs can also promote solar power. Local governments can offer information clearinghouses and connect consumers with solar installers.

This measure is broken into two distinct parts: 1) Savings Achieved by Solar Photovoltaic Systems Installed To-date (as reported by PG&E, see Figures 8 and 9 for details), and 2) Projected Savings from Solar Photovoltaic Systems Installed in Future Years.

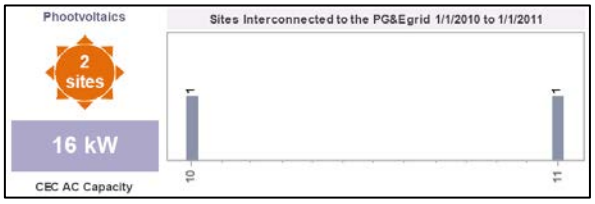


Figure 8- Commercial Photovoltaics Installed To-date

In order to project savings from future installations reasonable assumptions were made about the likely number of annual installations based upon historical trends. For the purposes of this Draft EAS, it was assumed that 50 kW of new Solar Photovoltaic panels will be installed annually.

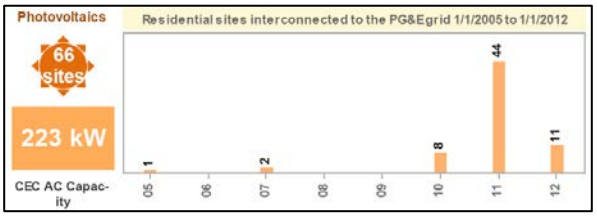


Figure 9- Residential Photovoltaics Installed To-date

CW-4: Solar Photovoltaic Installations- *Installed To-date*

Projected Annual Energy Savings:	1,339 Mmbtu
Projected Annual Cost Savings:	$49,085
Projected Annual GHG Reductions:	114 MTCO2e

CW-4: Solar Photovoltaic Installations- *Future Years*

Projected Annual Energy Savings:	280 Mmbtu
Projected Annual Cost Savings:	$10,269
Projected Annual GHG Reductions:	24 MTCO2e

Measure CW-5: Beyond Title 24 Standards

This measure will explore reducing energy and water use by applying stricter guidelines than Title 24 in the Residential Development sector. The current Title 24 or California Building Standards Code applies to all building occupancies and includes legally required energy efficiency standards, and these statewide requirements get stricter periodically with each subsequent revision (approximately every 3 years). Some municipalities have adopted stricter ordinances than Title 24, and this can improve energy security and stability for the entire municipality. It is important to note that this measure will require review and/or revision every 3 years, as the California Building Standards Code is revised.

Buildings account for 40% of total energy use and about 35% of GHG emissions in the United States. Design and construction of new buildings, or major renovation of existing ones, provides an opportunity to implement energy and cost saving measures that also reduce GHG emissions. Green building design views buildings as a complete system in order to maximize health, comfort, and productivity of occupants while minimizing resource use for construction and operation. An example of the kind of savings possible by carefully considering the whole building system before construction is that windows, insulation, and lighting systems can be chosen to minimize the cooling load, allowing for a smaller cooling unit to be used for savings in both capital and operations costs.

This measure is broken into two distinct parts: 1) Savings Achieved in Commercial Sector Development, and 2) Savings Achieved in Residential Sector Development.

CW-5: Beyond Title 24 Standards: *Commercial Development*

Projected Annual Energy Savings:	590 Mmbtu
Projected Annual Cost Savings:	$16,800
Projected Annual GHG Reductions:	44 MTCO2e

CW-5: Beyond Title 24 Standards: *Residential Development*

Projected Annual Energy Savings:	730 Mmbtu
Projected Annual Cost Savings:	$10,520
Projected Annual GHG Reductions:	43 MTCO2e

Measure CW-6: Wind Energy Installations

This measure will explore reducing GHG emissions by using electric power generated by wind turbines instead of fossil fuels. In many places, wind power is the most cost-effective form of renewable energy. Wind turbines come in a variety of sizes appropriate in both residential and commercial settings. Small wind turbines have a rated output of less than

100 kW, and often produce enough energy to power a home, small business, school or government building. Large wind turbines produce from 100 kW up to several MW. The energy they produce is sold to the local utility, generating income for the owners, or distributed to coop members. Local governments can promote small-scale wind by offering rebates and/or incentives (i.e. streamlined and/or subsidized permits). State or federal incentives may also be available, and local governments can help individuals apply.

CW-6: Wind Energy Installations

Projected Annual Energy Savings:	518 Mmbtu
Projected Annual Cost Savings:	$19,000
Projected Annual GHG Reductions:	44 MTCO2e

Measure CW-7: Solar Hot Water Heaters Installations

This measure is designed to reduce energy use by using solar water heaters instead of gas or electric. Solar water heating is one of the most efficient and cost-effective forms of renewable energy. Solar hot water is not a new technology; it has been utilized since the 1890s. Over the past 10-20 years, solar water heaters have improved in reliability, and systems can now last up to 40 years, with low annual maintenance costs. Offices, schools, and other municipal buildings use hot water, and can save money by using solar hot water. State or federal incentives may also be available, and local governments can help individuals apply for these. Governments can also offer rebates and/or incentives for installation of solar hot water on homes and businesses. For the purposes of this Draft EAS, it was assumed that 10 solar hot water heating systems will be installed annually in the City of Greenfield.

CW-7: Solar Hot Water Heater Installations

Projected Annual Energy Savings:	133 Mmbtu
Projected Annual Cost Savings:	$1,594
Projected Annual GHG Reductions:	7 MTCO2e

RESIDENTIAL SECTOR STRATEGIES

Measure RES-1: Residential Energy Efficiency Retrofits at Time-of-sale

This measure will explore increasing a home's efficiency by requiring energy efficiency upgrades at the time of sale or major renovations. Buildings account for 40% of total energy use and about 35% of GHG emissions in the United States. Over the next few decades, most of this energy will be used by existing buildings. Many measures can be applied to existing buildings to improve their efficiency, including using efficient light bulbs and fixtures, replacing appliances with more efficient ones, increasing insulation, replacing windows, and upgrading HVAC systems. In addition to energy and water cost savings, there are significant paybacks from increased employee productivity and health. These projects can also serve as a good public education program.

One way to enforce implementation of improvements to existing buildings is to require improvements when renovations are made or when buildings are sold. For the purposes of this Draft EAS, it was conservatively assumed that there will be 100 homes retrofitted each year as part of a voluntary pilot program.

RES-1: Residential Energy Efficiency Retrofits at Time-of-sale

Projected Annual Energy Savings:	852 Mmbtu
Projected Annual Cost Savings:	$11,500
Projected Annual GHG Reductions:	49 MTCO2e

Measure RES-2: Energy Upgrade California Whole Home Retrofit Program

Energy Upgrade California™ (energyupgradeca.org) Whole Home Retrofit is a statewide program that offers incentives to homeowners who complete select energy-saving home improvements on a single-family residence and 2-4 unit buildings such as a townhouse, condominium, as well as homeowners associations with either single family homes or two to four unit buildings. These incentive packages encourage customers to take a "whole house" approach by combining several related improvements at once to increase a home's overall energy efficiency and achieve greater savings.

By working with participating contractors or raters, homeowners can choose from two incentive options, the Basic Upgrade Package (up to $1000 in incentives) or Advanced Upgrade Package (up to$4000 in incentives), depending on their improvement needs and budget. 2-4 unit buildings only qualify for the Advanced Upgrade Package.

