

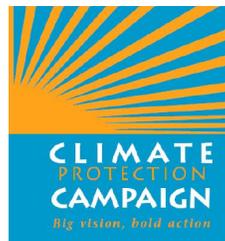
# Sonoma County Community Climate Action Plan



*Blueprint for the Future*

October 2008

by the  
Climate Protection Campaign  
[www.climateprotectioncampaign.org](http://www.climateprotectioncampaign.org)



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# **Introduction to the Sonoma County Community Climate Action Plan From the Steering Committee**

Dear Reader:

This Plan is a call for change.

People hear this call differently. Some feel they can postpone action, while others are firmly convinced we must act today — if not yesterday.

To all readers of this Plan we offer a view of change that helps us begin the task ahead, be it the person who feels immobilized by the scale of the effort, or the one who is ready to storm the Capitol demanding draconian remediation.

The process of change is often unpredictable. Sometimes it moves incredibly swiftly. Other times it seems to stall completely, only to surprise us with its reappearance like new leaves on a plant we thought was dead.

History is filled with mighty examples of positive change. But what causes it? Where was the first crack in the Berlin wall? What put an end to apartheid in South Africa? When was the first step taken toward the moon? Did the Civil Rights Act of 1964 become inevitable when Rosa Parks refused to give up her seat on the bus?

Every historic change is preceded by a massive collection of individual actions. Because we cannot foresee how change will occur, each action is critical. The main thing is to act.

This Plan offers a set of solutions to meet the challenge in Sonoma County to protect our climate. Readers may not agree with all the solutions presented in the following pages. That is okay. Plans adjust and evolve as they are put into action.

But it is not okay to continue life as usual. Non-action will create severe implications for our future.

Thank you in advance for reading this Plan. We hope you find it inspiring, challenging, and, ultimately, a compelling roadmap of the needed change ahead. For change is what it is about.

Steering Committee of the Sonoma County Community Climate Action Plan:

Jane Bender, Santa Rosa City Councilmember

Jim Leddy, President of the Board, Santa Rosa City Schools

Tanya Narath, Executive Director, Leadership Institute for Ecology and the Economy

Chris Thomas, Deputy County Administrator, County of Sonoma (ex-officio)

## EXECUTIVE SUMMARY

Sonoma County's commitment to the future and its pressing desire for extraordinary action brought this Community Climate Action Plan (Plan) into being.

"Climate change is not just another issue in this complicated world of proliferating issues. Climate change is THE issue which, unchecked, will swamp all other issues," declared Pulitzer winning journalist Ross Gelbspan.

This Plan presents a package of solutions that, when implemented as a large scale public works project, will meet Sonoma County's bold goal for reducing greenhouse gas (GHG) emissions — 25 percent below 1990 levels by 2015. All nine Sonoma cities and the County established this goal in 2005. Meanwhile, Sonoma County's emissions continue to rise.

Achieving Sonoma County's climate goal requires a monumental and extremely challenging intervention in business as usual. We must move together at tremendous *speed* and *scale*. Individual actions and volunteerism, while essential, are insufficient.

Transforming our energy infrastructure from fossil fuels to renewables entails a unity of purpose, ingenuity, and commitment similar to this country's mobilization during World War II and the New Deal era. Just as the Agricultural Revolution and the Industrial Revolution remade the world, so will the Energy Revolution.

Although our challenge is great, this crisis also presents us with huge opportunities. We have the knowledge,

resources, and technology to initiate change that will not only reduce our GHG emissions, but also will also result in a more robust and secure economy powered by local, reliable energy; a healthier environment with cleaner air and water; healthier people; and preservation of the natural world.

- Global warming is a manmade crisis that is happening now.
- It is an unintended consequence of using fossil fuels and of deforestation.
- The need to act is urgent.
- It is not too late.
- People are waking up and taking action.
- *You* are part of the solution.

### Analytic Process Is the Foundation of the Plan

*Informed by best available models* — We searched nationwide for the most powerful community climate action plans and solutions to help with the Plan.

*Tapped expertise* — Over fifteen technical experts prepared over 500 pages of Source Material that form the foundation of the Plan. They considered a comprehensive range of solutions and included those that best met the Plan's criteria.

*Engaged the community* — The Plan incorporates input from 50 representatives from government, business, youth, and the community at large, as well as a Steering Committee and many ad hoc advisors from business and other sectors.

*Organized by sector* — Solutions are presented in four sectors:

- Electricity and Natural Gas (including water, wastewater, efficiency, and new construction)
- Transportation and Land Use
- Agriculture and Forests
- Solid Waste

*Assessed solutions rationally* — Solutions were analyzed using four criteria:

- Significant, rapid GHG emission reductions
- Cost effective
- Under local control
- Politically feasible

*Prepared for implementation* — Where possible, the Plan estimates the amount of GHG reductions and the required financial investment associated with each solution, and recommends the entities to implement the solutions.

### Summary of Findings

*Role of government* — As with all public works projects from roads and railways to the Internet, the transformation of our infrastructure depends on the government to implement innovative fiscal policy, concerted investment, and appropriate regulation. Government has the unique power to plan, coordinate, and allocate resources on a system-wide scale. Government can also establish price signals that drive the necessary behavior using the principle “Reward the good/Polluter pays,” and thereby unleash market creation and reform that will support business-generated solutions.

*Financing solutions essential* — In most cases, the chief barrier to implementing climate protection solutions is funding. The Plan tackles the question: How can we invest in renewable energy and stop spending on fossil fuels? Access to low cost financing is a key.

*We must do it all* — We compared projected GHG emission reduction impacts of implementing the Plan’s major quantified solutions with Sonoma County’s emission reduction target. By 2015 Sonoma County must reduce its emissions by 1.4 million tons from the business as usual (BAU) total of 4.2 million tons to reach 2.7 million tons by 2015, which equals the target of 25 percent below the 1990 emission level.

Category	Reduces BAU by
Energy Efficiency	4%
Renewable Energy Production	15%
Transportation	17%

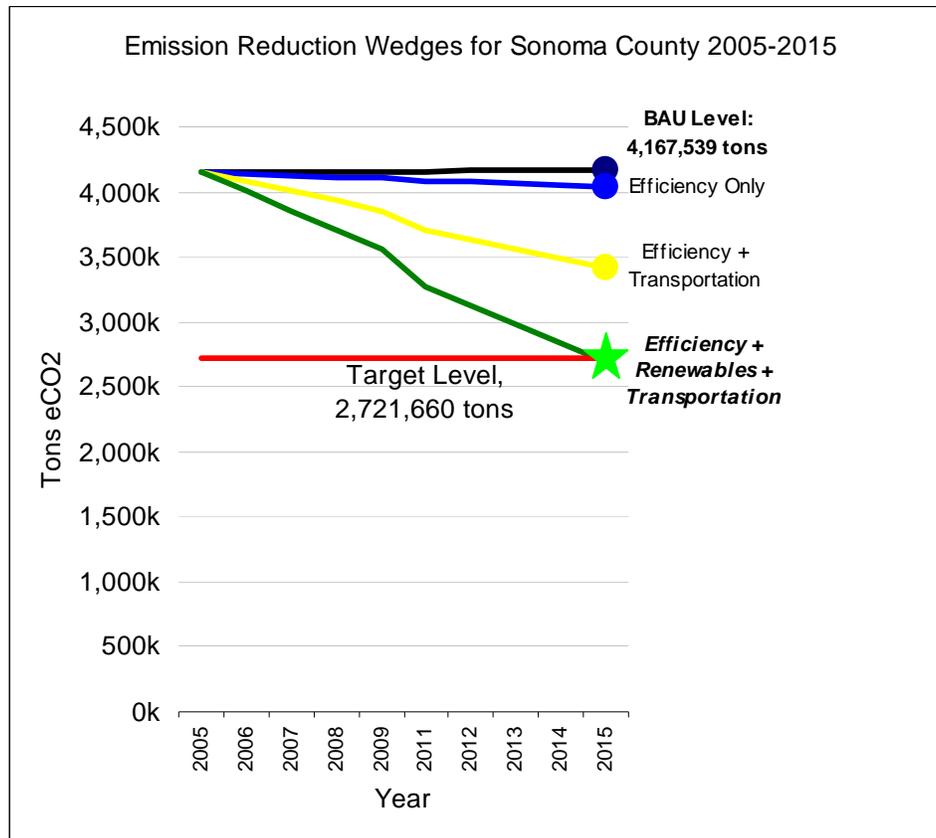
Projections of contributions of the major solutions toward the total reduction (1.4 million tons) are based on the following assumptions:

- Energy Efficiency: 80 percent of Sonoma County homes and commercial spaces retrofitted with all economically feasible efficiency improvements.
- Renewable Energy Production: Build a low carbon electricity portfolio with 67 percent new local renewables including natural gas replacement and efficiency retrofit.

- Transportation: Trip reduction, average trip length reduction, and shifting from single occupant vehicles to public transit, walking, and bicycling; large scale car share fleet of electric and plug-in hybrid vehicles.

Implementation of all major quantified solutions will reach about 22 percent below 1990 levels, which is about 37 percent below business as usual. (Emissions have continued to increase since 1990. Therefore the quantity of reductions needed to achieve the target has increased.) This suggests that all the solutions outlined in this Plan must be implemented. The sooner we start the more successful we'll be.

This Plan now leaves the technical realm and enters the public arena where the political feasibility of the proposed solutions will be tested. To move from plan to action will require widespread community engagement, ingenuity, and leadership. Elected representatives and local government staff must move boldly. Stakeholders and other community members must give government the support it needs to do so. Businesses must innovate and invest in the necessary programs.



*Although the Plan addresses both the agriculture/forest and solid waste sectors, they are not portrayed in the chart above because the amount of GHG emissions for these sectors is comparatively minor, and data for the solutions for these sectors need more development to be meaningful.*

## GLOSSARY OF ACRONYMS

ABAG	Association of Bay Area Governments
BAAQMD	Bay Area Air Quality Management District
BAU	Business As Usual
CACPS	Clean Air Climate Protection Software
CARB or ARB	California Air Resources Board
CCA	Community Choice Aggregation
CCAP	Community Climate Action Plan
CCP™	Cities for Climate Protection
CEC	California Energy Commission
CO <sub>2</sub>	Carbon Dioxide
CPUC or PUC	California Public Utility Commission
CTP	Comprehensive Transportation Plan
eCO <sub>2</sub>	Equivalent Carbon Dioxide — usually expressed in tons
EIR	Environmental Impact Report
EPA or USEPA	United States Environmental Protection Agency
ESP	Electric Service Provider
GDP	Gross Domestic Product
GHG	Greenhouse Gas — usually expressed in tons of eCO <sub>2</sub>
GMP	Gross Metro Product
HVAC	Heating, Ventilation, and Air Conditioning
ICLEI	International Council of Local Environmental Initiatives
IOU	Investor-Owned Utility
IPCC	International Panel on Climate Change
JPC	Joint Policy Committee
LEED	Leadership in Energy and Environmental Design
LFG	Landfill Gas
MTC	Metropolitan Transportation Commission
PAYS®	Pay As You Save
PG&E	Pacific Gas and Electric Company
PHEV	Plug-in Hybrid Electric Vehicle
PPM	Parts Per Million
SCAPOSD	Sonoma County Agriculture Preservation and Open Space District
SCTA	Sonoma County Transportation Authority
SCWA	Sonoma County Water Agency
SCWMA	Sonoma County Waste Management Agency
SEA	Sonoma Energy Agency
SMART	Sonoma Marin Area Rail Transit
RPS	Renewable Portfolio Standard
VMT	Vehicle Miles Traveled