RES-2: Energy Upgrade California Whole Home Retrofit Program

Projected Annual Energy Savings:	471 Mmbtu
Projected Annual Cost Savings:	$5,388
Projected Annual GHG Reductions:	26 MTCO2e

Measure RES-3: Residential Weatherization

This measure is intended to increase building efficiency and decrease energy use by providing and/or promoting weatherization programs. Weatherization programs seal cracks around windows and doors, add insulation, and sometimes replace inefficient appliances, reducing energy consumption and utility costs, as well as reducing the related GHG emissions. By making improvements to local housing, weatherization programs can increase property values and improve community pride and aesthetics.

Greenfield is served by Central Coast Energy Services (CCES, see: energyservices.org), which provides low-to-no cost weatherization and other related energy services for low income residences. While low-income earners generally have smaller houses and fewer appliances than higher-income earners, their homes are often older and poorly insulated. Helping low-income households save money on bills can help improve residents' quality of life as well as stimulate the local economy by providing residents extra money to spend on education, leisure, or savings.

RES-3: Residential Weatherization

Projected Annual Energy Savings:	203 Mmbtu
Projected Annual Cost Savings:	$2,647
Projected Annual GHG Reductions:	12 MTCO2e

Measure RES-4: Multi-Family Housing Lighting Retrofits

This measure aims to reduce electricity use by updating inefficient light fixtures with new, more efficient fixtures. Lighting can be a large energy user in multifamily buildings due to common areas in constant use. Some multi-family buildings use fluorescent lighting, which is relatively efficient, but many buildings still have older fixtures with magnetic ballasts and T-12 size fluorescent tubes. New electronic ballasts with T-8 size tubes use 30% less energy and can provide better light quality without flicker. Lighting plays an important role in keeping residents and guests comfortable and healthy. Local governments can promote

multi-family lighting retrofits in a number of ways, including marketing programs that provide these services and/or offering rebates or other incentives.

RES-4: Multi-Family Housing Lighting Retrofits

Projected Annual Energy Savings:	119 Mmbtu
Projected Annual Cost Savings:	$4,375
Projected Annual GHG Reductions:	10 MTCO2e

NON-RESIDENTIAL SECTOR STRATEGIES

Measure NR-1: Green Business Certification Program

This measure will explore reducing energy and water use and by assisting businesses to pursue energy efficiency measures potentially through certification. Green businesses can help reduce GHG emissions from all sectors: energy consumption, transportation, and waste. Green business programs can also support business development and retention efforts.

The Monterey Bay Region is lucky to have an existing green business certification program that has been recognizing environmentally friendly local businesses since 2004. The Monterey Bay Area Green Business Program (montereybaygreenbusiness.org) is a partnership of environmental agencies, utilities and nonprofit organizations that assist, recognize and promote businesses and government agencies that volunteer to operate in a more environmentally responsible way. The program is part of a larger Statewide Network of Green Business Programs, but is locally staffed and operated.

To be certified "green," participants must be in compliance with all regulations and meet program standards for conserving resources, preventing pollution and minimizing waste. The program offers motivated businesses and agencies an easy-to-use framework for improving environmental performance, including a streamlined web-based checklist process that provides a roadmap for environmentally friendly business practices. Technical assistance is provided to businesses that pursue Green Business Certification. This is helpful to smaller businesses that cannot afford to hire environmental consultants.

The incentive for businesses to participate is good publicity resulting from their efforts and the ability to advertise as a certified green business. Certified Green Businesses receive public recognition and special marketing materials, and they are listed on websites throughout the State of California, allowing them to promote their businesses as environmental leaders within the community.

Jurisdictions are in a good position to help raise awareness about the program in the business community, market the program to the public, and encourage local residents to shop at certified businesses. This provides an opportunity for local governments to promote the environmental benefits of the program, as well as the certified green businesses themselves. This can also have the effect of increasing the participation in the program, which can lead to significant energy reductions, utility bill savings for participating businesses, and reduced GHG emissions.

NR-1: Green Business Certification Program

Projected Annual Energy Savings:	N/A
Projected Annual Cost Savings:	N/A
Projected Annual GHG Reductions:	292 MTCO2e

*Note: Annual Energy and Cost Savings projections are not available at this time.

Measure NR-2: RightLights Program

RightLights (rightlights.org) is a PG&E administered program implemented by Ecology Action that provides subsidized energy efficiency upgrades of lighting and refrigeration systems, with free professional assistance to help utility business customers lower energy bills and increase cash flow. RightLights is available to qualified PG&E business customers. The RightLights program offers a free, no-obligation energy survey and project report. These reports include guaranteed bids with no hidden costs. After agreeing to move forward on the project, the RightLights program works with a pool of experienced lighting contractors to conduct the work. All projects are post-inspected for quality and the specialized incentive payment is automatically deducted from the cost of installation.

This measure is broken into two distinct parts: 1) Savings Achieved by the RightLights program between 2006 and Q2 of 2012, and 2) Projected Savings Resulting from Future RightLights projects (based upon historical participation and outcomes).

NR-2: RightLights Program - *2006 thru Q2 of 2012*

Projected Annual Energy Savings:	1,475 Mmbtu
Projected Annual Cost Savings:	$54,082
Projected Annual GHG Reductions:	126 MTCO2e

NR-2: RightLights Program – *Future Years*

Projected Annual Energy Savings:	227 Mmbtu
Projected Annual Cost Savings:	$8,320
Projected Annual GHG Reductions:	19 MTCO2e

Measure NR-3: School Energy Efficiency Campaign

The schools in the City of Seaside present another significant opportunity for energy savings and GHG reductions in the City of Seaside through the implementation of targeted energy efficiency and conservation measures in local retail establishments. PG&E offers a number of cost-effective programs and incentives that can support a School Energy Efficiency Campaign, including measures such as: refrigeration equipment, heating and air conditioning equipment, high-efficiency variable speed motors, high-efficiency lighting equipment, and more. City government could support the implementation of such a campaign through collaboration with the local school boards, targeted marketing and outreach, streamlined permitting and inspection processes, and/or reduced permitting fees.

NR-3: School Energy Efficiency Program

Projected Annual Energy Savings:	827 Mmbtu
Projected Annual Cost Savings:	$26,820
Projected Annual GHG Reductions:	66 MTCO2e

Measure NR-4: Retail Energy Efficiency Campaign

The Retail sector presents another significant opportunity for energy savings and GHG reductions in the City of Greenfield through the implementation of targeted energy efficiency and conservation measures in local retail establishments. PG&E offers a number of cost-effective programs and incentives that can support a Retail Energy Efficiency Campaign, including measures such as: refrigeration equipment, heating and air conditioning equipment, high-efficiency variable speed motors, high-efficiency lighting equipment, and more. City government could support the implementation of such a campaign through targeted marketing and outreach, streamlined permitting and inspection processes, and/or reduced permitting fees.

NR-4: Retail Energy Efficiency Program

Projected Annual Energy Savings:	396 Mmbtu
Projected Annual Cost Savings:	$14,478
Projected Annual GHG Reductions:	49 MTCO2e

Measure NR-5: 3rd Party Commissioning

Commissioning is the process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained according to the owner's operational needs. Retrocommissioning is the same systematic process applied to existing buildings that have never been commissioned to ensure that their systems can be operated and maintained according to the owner's needs. For buildings that have already been commissioned or retrocommissioned, it is recommended that the practices of recommissioning or ongoing commissioning be applied.

Recommissioning is the term for applying the commissioning process to a building that has been commissioned previously (either during construction or as an existing building); it is normally done every three to five years to maintain top levels of building performance and/or after other stages of the upgrade process to identify new opportunities for improvement.

Building owners, managers, staff, and tenants all stand to gain from the Retrocommissioning process. It can lower building operating costs by reducing demand, energy consumption, and time spent by management or staff responding to complaints. It can also increase equipment life and improve tenant satisfaction by increasing the comfort and safety of occupants. Researchers at three of the foremost building-commissioning think tanks in the U.S.—Lawrence Berkeley National Laboratory (LBNL), Portland Energy Conservation Inc., and the Energy Systems Laboratory at Texas A&M University—concluded in a study published in December 2004 that retrocommissioning is one of the most cost-effective means of improving energy efficiency in commercial buildings.