# Sonoma County Community Climate Action Plan

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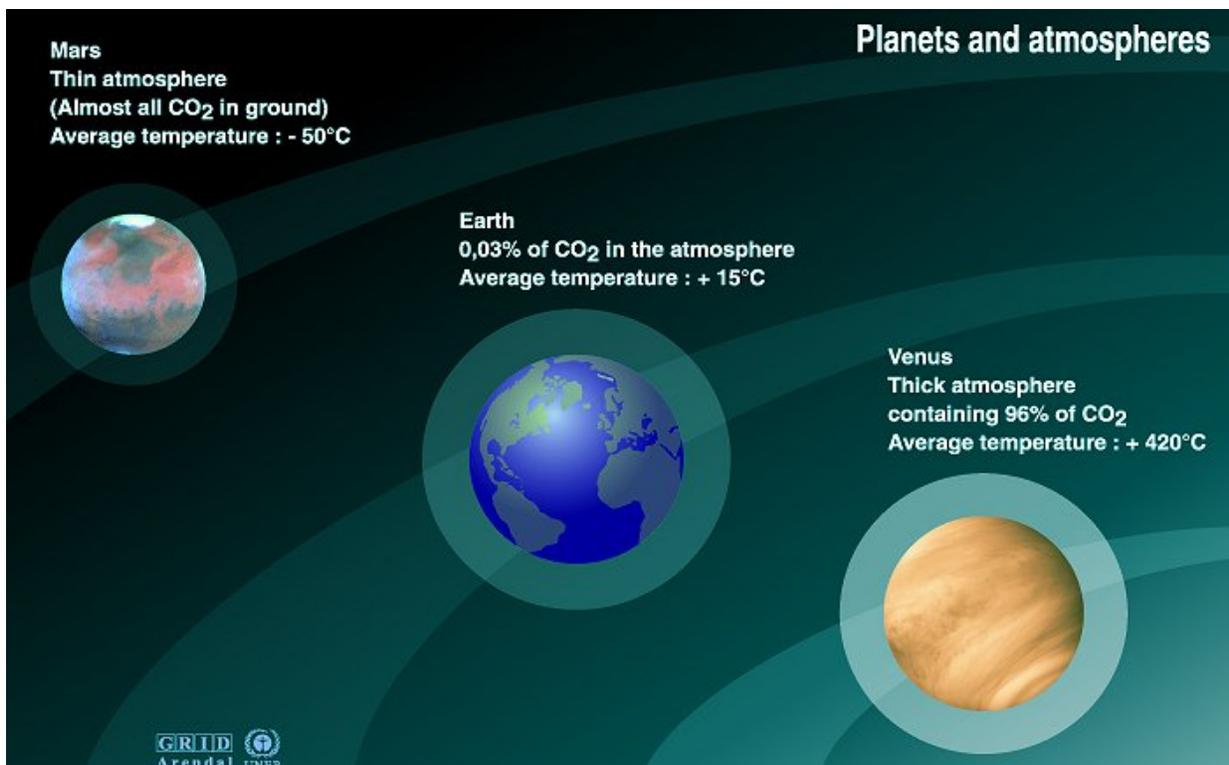
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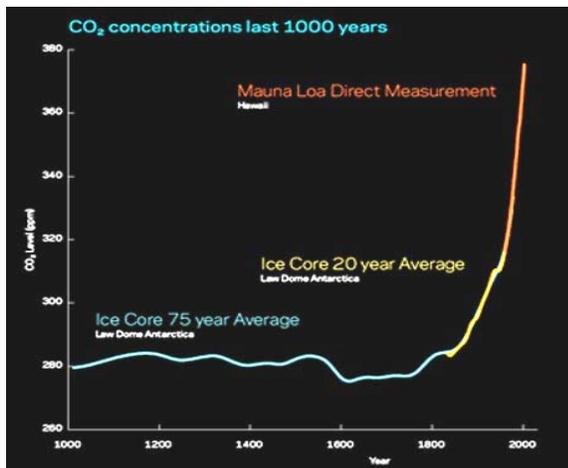
## CALL TO ACTION

Planet earth is in an accelerating state of emergency. Time is short to avert catastrophic climate change and protect the web of life. The climate crisis is different from all other problems humanity faces because of the severity of the impacts, the scale of the challenge and the solutions needed to address it, the speed with which we must act, and because impacts are diffuse and therefore impossible to experience directly.

Rajendra Pachauri, the Indian scientist and economist who accepted the 2007 Nobel Prize on behalf of the Intergovernmental Panel on Climate Change said, "If there's no action before 2012, that's too late. What we do in the next two to three years will determine our future. This is the defining moment."



*Global warming is caused by a blanket of carbon dioxide that surrounds the Earth and traps in heat.*



Carbon dioxide levels in the atmosphere have risen dramatically. Scientific data show a direct relation between CO<sub>2</sub> levels and overall Earth temperature.

### Scientific Imperative

The amount of heat-trapping gas surrounding the earth is the key measure of climate change. It is expressed in parts per million (ppm) of atmospheric carbon dioxide. The pre-industrial level of carbon dioxide in the atmosphere was about 275 ppm. The current level is 387 ppm.<sup>1,2</sup> James Hansen, this country's pre-eminent climate scientist, recently announced that we must return to 350

<sup>1</sup> Since pre-industrial times, the atmospheric concentration of greenhouse gases has grown significantly. Carbon dioxide (CO<sub>2</sub>) concentration has increased by about 31 percent, methane concentration by about 150 percent, and nitrous oxide concentration by about 16 percent (Watson et al, 2001). The present level of carbon dioxide concentration is the highest for 420,000 years, and probably the highest for the past 20 million years.

(<http://www.grida.no/climate/vital/intro.htm>), (<http://www.worldchanging.com/archives/007889.html>), ([http://maps.grida.no/go/graphic/past\\_and\\_future\\_co2\\_concentrations](http://maps.grida.no/go/graphic/past_and_future_co2_concentrations))

<sup>2</sup> NOAA — Earth Systems Research Laboratory, May 2008, (<http://www.esrl.noaa.gov/gmd/ccgg/trends/>)

ppm to avoid catastrophic climate change.<sup>3</sup> The seriousness of the situation is magnified because carbon dioxide remains in the atmosphere for about 100 years.

In 2007, the Intergovernmental Panel on Climate Change (IPCC), composed of the world's leading climate scientists, released The Fourth Assessment that calls for “maximum reductions, as quickly as possible” in order to stabilize atmospheric carbon dioxide concentration at the lowest possible level.<sup>4</sup> This is the scientific imperative.

- Global warming is a manmade crisis that's happening now.
- It's an unintended consequence of using fossil fuels and of deforestation.
- The need to act is urgent.
- It's not too late.
- People are waking up and taking action.
- *You* are part of the solution.

### Economic Imperative

A corresponding economic imperative — that early and aggressive action is necessary to minimize the economic costs of addressing climate change — was made in the Stern Review Report on the Economics of Climate Change in

<sup>3</sup> “Target atmospheric CO<sub>2</sub>: Where should humanity aim?” Hansen et al, 2008, (<http://arxiv.org/abs/0804.1126v1>)

<sup>4</sup> “Working Group I: The Physical Science Basis of Climate Change,” Intergovernmental Panel on Climate Change, 2007, (<http://ipcc-wg1.ucar.edu/wg1/wg1-report.html>)

2006.<sup>5</sup> Sir Nicholas Stern, former chief economist of the World Bank who produced this report, concluded that inaction would be catastrophic to the global economy. Melting glaciers and rising sea levels could displace 200 million people; 40 percent of remaining species could be extinct by 2050. Cost to adapt to this changing world will reach as much as 5 to 20 percent of the world's gross domestic product (GDP). If, however, we take early and aggressive action, Stern concluded that we can minimize the worst effects of climate change at an estimated cost of 1 percent of world GDP, and that we will create millions of new jobs in the process.

#### Moral Imperative

World leaders regard the climate crisis as a matter not only of science and economics, but also of conscience. An underlying moral imperative exists for all people to assume responsibility to protect the climate.

#### Will We Respond at The Speed and Scale Needed?

Will we respond to the climate challenge the way previous generations have met seemingly impossible challenges? In 1941 the people of the United States mobilized to fight in World War II with a unity of purpose never seen before. Following the war the U.S. led the effort to rebuild Europe under the Marshall Plan. In response to the Great Depression, the New Deal was implemented to care for people and invigorate the econ-

<sup>5</sup> "Stern Review Report on the Economics of Climate Change," ([http://www.hm-treasury.gov.uk/independent\\_reviews/stern\\_review\\_economics\\_climate\\_change/stern\\_review\\_Report.cfm](http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_Report.cfm))

omy. The global climate crisis requires a similar collective effort. Will we focus our innovation, investment, and ingenuity with solutions that meet this global crisis?

While investing in solutions may be costly at first, the rewards vastly outweigh the costs, as noted in the Stern Report. Complacency, hesitation, and inaction threaten our future. Government, business, and community leaders need the people's support to act. "When the people lead, the leaders follow" is a truism of collective action

#### How Does Great Change Happen? The Hero's Journey

An age-old story, the Hero's Journey describes how a person is called forth, leaves home to face a seemingly impossible challenge, and overcomes it. The journey transforms not only the hero, but ultimately, his or her community as well.

Solving the climate crisis is like the hero's journey because we must leave behind our old ways of using energy, transform how we live, and offer what we gain through our transformation to others.

The journey is uncertain and fraught with peril, but knowing the story helps us venture forth.

Along the way we discover who we are.

Although actions by individuals are essential to help slow and reverse climate change, those actions alone are insufficient to reduce GHG emissions at the scale and speed needed. Neither will volunteerism produce the changes needed, despite a pervasive belief to the

contrary. “Self-reinforced abstinence alone is a waste of time,” declared one leading writer recently.<sup>6</sup> To transform an infrastructure based on fossil fuel to one based on renewable energy, a major, system-wide intervention in business as usual is required. Together we must be inspired, aligned, and mobilized.

In Sonoma County, the solutions outlined in this Plan should be adopted as quickly as possible for maximum impact. The more that readers of this Plan speak up and show support for taking action, the more likely it is that solutions will be implemented.

## SOLUTIONS EXIST

We possess the means to meet Sonoma County’s target. Using proven, off-the-shelf technologies we can become vastly more energy efficient, and can harness the power of renewable energy sources like solar, wind, and geothermal. Given the increasing investment in clean, green technology and the application of innovative, entrepreneurial thinking, we can expect breakthroughs in the near future that will accelerate emission reductions.

Although our challenge is great, in many ways we are in an enviable position. Local momentum is already building to reduce GHG emissions. Sonoma County possesses rich natural, intellectual, technological, and political capital. We can anticipate a renaissance as the billions of dollars now sent overseas to buy fossil fuel are instead invested at home. This will result in a more secure economy powered by local, reliable energy; a healthier environment with

cleaner air and water; healthier people; and preservation of the natural world.

Some ask if climate change is a global problem, why do anything on the local level? The Intergovernmental Panel on Climate Change (IPCC) emphasizes the importance of local action because it is at this level that the most appropriate actions for any given area can be implemented. The IPCC recommends the following for the local level:

- Energy efficiency improvement
- Investment in renewable energy
- Transportation mode share shifts
- Stronger land use policies
- Better agricultural practices
- Improved municipal services (solid waste, water, and wastewater).<sup>7</sup>

These recommendations parallel those recently issued by the Brookings Institute:<sup>8</sup>

- Expand transit and compact development options
- Engage in regional freight planning to introduce more energy-efficient freight operations
- Stimulate energy efficient retrofitting
- Incentivize location efficient housing decisions
- Issue a metropolitan challenge to develop innovative solutions that integrate land use, transportation, energy, and other areas

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<sup>7</sup> “Policies, Instruments and Co-operative Arrangements,” S. Gupta et. al., In *Climate Change 2007: Mitigation of Climate Change.* Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, B. Metz et. al., Cambridge University Press.

<sup>8</sup> “Shrinking the Carbon Footprint of Metropolitan America,” Brown et al, May 2008, ([http://www.brookings.edu/reports/2008/05\\_carbon\\_footprint\\_sarzynski.aspx](http://www.brookings.edu/reports/2008/05_carbon_footprint_sarzynski.aspx))

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<sup>6</sup> *Heat: How to Stop the Planet from Burning*, George Monbiot, 2007, South End Press.

## WHAT CLIMATE ACTION HAS HAPPENED IN SONOMA COUNTY TO DATE?

Realizing our responsibility to future generations as well as to the present, the people of Sonoma County have pledged to take bold action on climate change, to be environmental stewards and an inspiration to communities nationwide.

In 2002 all nine Sonoma cities and the County pledged by resolution to participate in Cities for Climate Protection™, a program of over 700 local governments around the world. This program provides communities with a way to address a global problem at the local level — by adopting practices and policies to reduce greenhouse gas (GHG) emissions, improve air quality, and enhance community livability and economic viability. The program is based on five steps for reducing emissions. Local governments follow these steps both for internal municipal operations and for the whole community.<sup>9</sup>

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<sup>9</sup> To address internal operations, all nine cities and the County have completed the first two steps, inventories and targets. The County and several of the cities have achieved the third step, adopting climate action plans. The remaining cities are expected to have plans in place by the end of 2008. These cutting-edge plans have proven to be powerful motivators that make the financial case for climate protection. Plans are available online: ([www.climateprotectioncampaign.org](http://www.climateprotectioncampaign.org))

### Five Steps For Climate Protection

- Step 1:** Complete an **inventory** of greenhouse gas emissions
- Step 2:** Set a **target** for reducing emissions
- Step 3:** Create a **plan** for achieving the target
- Step 4:** **Implement** measures for GHG reductions
- Step 5:** **Track** progress toward the target