Jurisdictions can promote 3rd Party Commissioning in local commercial buildings in a number of ways, including: marketing strategies, incentives such as public recognition, permit streamlining, reduced permit fees, rebates and/or other subsidies), and municipal policy.

NR-5: 5rd Party Commissioning

Projected Annual Energy Savings:	547 Mmbtu
Projected Annual Cost Savings:	$11,375
Projected Annual GHG Reductions:	36 MTCO2e

Measure NR-6: Hospitality Energy Efficiency Campaign

The Hospitality industry is one of the largest consumers of energy as a sector in Greenfield, and thus it represents a substantial opportunity for energy savings and GHG emissions reductions through strategic implementation of energy efficiency measures. PG&E offers a number of cost-effective programs and incentives that can support a Hospitality Energy Efficiency Campaign, including measures such as: refrigeration and kitchen equipment, heating and air conditioning equipment, high-efficiency variable speed motors, high-efficiency lighting equipment, and more. City government could support the implementation of such a campaign through targeted marketing and outreach, streamlined permitting and inspection processes, and/or reduced permitting fees.

NR-6: Hospitality Energy Efficiency Campaign

Projected Annual Energy Savings:	276 Mmbtu
Projected Annual Cost Savings:	$6,765
Projected Annual GHG Reductions:	19 MTCO2e

STEP 4- IMPLEMENT THE STRATEGY

The implementation of the EAS will be accomplished by Greenfield staff with support from AMBAG Energy Watch in an ongoing process that includes additional research, initiation of projects selected for immediate implementation, as well as monitoring and reporting of results. This section of the EAS provides an overall, planning-level framework for implementing the energy efficiency and conservation measures and achieving the reductions in this Plan.

One component to the successful implementation of Greenfield's EAS will be the sharing of resources through continued communication and collaboration with other jurisdictions in the region. Continued collaboration will foster a more supportive environment to share best practices, and potentially coordinate future requests for funding and/or implementation. Efforts to implement programs and policies on a regional scale will provide consistency in the energy efficiency market and leverage economies of scale.

Table 8 below presents indicators for the implementation of each measure, including implementation horizon, performing targets, and responsible department.

Table 8- Energy Action Strategy Implementation Matrix

Measure Reference Number	Energy Measure	Implementation Horizon	Performance Targets	GHG Emission Reduction Potential	Energy and Cost Savings Potential	Responsible Department
CW-1	Energy Watch (2006 thru Q2 of 2012)	Completed (2006-2012)	n/a	High	High	Public Works and Building Services
	Energy Watch (Future)	Long-term (2013-2035)	Meet or Exceed Historical Participation Rates	Medium-low	Medium-low	Public Works and Building Services
CW-2	PG&E EE Programs (2006 thru Q2 of 2012)	Completed (2006-2012)	n/a	High	High	Planning and Building Services/Energy Watch
	PG&E EE Programs (Future)	Long-term (2012-2035)	Meet or Exceed Historical Participation Rates	Medium-low	Medium-low	Planning and Building Services/Energy Watch
CW-3	Energy/Transportation - Provide Electric Vehicle Charging	Medium-term (2013-2020)	50 New EV's by 2020	Medium-high	n/a	Planning and Public Works
CW-4	Renewable Energy - Solar Power (Installed To-date)	Completed (239 kW Installed)	n/a	Medium-high	Medium-high	Planning and Building Services
	Renewable Energy - Solar Power (Future Growth)	Short-term (2013-2020)	50 kW Installed per year	Medium-low	Medium-low	Planning and Building Services
CW-5	Beyond Title 24 - Commercial	Long-term (2013-2035)	All New Commercial Construction (est. 115,883 sf per year)	Medium-low	Medium-low	Planning
	Beyond Title 24 - Residential	Long-term (2013-2035)	All New Residential Construction (est. 219,833 per year)	Medium-low	Medium-low	Planning
CW-6	Renewable Energy - Wind Power	Long-term (2013-2035)	100 kW Installed per year	Medium-low	Medium-low	Planning and Building Services
CW-7	Renewable Energy - Solar Water Heaters	Medium-term (2013-2020)	10 Systems Installed per year	Low	Low	Planning and Building Services

NR-1	Green Business Certification Program	Medium-term (2013-2020)	5 Businesses Certified per year	High	High	Planning and Building Services
NR-2	Right Lights (2006 thru Q2 of 2012)	Completed (2006-2012)	n/a	Medium-high	Medium-high	Planning and Building Services
	Right Lights (Future)	Long-term (2013-2035)	Meet or Exceed Historical Participation Rates	Low	Low	Planning and Building Services
NR-3	School EE Campaign	Short-term (2013-2019)	2 Schools Retrofitted per year	Medium-low	Medium-low	Community Development /Energy Watch
NR-4	Retail EE Campaign	Medium-term (2013-2020)	5 Firms Served per year	Low	Low	Community Development /Energy Watch
NR-5	Building Energy - 3rd Party Commissioning	Medium-term (2013-2020)	50,000 sf of Existing Commercial/Industrial Retrocommisioning per year	Low	Low	Community Development /Energy Watch
NR-6	Hospitality EE Campaign	Medium-term (2013-2020)	Retrofit 5 Retail Stores per year	Low	Low	Community Development /Energy Watch
RES-1	Energy Efficiency Retrofits at Time of Sale	Long-term (2013-2035)	Retrofit All Homes Sold (est 100 home sales per year)	Medium-low	Medium-low	Building Services
RES-2	Energy Upgrade CA Whole Home Retrofit Program	Long-term (2013-2035)	10 Retrofits per year	Low	Low	Building Services
RES-3	Building Energy Weatherization Programs	Long-term (2013-2035)	25 Homes per year	Low	Low	Community Development /Social Services
RES-4	Lighting - Multi Family Housing Retrofits	Medium-term (2013-2020)	5 Retrofits per year	Low	Low	Community Development /Building Services
MEASURE REFERENCE KEY: **CW = Community-wide Measure** **NR = Non-Residential Measure** **RES = Residential Measure**						

STEP 5- MONITOR PROGRESS AND REFINE STRATEGY

The EAS is a living document that will be updated on a regular basis. To achieve EAS goals, Greenfield should have a system in place for building on the projects identified here, identifying other potential energy saving projects, tracking projects that have been implemented, and updating the overall goals and strategies of the plan when necessary.

Track and Report Reductions

In order to track Greenfield's progress towards the established energy and GHG emission reduction goals it is important for municipal staff to monitor measure implementation regularly. This will allow Greenfield to verify which measures are achieving their intended outcomes, and understand whether changes to existing measures or adding new measures is necessary in order to meet the established goals for the EAS.

The estimated economic and environmental benefits associated with each included measure were calculated using the SEEC CEMS tools, which are also setup to facilitate tracking and reporting the actual measure outcomes and overall EAS progress. A supplemental progress report should be assembled once each year to highlight successes and positive outcomes, as well as any unforeseen obstacles or deficiencies in the EAS. AMBAG Energy Watch staff will provide support to municipal staff to ensure that the process of tracking measure outcomes and reporting overall progress towards established goals to the City Administration and community stakeholders is manageable.

Adjusted Annual Energy-related GHG Emissions Forecast

An Adjusted Annual GHG Forecast, which estimates the impacts of EAS measures on future GHG emissions, is one good way to track progress towards Greenfield's established goals. As the Greenfield Annual GHG Inventory is updated, which should be completed in regular intervals (i.e. - every 5 years), the Adjusted Annual GHG Forecast will allow municipal staff to verify whether the EAS measures are performing as expected.