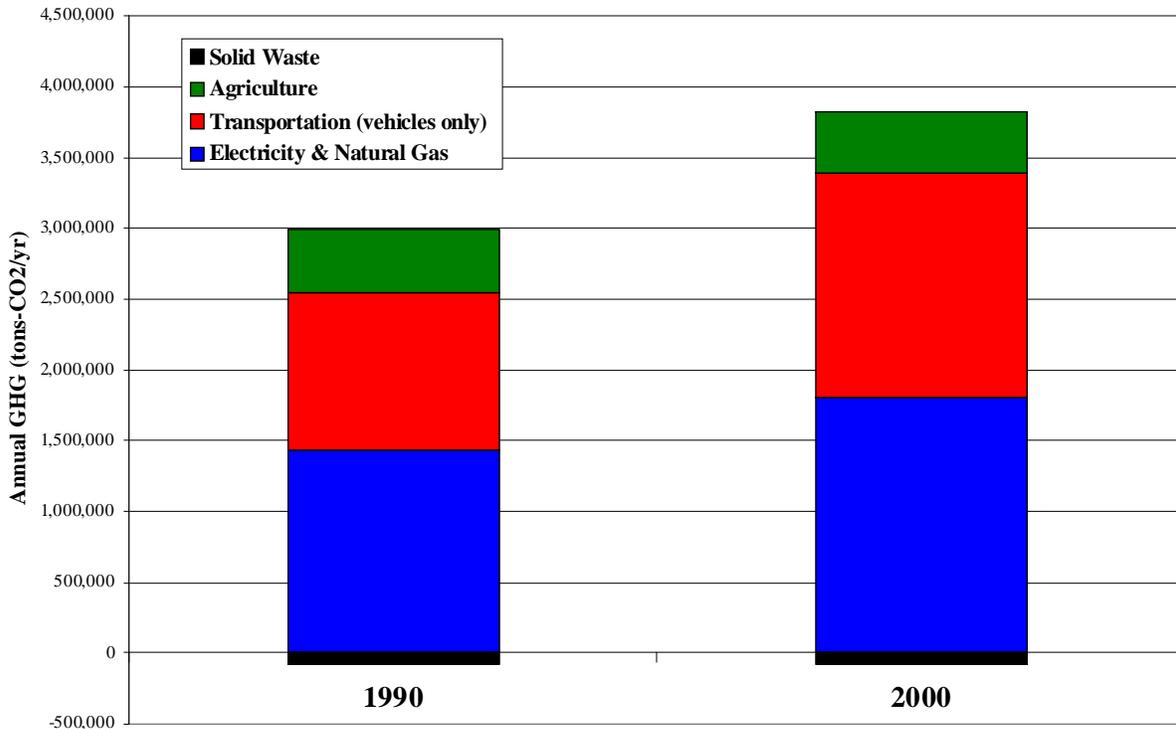
From Cities for Climate Protection™

### Step 1: Complete an Inventory Of GHG Emissions

The Climate Protection Campaign completed a countywide inventory of Sonoma County GHG emissions in 2005 based on the following sectors:

- Electricity and natural gas
- Transportation
- Agriculture
- Solid waste

Major findings of this inventory were that Sonoma County's emissions increased 28 percent between 1990 and 2000, double the national rate. Although population increased by 18 percent from 1990 to 2000, emissions from transportation increased by approximately 42 percent.



**Step 2: Set a Target For Reducing Emissions**

In 2005, all nine cities and the County passed resolutions adopting the boldest communitywide target in the nation — 25 percent below 1990 levels by 2015 — a target that corresponds with the scientific imperative. Although this target is aggressive by national standards, it is on par with targets of other nations.

**Some European Reduction Targets**

- European Union:** 20% below 1990 by 2020
- United Kingdom:** 20% below 1990 by 2010
- Germany:** 21% below 1990 by 2012
- Denmark:** 21% below 1990 by 2012
- Luxembourg:** 28% below 1990 by 2012
- Sweden:** 30% below 1990 by 2020

**Step 3: Create a Plan For Achieving the Target**

This Community Climate Action Plan fulfills this step. To be efficient and

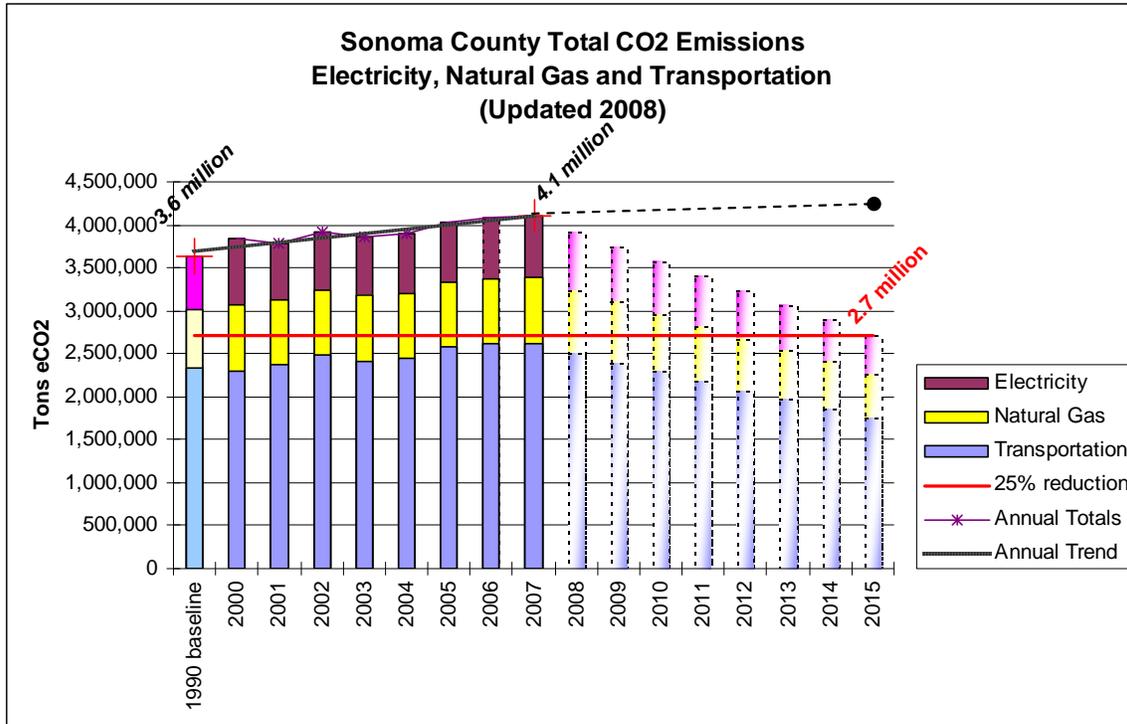
comprehensive, Sonoma County chose to create one Plan for Sonoma County rather than ten plans — one for each city and the County.

**Step 4: Implement Measures For GHG Reductions**

Major efforts are underway in Sonoma County to reduce emissions. All nine cities are considering and/or have implemented energy efficiency programs as well as programs to generate solar power and other renewables. Similarly many other local agencies, businesses, and schools have embarked on programs to reduce GHG emissions.

**Step 5: Track Progress**

The Climate Protection Campaign has updated the inventory each year since 2005 when it completed the GHG baseline for Sonoma County. The update for 2007 follows.



*From 1990 to 2007 Sonoma County's GHG emissions increased. If we are to achieve our reduction target (horizontal red line on graph), we must intervene aggressively in business as usual.*

Although Sonoma County has made a powerful commitment, our greenhouse gas emissions continue to increase, as shown in the chart above. Can we align our actions with our pledge by dramatically reducing our emissions?

### Community Endeavor

From its inception to its publication, this Community Climate Action Plan (Plan) was developed with attention, time, and resources from many people in Sonoma County committed to doing something effective and inspirational to address the climate crisis.

To inaugurate the Plan, a public meeting composed of over 200 people was held in April 2007, which provided much rich input for the Plan. Over fifty community representatives from government, business, youth, and the community at large

from each city and the unincorporated area of the County met several times in full day workshops to engage intensively in the development of the Plan. The representatives' role is to help evaluate solutions, craft language to describe the solutions, and build community support for the plan. We also were guided by a Steering Committee and many ad hoc advisors from business and other sectors. We invited and received many publicly generated solutions that we subsequently evaluated using the criteria established for the plan.<sup>10</sup> We engaged a team of technical experts who developed solutions to form the basis of this plan.

<sup>10</sup> See "Public Input from April 2, 2007" in online Source Material at ([www.coolplan.org](http://www.coolplan.org)).

### What Is Not in The Community Climate Action Plan?

Several significant causes and sources of GHG emissions were not included in the Plan, for example, population growth, consumer behavior, propane consumption, and airline travel. These were not addressed in the Plan because their corresponding analyses and solutions were either outside the Cities for Climate Protection protocol, too costly to analyze, too costly to solve, outside local control, and/or politically infeasible.

Beyond what this Plan provides, more development as well as implementation of solutions is needed. We have endeavored to identify these cases and suggest what agencies or other parties are responsible for the solutions identified.

### GLOBAL, NATIONAL, STATE, AND REGIONAL CONTEXT

To reach the scientifically mandated GHG reductions, government at every level must take significant and rapid action. This section highlights the status of such action at each governmental level. In almost every case, current targets adopted by all levels of government fall short of the scientific imperative, and their plans fail to meet even their short targets.

#### Global

Of the total world population in 2006, the U.S. accounted for 4.5 percent while its share of global GHG emissions was more than 24 percent.<sup>11</sup>

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<sup>11</sup> From <http://www.solcomhouse.com/toptenco2.htm> Oak Ridge National Laboratory credited. Note that recently China surpassed the U.S. in production of GHG emissions.

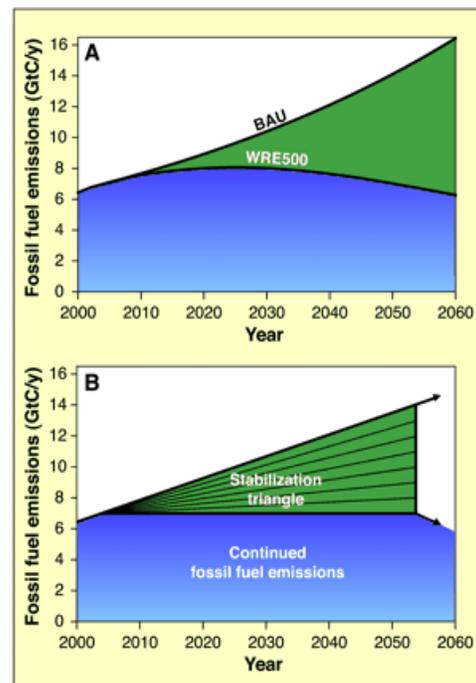
Rank	Country	CO <sub>2</sub> Emissions in Thousands of Metric Tons	Percent of Total Emissions	Percent of World Population
1	USA	5,844,042	24.3	4.50
2	China	3,263,103	14.5	20.30
3	Russia	1,432,513	5.9	2.10
4	India	1,220,926	5.1	17.00
5	Japan	1,203,535	5.0	1.90
6	Germany	804,701	3.3	1.20
7	United Kingdom	543,633	2.3	0.92
8	Canada	517,157	2.1	0.50
9	South Korea	446,190	1.8	0.75
10	Italy	433,018	1.8	0.88

This ranking is changing as developing countries like China and India use more fossil fuel for their growing economies. The U.S. will, however, continue to be a major GHG emitter. Our responsibility for our historic emissions and our ongoing role as a world leader require that we more fully participate in the global effort to avert climate change.

The world's collective response to documenting climate change is commendable. The Intergovernmental Panel on Climate Change is a powerful, authoritative body of the world's top climate scientists. Their work earned them the Nobel Prize in 2007.

Cities for Climate Change™ provides strong world leadership for local governments, as mentioned previously.

The Kyoto Protocol, agreed to in 1997, and entered into force in 2005, represents the strongest global collective climate protection action to date. As of November 2007, 175 parties had ratified the protocol; however, the U.S. is not one of the ratifying parties. Mean-



while, increasing amounts of GHG emissions enter the atmosphere and Earth continues to warm. Clearly, the Kyoto Protocol is not a solution commensurate with the scale of the problem.