Figure 10 provides a visual representation of the GHG emission reduction benefits expected to result from the implementation of all of the energy action measures contained in this Draft EAS. Notes- a) the top (orange) line shows the BAU Forecast if no energy actions or policies were implemented, b) the middle (brown) line indicates the Adjusted Forecast that shows the combined total GHG reductions expected to result from implementing all measures included in this Draft EAS, c) the bottom (green) line reflects the 15% Reduction from Baseline GHG Levels by 2020 goal, which provides the context needed to understand the projected contribution of the EAS towards achieving that goal.

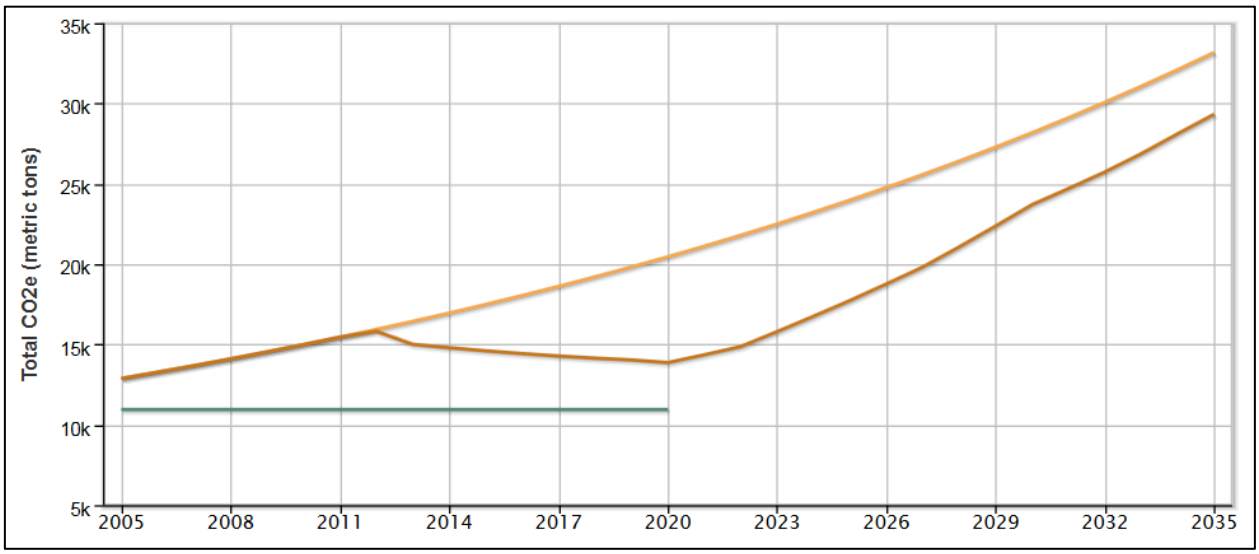


Figure 10- Adjusted 2035 Energy-related GHG BAU Forecast Reflecting Reductions from Implementation of Included EAS Measures *(Source: AMBAG Energy Watch)*

Table 9 provides a numerical representation of the expected GHG emission reduction benefits resulting from the implementation of all of the energy action measures contained in this Draft EAS.

Table 9- Adjusted Energy-related GHG Forecast With All Included Energy Action Strategy Measures
(Source: AMBAG Energy Watch)

Year	BAU Forecast	Adjusted Forecast	MTCO2e Reduced	Reduction from BAU	Reduction from 2005
2005	12,883	12,883	0	0%	0%
2006	13,276	13,276	0	0%	-3%
2007	13,683	13,683	0	0%	-6%
2008	14,104	14,104	0	0%	-9%
2009	14,540	14,540	0	0%	-13%
2010	14,990	14,990	0	0%	-16%
2011	15,456	15,456	0	0%	-20%
2012	15,939	15,825	114	1%	-23%
2013	16,438	15,009	1,429	9%	-16%
2014	16,954	14,800	2,155	13%	-15%
2015	17,489	14,609	2,880	16%	-13%
2016	18,042	14,437	3,605	20%	-12%
2017	18,615	14,285	4,330	23%	-11%
2018	19,208	14,152	5,055	26%	-10%
2019	19,821	14,040	5,781	29%	-9%
2020	***20,456***	***13,876***	***6,581***	***32%***	***-8%***
2021	21,113	14,360	6,753	32%	-11%
2022	21,794	14,869	6,925	32%	-15%
2023	22,498	15,800	6,699	30%	-23%
2024	23,228	16,756	6,472	28%	-30%
2025	23,983	17,737	6,246	26%	-38%
2026	24,765	18,765	6,000	24%	-46%
2027	25,574	19,821	5,754	22%	-54%
2028	26,413	21,073	5,340	20%	-64%
2029	27,281	22,373	4,907	18%	-74%
2030	28,180	23,705	4,475	16%	-84%
2031	29,110	24,706	4,405	15%	-92%
2032	30,074	25,740	4,335	14%	-100%
2033	31,073	26,876	4,197	14%	-109%
2034	32,107	28,119	3,987	12%	-118%
2035	33,177	29,474	3,703	11%	-129%

32% Reduction from BAU

Updating and Refining the Energy Action Strategy

The EAS is intended to be monitored, updated and refined as needed to ensure optimal progress toward established goals and maximum overall benefit to the community. Additional energy policies and actions may need to be developed and launched as part of the long-term implementation of the EAS in order to meet established goals.

It is important to note that the tools and methodologies utilized in the development of this EAS (i.e. - the SEEC CEMS platform) are continuously evolving and improving, and new energy efficiency and conservation measures will be added to the palette of options. This means that every new revision of the EAS can benefit from these improvements and additions. Also, as other communities throughout California take action to reduce energy consumption in their cities and counties, new and innovative policies and actions are likely to emerge. Greenfield can incorporate appropriate best practices in energy efficiency and conservation into the EAS process by monitoring what is working well in other communities.

CONCLUSION

This EAS for the Greenfield provides a long-term vision and a policy framework for decision making regarding energy efficiency and conservation. The EAS lays out a pathway for achieving significant reductions in the community's overall annual energy consumption, as well as the related GHG emissions. The included energy policies and actions have been selected with the unique needs and circumstances of the Greenfield community in mind, and they were customized to reflect existing and expected conditions in the community.

By adopting the EAS and implementing the energy measures it contains, Greenfield demonstrates its leadership and recognizes the value of energy efficiency and conservation as powerful and dynamic tools that reflects the community's identity and supports Greenfield's objectives. The EAS is intended to be monitored and updated regularly to report progress towards established goals, and the strategy will be refined and adjusted as needed to ensure maximum benefit to the community.

Lastly, Greenfield may choose to build upon the foundation laid by the EAS to create a more comprehensive Climate Action Plan, which would address sources of GHG emissions beyond energy consumption (i.e. - Transportation, Solid Waste, etc.).

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GLOSSARY OF TERMS

Annual Consumption

Annual consumption refers to the amount of electricity used by a consumer in one year and is typically measured in kilowatt-hours (kWh). This information can be acquired from your electricity bill or by contacting your energy provider.

Average Site Energy Use Intensity (EUI)

The site energy intensity (Kbtu/Sq. Ft.) this facility would consume if it had a national energy performance rating of 50, the rating associated with median performance.

Average Weather Normalized Source EUI

The weather-normalized source energy intensity (kBtu/Sq. Ft.) for the energy baseline 12 month evaluation period.

Carbon Dioxide

A naturally occurring gas, and also a by-product of burning fossil fuels and biomass, as well as land-use changes and other industrial processes. It is the principal human caused greenhouse gas that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1. See climate change and global warming.

Carbon Dioxide Equivalent

A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). Carbon dioxide equivalents are commonly expressed as "metric tons of carbon dioxide equivalents (MTCO2e)." The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP.