But solutions do exist. The above graphs, produced in 2004 by Princeton scientists Pacala and Socolow, are in-

tended to show how a package of measures (represented as wedges in graph B) using current technology can intervene in business as usual (BAU) to reduce GHG emissions to the level needed, according to “WRE500.”<sup>12</sup>

“Humanity already possesses the fundamental scientific, technical, and industrial know-how to solve the carbon and climate problem for the next half-century. A portfolio of technologies now exists to meet the world's energy needs over the next 50 years and limit atmospheric CO<sub>2</sub> to a trajectory that avoids a doubling of the preindustrial concentration. Every element in this portfolio has passed beyond the laboratory bench and demonstration project; many are already implemented somewhere at full industrial scale. Although no element is a credible candidate for doing the entire job (or even half the job) by itself, the portfolio as a whole is large enough that not every element has to be used.”

### National

U.S. administration and Congressional action regarding the climate crisis has also been inadequate. To date only voluntary efforts are required by the federal government, and there is no national emissions reduction target. Many place hope in new presidential leadership in 2009; top presidential candidates have pledged that climate protection will be among their priorities.

Recent positive steps include the enactment of a national energy bill in

<sup>12</sup> “Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies,” S. Pacala and R. Socolow, *Science*, 13 August 2004, (<http://www.sciencemag.org/cgi/content/full/305/5686/968>)

WRE500 = **W**igley, **R**ichels, **E**dmonds model for stabilization at 500 parts per million.

December 2007. This law raises automotive fuel economy standards for the first time in more than three decades by requiring automobile manufacturers to produce cars with an average of 35 miles per gallon by the year 2020. The law also boosts federal support for alternative fuel research and energy conservation.

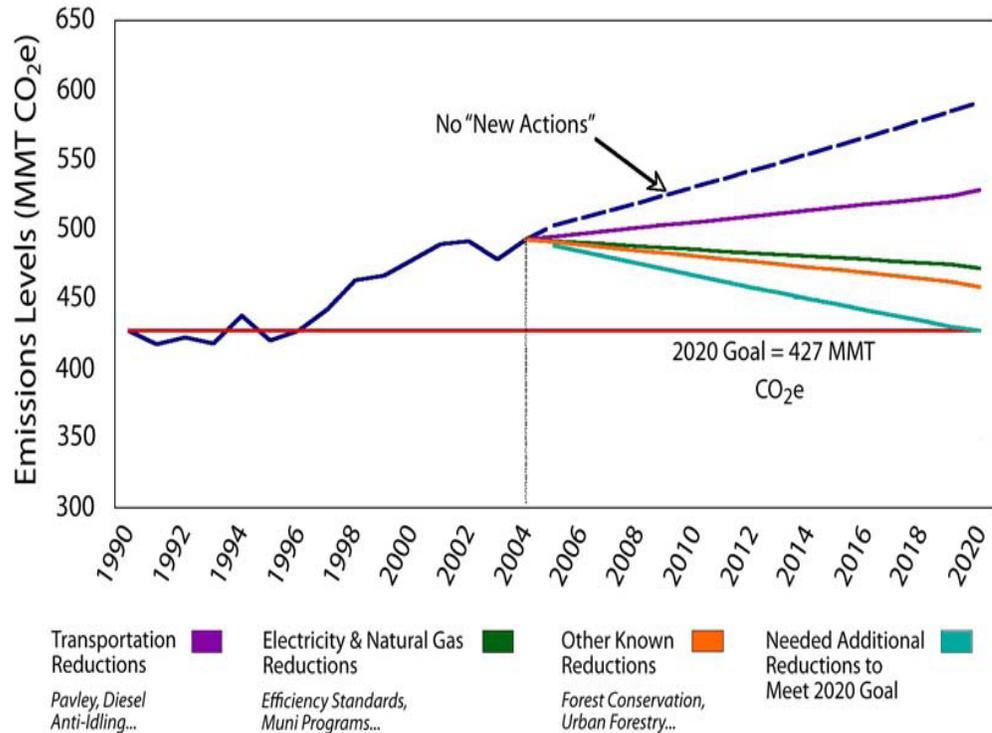
Other positive federal signs include progress made by bills in 2007, although none were passed. The bill authored by Senators Lieberman (ID-CT) and Warner (R-VA) called America's Climate Security Act would set a target to reduce total U.S. greenhouse-gas emissions 19 percent below 2005 levels (4 percent below 1990 levels) by 2020 and 63 percent below 2005 levels by 2050. Also, the Safe Climate Act of 2007 (H.R. 1590) introduced in March 2007 by Representative Waxman (D-CA) also sets targets (2 percent reduction each year from 2010 to 2050) and would require actions such as setting caps on emissions of sources and sectors with the largest emissions, issuing and authorizing trading of emission allowances, and penalizing excess emissions.

### State

California has long been an environmental leader starting in the nineteenth century with John Muir. In 2005 Governor Schwarzenegger signed an Executive Order that established California's series of GHG emissions reduction targets:

- By 2010, reduce to 2000 emission levels
- By 2020, reduce to 1990 emission levels
- By 2050, reduce to 80 percent below 1990 levels

While bold compared with global and national commitments, California's targets are still too low and too slow compared with the scientific imperative. And, as seen in the graph to the right, even if all of California's proposed solutions were implemented, a gap remains in meeting the targets.



Currently, the most significant state level legislation in California to reduce emissions in California to begin meeting these targets is the Global Warming Solutions Act of 2006, Assembly Bill 32 (AB32). Implementation of AB32 is driving many policy actions that will have far reaching effects on the electricity and natural gas utilities, transportation systems, and industries including construction. More specifically, AB32:

- Commits the State to reduction of GHGs to 1990 levels by 2020
- Determines what 1990 emissions were
- Sets annual emissions limits that will result in meeting the target
- Requires the California Air Resources Board (CARB) to develop regulations and market mechanisms to cap emissions and establish a mandatory reporting system to track and monitor emissions levels; and

- Will identify a list of discrete early actions that directly address GHG emissions that are regulatory and can be enforced by January 1, 2010.

California currently emits almost 500 million metric tons of greenhouse gases — 28 percent from electricity generation and more than 38 percent from transportation.