Climate

Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands of years. The classical period is 3 decades, as defined by the World Meteorological Organization (WMO). These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. See weather.

Climate Change

Climate change refers to any significant change in the measures of climate lasting for an extended period of time. In other words, climate change includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer.

Co-Benefit

The benefits of policies that are implemented for various reasons at the same time including climate change mitigation acknowledging that most policies designed to address greenhouse gas mitigation also have other, often at least equally important, rationales (e.g., related to objectives of development, sustainability, and equity).

Emissions

The release of a substance (usually a gas when referring to the subject of climate change) into the atmosphere.

Emissions Factor

A unique value for scaling emissions to activity data in terms of a standard rate of emissions per unit of activity (e.g., grams of carbon dioxide emitted per barrel of fossil fuel consumed, or per pound of product produced).

Energy Efficiency

Energy efficiency refers to products or systems using less energy to do the same or better job than conventional products or systems. Energy efficiency saves energy, saves money on utility bills, and helps protect the environment by reducing the amount of electricity that needs to be generated.

Energy Performance Rating (1-100)

The benchmark rating for a facility on a scale of 1-100 relative to similar buildings nationwide using EPA's national energy performance rating system. The benchmark rating is based on your facility's source energy use, level of business activity, and geographical location. The rating indicates the percentile rank of the facility once all required data is entered. A rating of 68 means that the facility is in the 68th percentile of all comparable facilities nationwide. To qualify for the ENERGY STAR, a facility must have a rating of 75 or higher. Please see ENERGY STAR Eligibility Criteria.

Fossil Fuel

A general term for organic materials formed from decayed plants and animals that have been converted to crude oil, coal, natural gas, or heavy oils by exposure to heat and pressure in the earth's crust over hundreds of millions of years.

Global Warming

The recent and ongoing global average increase in temperature near the Earths surface.

Global Warming Potential

A measure of the total energy that a gas absorbs over a particular period of time (usually 100 years), compared to carbon dioxide.

Greenhouse Effect

Trapping and build-up of heat in the atmosphere (troposphere) near the Earths surface. Some of the heat flowing back toward space from the Earth's surface is absorbed by water vapor, carbon dioxide, ozone, and several other gases in the atmosphere and then reradiated back toward the Earths surface. If the atmospheric concentrations of these greenhouse gases rise, the average temperature of the lower atmosphere will gradually increase. See greenhouse gas, anthropogenic, climate, global warming. [4]

Greenhouse Gas (GHG)

Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, carbon dioxide, methane, nitrous oxide, ozone, chlorofluorocarbons, hydrochlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride.

Heat Island

An urban area characterized by temperatures higher than those of the surrounding non-urban area. As urban areas develop, buildings, roads, and other infrastructure replace open land and vegetation. These surfaces absorb more solar energy, which can create higher temperatures in urban areas

Indirect Emissions

Indirect emissions from a building, home or business are those emissions of greenhouse gases that occur as a result of the generation of electricity used in that building. These emissions are called "indirect" because the actual emissions occur at the power plant which generates the electricity, not at the building using the electricity.

Mitigation

A human intervention to reduce the human impact on the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks.

National Median Source EUI

For a building with a rating, this defines the source energy intensity (kBtu/gallons per day) this facility would consume if it had a national energy performance rating of 50, the rating associated with median performance. For a building not eligible for a rating, this defines the national median source EUI calculated in kBtu/gallons per day as a weighted average across all buildings of a similar type. This metric is only available for Water and Wastewater facilities.

Ratable Buildings (Energy Star Portfolio Manager)

1. All Buildings must be at least 5,000 sqft and with qualified space types (see below).
2. Space types that are eligible for Energy Star Rating:
    a. Bank/Financial Institution
    b. Courthouse
    c. Data Center
    d. Hospital
    e. Hotel
    f. House of Worship
    g. K-12 School
    h. Medical Office
    i. Municipal Wastewater Treatment Plant
    j. Office
    k. Residence Hall
    l. Retail Store
    m. Senior Care Facility
    n. Supermarket
    o. Warehouse

% Difference from National Median Source EUI

For a building with a rating, percent difference is computed from the actual source EUI of the building and the source EUI for a median performance rating of 50. For a building not eligible for a rating, percent difference is computed from the actual source EUI of the building and the national median source EUI associated with that building type. A negative number indicates that a building is performing better than the national median.

Renewable Energy

Energy resources that are naturally replenishing such as biomass, hydro, geothermal, solar, wind, ocean thermal, wave action, and tidal action.

Utility

A utility is a municipal or private business that provides electricity to the public and is subject to governmental regulation.

APPENDIX A – MEASURE REDUCTION CALCULATIONS

This Appendix is intended to provide the calculations that yielded the energy and GHG emission reduction estimate for all of the measures included in this Energy Action Strategy. These estimates were generated using the Statewide Energy Efficiency Collaborative (SEEC) Climate and Energy Management Suite (CEMS) suite of tools and calculators. Screenshots are provided below from each Measure's SEEC CEMS Calculator, to allow the reader to see the detailed assumptions and calculations behind each Measure.

Measure CW-1: AMBAG Energy Watch (2006 thru Q2 of 2012)

Reduction Measure - Energy Watch DI (2006 thru (

Electricity Savings: 1,062,822.07 kWh (Source: PG&E)
0.00029 MTCO2e/kWh = 308 MTCO2e/yr

Natural Gas Savings: ____ Therms (Source: PG&E)
0.0053435 MTCO2e/Therm = ____

User Defined Actions

This worksheet is available for you to include reductions associated with actions where the calculation has been performed outside of the CAPA application. This could be in cases where outside work has already been completed in another tool and you wish to utilize that work in the plan you create in CAPA. This allows you to leverage any outside analysis and include a limitless number of emissions reduction actions in your plan, regardless of whether CAPA explicitly covers them or not.

To use this page simply indicate the annual reduction you expect an action to produce and use the "Implement Cumulatively" and "Effective Useful Life" fields as you have on other worksheets as needed for your particular action. If the action is something that depends on the level of implementation you can use that field to increase the savings on a per unit basis. For more discrete actions, simply leave this value as "1".

User Defined Measure

Degree of Implementation 1

If this is a discrete action enter "1". If this is a savings per unit measure, enter the number of units

Implement Cumulatively

Effective Useful Life 20 Years

Total Annual Emissions Savings 308 MTCO2e

Total Annual Emission Savings

308 metric tons per year

Measure CW-1: AMBAG Energy Watch (Future)

Reduction Measure - Energy Watch DI (Future)

Annualized Average projection based on historical participation rates. Assumes similar participation rates to the 2006-Q2 of 2012 in future years.

308 (MTCO2e/yr from 2006 thru Q2 of 2012) / 26 (number of quarters 2006-Q2 of 2012) x 4 (number of quarters per year) = 47 MTCO2e/yr

User Defined Actions

This worksheet is available for you to include reductions associated with actions where the calculation has been performed outside of the CAPA application. This could be in cases where outside work has already been completed in another tool and you wish to utilize that work in the plan you create in CAPA. This allows you to leverage any outside analysis and include a limitless number of emissions reduction actions in your plan, regardless of whether CAPA explicitly covers them or not.

To use this page simply indicate the annual reduction you expect an action to produce and use the "Implement Cumulatively" and "Effective Useful Life" fields as you have on other worksheets as needed for your particular action. If the action is something that depends on the level of implementation you can use that field to increase the savings on a per unit basis. For more discrete actions, simply leave this value as "1".

User Defined Measure

Degree of Implementation 1

If this is a discrete action enter "1". If this is a savings per unit measure, enter the number of units

Implement Cumulatively ☑

Effective Useful Life 20 Years

Total Annual Emissions Savings 47 MTCO2e

Total Annual Emission Savings

47 metric tons per year

Measure CW-2: PG&E Energy Efficiency Programs (2006 thru Q2 of 2012)

Reduction Measure - PG&E EE Programs (2006 th

Electricity Savings: 385,625.71 kWh (Source: PG&E)
0.00029 MTCO2e/kWh = 118.8 MTCO2e/yr

Natural Gas Savings: 7,712.00 Therms (Source: PG&E)
0.0053435 MTCO2e/Therm = 41.2

User Defined Actions

This worksheet is available for you to include reductions associated with actions where the calculation has been performed outside of the CAPA application. This could be in cases where outside work has already been completed in another tool and you wish to utilize that work in the plan you create in CAPA. This allows you to leverage any outside analysis and include a limitless number of emissions reduction actions in your plan, regardless of whether CAPA explicitly covers them or not.

To use this page simply indicate the annual reduction you expect an action to produce and use the "Implement Cumulatively" and "Effective Useful Life" fields as you have on other worksheets as needed for your particular action. If the action is something that depends on the level of implementation you can use that field to increase the savings on a per unit basis. For more discrete actions, simply leave this value as "1".

User Defined Measure

Degree of Implementation 1

If this is a discrete action enter "1". If this is a savings per unit measure, enter the number of units

Implement Cumulatively ☐

Effective Useful Life 20 Years

Total Annual Emissions Savings 160 MTCO2e

Total Annual Emission Savings

160 metric tons per year

Measure CW-2: PG&E Energy Efficiency Programs (Future)

Reduction Measure - PG&E EE Programs (Future)

Annualized Average projection based on historical participation rates. Assumes similar participation rates to the 2006-Q2 of 2012 in future years.

160 (MTCO2e/yr from 2006 thru Q2 of 2012) / 26 (number of quarters 2006-Q2 of 2012) x 4 (number of quarters per year) = 24.6 MTCO2e/yr

User Defined Actions

This worksheet is available for you to include reductions associated with actions where the calculation has been performed outside of the CAPA application. This could be in cases where outside work has already been completed in another tool and you wish to utilize that work in the plan you create in CAPA. This allows you to leverage any outside analysis and include a limitless number of emissions reduction actions in your plan, regardless of whether CAPA explicitly covers them or not.

To use this page simply indicate the annual reduction you expect an action to produce and use the "Implement Cumulatively" and "Effective Useful Life" fields as you have on other worksheets as needed for your particular action. If the action is something that depends on the level of implementation you can use that field to increase the savings on a per unit basis. For more discrete actions, simply leave this value as "1".

User Defined Measure

Degree of Implementation 1

If this is a discrete action enter "1". If this is a savings per unit measure, enter the number of units

Implement Cumulatively ☑

Effective Useful Life 20 Years

Total Annual Emissions Savings 24.6 MTCO2e

Total Annual Emission Savings

24.6 metric tons per year

Measure CW-3: Provide Electric Vehicle Charging

Electric Vehicles

Degree of Implementation 50 Vehicles

Enter the number of vehicles that will be replaced with an electric powered model.

Average VMT 10,000 Miles

Enter the average annual miles traveled for all vehicles included in this calculation. Consider creating multiple records for substantially different vehicles.

Existing Vehicles

CO2 Reduction

Existing Vehicle Fuel Economy 21 MPG

Gasoline Consumption Reduced **23,810** Gallons per Year

CO2 Reduced **209** MTCO2 per year

N2O Reduction

N2O Emissions Factor 0.0166 g/mi

N2O Reduced **3** MTCO2e per Year

CH4 Reduction

CH4 Emissions Factor 0.2173 g/mi

CH4 Reduced **2** MTCO2e per Year

Total Gasoline Emissions Reduced **214** MTCO2e per Year

Electric Vehicles

CO2 Production

Electric Vehicle Fuel Economy 105 MPGGe

Enter the fuel economy for the replacement vehicle being considered. Electric Vehicle fuel economy numbers are reported in terms of Miles per Gallon Gasoline Equivalent (MPGGe). models are available at www.FuelEconomy.gov

Equivalent Gallons of Gasoline Consumed **4,762** Gallons

Increased Electricity Consumption **174,385** kWh per Year

Electricity Emission Coefficient **0.000419** metric tons per kWh

RPS Adjustment Factor 1

CO2 Produced **73** MTCO2 per year

Total Electricity Sector Emissions Produced **73** MTCO2e per Year

Net Emissions Reduction

141 MTCO2e per Year

Measure CW-4: Solar Photovoltaic Installations (Installed To-date)

Photovoltaic Panels

Degree of Implementation 239 kW of planned installed solar capacity

Enter the total planned installed capcity you plan to deploy.

Implement Cumulatively ☐

Effective Useful Life 20 Years

Savings

Generation Potential 1,643 kWh/kW Installed per year

Enter the value as appropriate from the Reference Sheet linked above.

Annual Electricity Produced **392,677** kWh per year

Electricity Emission Coefficient **0.00029** metric tons per kWh

RPS Adjustment Factor 1

Annual Electric Emission Savings **113.88** metric tons per year

Total Annual Emission Savings

114 metric tons per year

Measure CW-4: Solar Photovoltaic Installations (Future Growth)

Photovoltaic Panels

Degree of Implementation 50 kW of planned installed solar capacity

Enter the total planned installed capcity you plan to deploy.

Implement Cumulatively ☑

Effective Useful Life 20 Years

Savings

Generation Potential 1,643 kWh/kW Installed per year

Enter the value as appropriate from the Reference Sheet linked above.

Annual Electricity Produced **82,150** kWh per year

Electricity Emission Coefficient **0.00029** metric tons per kWh

RPS Adjustment Factor 1

Annual Electric Emission Savings **23.82** metric tons per year

Total Annual Emission Savings

24 metric tons per year

Beyond Title 24 - Commercial

Degree of Implementation 115,883 Square Feet

Enter the area of building space to be constructed annually under the stricter standard

Planned Percent Improvement over Title 24 2008 15 %

Enter a whole number. Ex. for 5% enter the value "5"

Effective Useful Life 20 Years

Pathways to Savings

Savings

Electricity Impacts

Baseline Electricity Intensity 6.9 kWh/Ft2-yr

Obtain this value as appropriate for your utility region from the linked documentation above.

Annual Electric Savings **119,938.905** kWh per year

Electricity Emission Coefficient **0.00029** metric tons per kWh

RPS Adjustment Factor 1

Annual Emission Savings **34.78228245** metric tons per year

Gas Impacts

Baseline Gas Use Intensity 0.104 Therms/ft2-yr

Annual Gas Savings **1,807.7748** Therms per year

Gas Emission Coefficient **0.0053435** metric tons per Therm

Annual Emission Savings **9.6598446438** metric tons per year

Total Annual Emission Savings

44 metric tons per year

Measure CW-5: Beyond Title 24 - Residential

Beyond Title 24 - Residential

Degree of Implementation 219,833 Square Feet

Enter the area of building space to be constructed annually under the stricter standard

Planned Percent Improvement over Title 24 2008 15 %

Enter a whole number. Ex. for 5% enter the value "5"

Effective Useful Life 15 Years

Single Family Households

Percent of New Construction as Single Family Units 45 %

Electricity Impacts

Baseline Electricity Intensity 1.07 kWh/Ft2-yr

Obtain this value as appropriate for your utility region from the linked documentation above.

Annual Electric Savings **15,877.438425** kWh per year

Electricity Emission Coefficient **0.00029** metric tons per kWh

RPS Adjustment Factor 1

Annual Emission Savings **5** metric tons per year

Gas Impacts

Baseline Gas Use Intensity 0.171465 Therms/ft2-yr

Obtain this value as appropriate for your utility region from the linked documentation above.

Annual Gas Savings **2,544.3224107875** Therms per year

Gas Emission Coefficient **0.0053435** MTCO2e per Therm

Annual Emission Savings **14** metric tons per year

Townhouses

Percent of New Construction as Townhouses 30 %

Electricity Impacts

Baseline Electricity Intensity 0.68 kWh/Ft2-yr

Obtain this value as appropriate for your utility region from the linked documentation above.

Annual Electric Savings **6,726.8898** kWh per year

Electricity Emission Coefficient **0.00029** metric tons per kwH

RPS Adjustment Factor 1

Annual Emission Savings **2** metric tons per year

Gas Impacts

Baseline Gas Use Intensity 0.151316 Therms/ft2-yr

Obtain this value as appropriate for your utility region from the linked documentation above.

Annual Gas Savings **1,496.89126026** Therms per year

Gas Emission Coefficient **0.0053435** MTCO2e per Therm

Annual Emission Savings **8** metric tons per year

Multi-Family Households (5+ Units)

Percent of New Construction as Multi-Family Units 25 %

Electricity Impacts

Baseline Electricity Intensity 1.55 kWh/Ft2-yr

Obtain this value as appropriate for your utility region from the linked documentation above.

Annual Electric Savings **12,777.793125** kWh per year

Electricity Emission Coefficient **0.00029** metric tons per kwH

RPS Adjustment Factor 1

This value reflects the RPS adjustment for Average CEC energy over the lifetime of emissions avoided and generation lost for this action, which is on the order of 60-80 years.

Annual Emission Savings **4** metric tons per year

Gas Impacts

Baseline Gas Use Intensity 0.249391 Therms/ft2-yr

Obtain this value as appropriate for your utility region from the linked documentation above.

Annual Gas Savings **2,055.9139388625** Therms per year

Gas Emission Coefficient **0.0053435** MTCO2e per Therm

Annual Emission Savings **11** metric tons per year

Total Annual Emission Savings

43 metric tons per year

Wind Turbines

Degree of Implementation 100 kW of planned installed wind capacity

Enter the total planned installed capcity you plan to deploy.

Implement Cumulatively ☑

Effective Useful Life 20 Years

Savings

Generation Potential 1,520 kWh/kW Installed per year

The value of 1520 kWh/kW of Capacity was derived from data from the California electronic Wind Performance Reporting System (eWPRS). ranging in capacity from 13 - 13,000 kW.

Annual Electricity Produced **152,000** kWh per year

Electricity Emission Coefficient **0.00029** metric tons per kWh

RPS Adjustment Factor 1

Annual Electric Emission Savings **44** metric tons per year

Total Annual Emission Savings

44 metric tons per year

Measure CW-7: Solar Water Heaters

Solar Thermal

Degree of Implementation 10 Systems Installed Annually

Enter the annual number of Solar Thermal systems that will be installed annually.

Implement Cumulatively ☑

Effective Useful Life 15 Years

Energy Savings

Electric

Percent Electric Water Heaters 10 %

Adjust the % of households with electric water heaters if necessary

Electricity Savings per System 0 kWh/system

Annual Electricity Savings **0** kWh per year

Electricity Emission Coefficient **0.00029** metric tons per kWh

RPS Adjustment Factor 1

Annual Electric Emission Savings **0** metric tons per year

Gas

% Gas Water Heaters **90**

Calculated as the remainder from the % electric water heaters

Gas Savings per System 137 Therms/System

Annual Gas Savings **1,233** Therms per year

gas Emission Coefficient **0.0053435** MTCO2e per Therm

Annual Gas Emission Savings **7** metric tons per year

Total Annual Emission Savings

7 metric tons per year

Measure RES-1: Retrofits at Time of Sale

Time of Sale Retrofits

Degree of Implementation 100 Homes

Enter the annual number of inspections and tune ups.

Implement Cumulatively ☑

Effective Useful Life 10 Years

ElectricSavings

Electric

Electricity Savings per Home 328 kWh/home

Annual Electricity Savings **32,800** kWh per year

Electricity Emission Coefficient **0.00029** metric tons per kWh

RPS Adjustment Factor 1

Annual Electric Emission Savings **10** metric tons per year

Gas

Gas Savings per Home 74 Therms/Home

Annual Gas Savings **7,400** Therms per year

gas Emission Coefficient **0.0053435** MTCO2e per Therm

Annual Gas Emission Savings **40** metric tons per year

Total Annual Emission Savings

49 metric tons per year

Measure RES-2: Energy Upgrade California Whole Home Retrofit Program

Reduction Measure - Energy Upgrade CA Whole H

Annualized Average projection based on historical participation rates and distribution of Small, Medium, and Large PG&E Accounts within this market sector.

Average Electricity Savings (per Account/SAID): 750 kWh (Source: PG&E) 0.00029 MTCO2e/kWh = 0.22 MTCO2e/yr

Average Natural Gas Savings (per Account/SAID): 445 Therms (Source: PG&E) 0.0053435 MTCO2e/Therm = 2.4 MTCO2e/yr

Total MTCO2e/yr (Assuming 10 Account/SAID/yr) = 26.2 MTCO2e/yr

User Defined Actions

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To use this page simply indicate the annual reduction you expect an action to produce and use the "Implement Cumulatively" and "Effective Useful Life" fields as you have on other worksheets as needed for your particular action. If the action is something that depends on the level of implementation you can use that field to increase the savings on a per unit basis. For more discrete actions, simply leave this value as "1".

User Defined Measure

Degree of Implementation 1

If this is a discrete action enter "1". If this is a savings per unit measure, enter the number of units

Implement Cumulatively ☑

Effective Useful Life 15 Years

Total Annual Emissions Savings 26.2 MTCO2e

Total Annual Emission Savings

26.2 metric tons per year

Measure RES-3: Residential Weatherization

Weatherization

Degree of Implementation 25 Homes

Enter the annual number of weatherizations that you will complete annually.

Implement Cumulatively ☑

Effective Useful Life 10 Years

ElectricSavings

Electric

Electricity Savings per Home 271 kWh/home

Annual Electricity Savings **6,775** kWh per year

Electricity Emission Coefficient **0.00029** metric tons per kWh

RPS Adjustment Factor 1

Annual Electric Emission Savings **2** metric tons per year

Gas

Gas Savings per Home 72 Therms/Home

Annual Gas Savings **1,800** Therms per year

gas Emission Coefficient **0.0053435** MTCO2e per Therm

Annual Gas Emission Savings **10** metric tons per year

Total Annual Emission Savings

12 metric tons per year

Measure RES-4: Multi Family Housing Lighting Retrofit Program

Comprehensive Multi-Family Lighting Retrofits

Degree of Implementation 5 Retrofit Projects

Enter the number of Multi-Family Complexes to recieve retrofits.

Implement Cumulatively ☑

Effective Useful Life 10 Years

Common Areas

Retrofit Details

Exterior Compact Fluorescent (CF) Fixtures

Average number of Exterior CF Fixtures per Apartment Complex 10 Fixtures

Average Savings per Common Area Exterior CF Fixture 189 kWh/Year

Total Annual kWh from Common Area Exterior CF Fixtures **9,450** kWh/Year

Interior Compact Fluorescent (CF) Fixtures

Average number of Interior CF Fixtures per Apartment Complex 10 Fixtures

Average Savings per Common Area Interior CF Fixture 164 kWh/Year

Total Annual kWh from Common Area Interior CF Fixtures **8,200** kWh/Year

Interior Compact Fluorescent Lightbulbs (CFL)

Average number of Interior CFL Bulbs per Apartment Complex 10 Bulbs

Average Savings per Common Area Interior CFL Bulbs 124 kWh/Year

Total Annual kWh from Common Area Interior CFL Bulbs **6,200** kWh/Year

Linear Fluorescent Fixtures

Average number of Common Area Linear Fluorescent Fixtures per Apartment Complex 10 Fixtures

Average Savings per Common Area Linear Fluorescent Fixtures 41 kWh/Year

Total Annual kWh from Common Area Linear Fluorescent Fixtures **2,050** kWh/Year

Total Annual kWh Savings for Common Areas **25,900** kWh/Year

In-Apartment Areas

Retrofit Details

Exterior Compact Fluorescent (CF) Fixtures

Average number of Exterior CF Fixtures per Apartment Complex 10 Fixtures

Average Savings per In-Apartment Exterior CF Fixture 81 kWh/Year

Total Annual kWh from In-Apartment Exterior CF Fixtures **4,050** kWh/Year

Interior Compact Fluorescent (CF) Fixtures

Average number of Interior CF Fixtures per Apartment Complex 10 Fixtures

Average Savings per In-Apartment Interior CF Fixture 50 kWh/Year

Total Annual kWh from In-Apartment Interior CF Fixtures **2,500** kWh/Year

Interior Compact Fluorescent Lightbulbs (CFL)

Average number of Interior CFL Bulbs per Apartment Complex 10 Bulbs

Average Savings per In-Apartment Interior CFL Bulbs 38 kWh/Year

Total Annual kWh from In-Apartment Interior CFL Bulbs **1,900** kWh/Year

Linear Fluorescent Fixtures

Average number of In-Apartment Linear Fluorescent Fixtures per Apartment Complex 10 Fixtures

Average Savings per In-Apartment Linear Fluorescent Fixtures 13 kWh/Year

Total Annual kWh from In-Apartment Linear Fluorescent Fixtures **650** kWh/Year

Total Annual kWh Savings for In-Apartment Areas **9,100** kWh/Year

Emissions Savings

Annual kWh Reduced **35,000** kWh/Year

Electricity Emission Coefficient **0.00029** metric tons per kWh

RPS Adjustment Factor 1

Total Annual Emission Savings

10 metric tons per year

Measure NR-1: Green Business Certification Program

Measure Name	Reduction Measure - Green Business Certification I
Notes	128,886 lbs/year per business = 58.4 MTCO2e/year per business (Source: Jo Fleming- Regional GBP Coordinator) 5 Business/year Goal = 292 MTCO2e/yr

User Defined Actions

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User Defined Measure

Degree of Implementation 1

If this is a discrete action enter "1". If this is a savings per unit measure, enter the number of units

Implement Cumulatively ☑

Effective Useful Life 10 Years

Total Annual Emissions Savings 292 MTCO2e

Total Annual Emission Savings

292 metric tons per year

Measure NR-2: RightLights Program (2006 thru Q2 of 2012)

Reduction Measure - Right Lights (2006 thru Q2 of

Electricity Savings: 432,653.23 kWh (Source: PG&E)
0.00029 MTCO2e/kWh = 125.5 MTCO2e/yr

User Defined Actions

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User Defined Measure

Degree of Implementation 1

If this is a discrete action enter "1". If this is a savings per unit measure, enter the number of units

Implement Cumulatively ☐

Effective Useful Life 15 Years

Total Annual Emissions Savings 125.5 MTCO2e

Total Annual Emission Savings

125.5 metric tons per year

Measure NR-2: RightLights Program (Future)

Reduction Measure - Right Lights (Future)

Annualized Average projection based on historical participation rates. Assumes similar participation rates to the 2006-Q2 of 2012 in future years.

126 (MTCO2e/yr from 2006 thru Q2 of 2012) / 26 (number of quarters 2006-Q2 of 2012) x 4 (number of quarters per year) = 19 MTCO2e/yr

User Defined Actions

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User Defined Measure

Degree of Implementation 1

If this is a discrete action enter "1". If this is a savings per unit measure, enter the number of units

Implement Cumulatively ☑

Effective Useful Life 15 Years

Total Annual Emissions Savings 19 MTCO2e

Total Annual Emission Savings

19 metric tons per year

Measure NR-3: School Energy Efficiency Campaign

Reduction Measure - School EE Campaign

Annualized Average projection based on historical participation rates and distribution of Small, Medium, and Large PG&E Accounts within this market sector.

Weighted Average Electricity Savings (per Account/SAID): 102,046 kWh (Source: AMBAG)
0.00029 MTCO2e/kWh = 29.6 MTCO2e/yr

Weighted Average Natural Gas Savings (per Account/SAID: 654 Therms (Source: AMBAG)
0.0053435 MTCO2e/Therm = 3.5 MTCO2e/yr

User Defined Actions

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User Defined Measure

Degree of Implementation 1

If this is a discrete action enter "1". If this is a savings per unit measure, enter the number of units

Implement Cumulatively ☑

Effective Useful Life 15 Years

Total Annual Emissions Savings 66.2 MTCO2e

Total Annual Emission Savings

66.2 metric tons per year

Measure NR-4: Retail Energy Efficiency Campaign

Reduction Measure - Retail EE Campaign

Annualized Average projection based on historical participation rates and distribution of Small, Medium, and Large PG&E Accounts within this market sector.

Weighted Average Electricity Savings (per Account/SAID): 23,141 kWh (Source: AMBAG)
0.00029 MTCO2e/kWh = 6.7 MTCO2e/yr

Weighted Average Natural Gas Savings (per Account/SAID: 3 Therms (Source: AMBAG)
0.0053435 MTCO2e/Therm = n/a MTCO2e/yr

Total MTCO2e/yr (Assuming 5 Account/SAID/yr) = 48.5 MTCO2e/yr

User Defined Actions

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User Defined Measure

Degree of Implementation 1

If this is a discrete action enter "1". If this is a savings per unit measure, enter the number of units

Implement Cumulatively ☑

Effective Useful Life 15 Years

Total Annual Emissions Savings 48.5 MTCO2e

Total Annual Emission Savings

48.5 metric tons per year

Measure NR-5: 3rd Party Commissioning

Retro-Commissioning

Degree of Implementation 50,000 Square Feet

Enter the annual number of square feet of building space that will be retro-commissioned.

Implement Cumulatively ☐

Effective Useful Life 10 Years

ElectricSavings

Electric

Electricity Savings per Square Foot 1.3 kWh/square foot

Annual Electricity Savings **65,000** kWh per year

Electricity Emission Coefficient **0.00029** metric tons per kWh

RPS Adjustment Factor 1

Annual Electric Emission Savings **19** metric tons per year

Gas

Gas Savings per Square Foot 0.065 Therms/Square Foot

Annual Gas Savings **3,250** Therms per year

gas Emission Coefficient **0.0053435** MTCO2e per Therm

Annual Gas Emission Savings **17** metric tons per year

Total Annual Emission Savings

36 metric tons per year

Measure NR-6: Hospitality Energy Efficiency Campaign

Measure Name	Reduction Measure - Hosptiality EE Campaign
Notes	Annualized Average projection based on historical participation rates and distribution of Small, Medium, and Large PG&E Accounts within this market sector. Weighted Average Electricity Savings (per Account/SAID): 36,409 kWh (Source: PG&E) 0.00029 MTCO2e/kWh = 10.6 MTCO2e/yr Weighted Average Natural Gas Savings (per Account/SAID: 700 Therms (Source: PG&E) 0.0053435 MTCO2e/Therm = 3.7 MTCO2e/yr Total MTCO2e/yr (Assuming 5 Account/SAID/yr) = 71.5 MTCO2e/yr

User Defined Actions

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User Defined Measure

Degree of Implementation 1

If this is a discrete action enter "1". If this is a savings per unit measure, enter the number of units

Implement Cumulatively ☑

Effective Useful Life 15 Years

Total Annual Emissions Savings 71.5 MTCO2e

Total Annual Emission Savings

71.5 metric tons per year