California must step up efforts with every emissions-saving technique in its substantial repertoire for transportation and electricity to reduce greenhouse gases in 2020 to the levels mandated by the AB 32 goals. As the graph above reflects, meeting the State's target will require a major intervention to change business as usual.<sup>13</sup>

<sup>13</sup> "Integrated Energy Policy Report, 2007 Summary," California Energy Commission, 2007, (<http://www.energy.ca.gov/2007publications/CEC-100-2007-008/CEC-100-2007-008-CMF-ES.PDF>)

Governor Schwarzenegger stressed that AB32 will be good for both the economy and the environment. Two substantial research studies support the Governor's assertion. The State's top energy modelers found that by 2020, 83,000 jobs and \$4 billion in income could be generated in California by meeting the state's GHG reduction goals. Additionally, leading economists from the University of California — Berkeley concluded that policies, such as cleaner standards for vehicles and capturing methane from landfills, would increase the State's GDP by approximately \$60 billion, and create over 20,000 new jobs.<sup>14</sup>

Other current significant initiatives in California include:

- Assembly Bill 1493 was sponsored by Assembly member Pavley and enacted in 2002. The "Pavley Bill" is precedent-setting legislation that limits tailpipe emissions of GHG from automobiles in California. This legislation has encountered various barriers to implementation, the most recent being denial of a waiver by the U.S. Environmental Protection Agency (EPA).
- Senate Bill 375, sponsored by Senator Steinberg, is a land use reform bill that requires regional planning by local governments. It is designed to help protect prime farmland, habitat, and other open space; encourage compact development; and increase

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<sup>14</sup> Hanemann, Michael and A. Farrell, "Managing Greenhouse Gas Emissions in California," January 2006. ([http://calclimate.berkeley.edu/managing\\_GHG\\_in\\_CA.html](http://calclimate.berkeley.edu/managing_GHG_in_CA.html)) and Chapter 8, "Economic Assessment," Climate Action Team Report, March 2006 ([http://www.climatechange.ca.gov/climate\\_action\\_team/reports/index.html](http://www.climatechange.ca.gov/climate_action_team/reports/index.html))

"Some have challenged whether AB32 is good for businesses. I say unquestionably it is good for businesses. Not only large, well-established businesses, but small businesses that will harness their entrepreneurial spirit to help us achieve our climate goals.... We simply must do everything in our power to slow down global warming before it's too late."  
Gov. Schwarzenegger, September 2006

use of transit resulting in fewer vehicles miles traveled and reduced GHG emissions.

- The California Attorney General's office has also begun efforts to include GHG reduction within the scope of the California Environmental Quality Act (CEQA). These efforts have been largely targeted at quantifying and mitigating the effect on emissions of new development and local General Plans.

## Regional

Four Bay Area agencies — the Bay Area Air Quality Management District, Metropolitan Transportation Commission, Association of Bay Area Governments, and San Francisco Bay Conservation and Development Commission — have also formally made climate protection part of their agendas. Separately they are pursuing trailblazing regulatory and incentive-based programs, and together through the Joint Policy Committee they are also forging a coordinated effort to reduce emissions throughout the region. Elected representatives and others from Sonoma County helped spur regional climate protection leadership through their influence on regional agencies.

## OVERVIEW OF SOLUTIONS

The package of solutions in this Community Climate Action Plan (Plan) will enable Sonoma County to achieve its bold greenhouse gas reduction target and meet Sonoma County's share of reductions toward the scientific imperative. Coincidentally, the solutions for climate change align with those for "Peak Oil," the name given to the problem of running out of fossil fuels and therefore crashing the economic and social systems they support. In essence, the solutions are a blueprint for an ambitious, large scale public works project similar to what was done to recover from the Great Depression, to electrify our rural areas, and to build our highway system. Like these efforts, these solutions rely on the collective efforts, technical know-how, and ingenuity of Americans to meet significant challenges.

"Where there's a will, there's a way" has a corollary: "Where there's a way, there's a will." This plan is intended to provide the way to galvanize this community's pressing desire to produce extraordinary climate protection achievements in Sonoma County and inspire other communities around the nation to do the same.

In developing this Plan, we searched nationwide to find and import the best examples of community climate action plans and local solutions that significantly, rapidly, and cost-effectively reduce GHG emissions.

To gain a full understanding of these solutions, readers are encouraged to view the reports located in the Source

Material, on which this summary of solutions is based.<sup>15</sup>

## Key Role of Government

When society's normal functioning fails to respond adequately to urgent circumstances, government must intervene. Historically, the hallmark of all fast, large-scale transformations has been government's strong engagement in planning, coordinating, and allocating resources, backed by its administrative power.

The U.S. gear-up for war after the bombing of Pearl Harbor exemplifies the potential speed and scale of American mobilization. After Pearl Harbor, the U.S. government told Detroit to stop manufacturing automobiles for private use and start building tanks and other war materiel. Automobile production was 162,000 in 1941, and zero in 1942. Tank production was less than 300 in 1940, and 25,000 by 1942.

Our dependency on fossil fuel will not end in time by leaving the free market to its devices, by voluntary measures, by "business as usual," and by aspirational goals. Only government intervention including innovative fiscal policy, concerted investment, and appropriate regulation will do this.

While every community on earth is threatened by catastrophic global warming, governments have yet to respond with the speed and financial commitment necessary. Worldwide, citizens must impel their governments to

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<sup>15</sup> All Community Climate Action Plan documents are posted online: ([www.coolplan.org](http://www.coolplan.org))

act.<sup>16</sup> In Sonoma, the County and cities have pledged such action. Now community members and business leaders must let their elected leaders know that they have their support to move swiftly on bold climate protection initiatives.

## HOW WILL CLIMATE PROTECTION IMPACT THE ECONOMY?

Because no County-specific economic studies have been made, conclusions of five studies assessing the impact of climate protection on California's economy are summarized here to forecast the impact of climate protection on Sonoma County's economy. One study found that "climate action in California can yield net gains for the state economy, increasing growth and creating jobs."<sup>17</sup>

Another concluded that achieving California's targets will promote economic growth through savings from reduced energy bills and the benefits of investing in technologies for innovation.<sup>18</sup>

A third stated that "California's 2020 emission target can be achieved with small positive or small negative [less than 1 percent in either direction]

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<sup>16</sup> Key role of government taken from *Climate Code Red: The Case for a Sustainability Emergency*, David Spratt and Philip Sutton, 2008, Scribe Publications, (<http://www.climatecodedred.net/>)

<sup>17</sup> "Managing Greenhouse Gas Emissions in California," California Climate Change Center, UC Berkeley, January 2006, ([http://calclimate.berkeley.edu/managing\\_GHG\\_in\\_CA.html](http://calclimate.berkeley.edu/managing_GHG_in_CA.html))

<sup>18</sup> See also "Economic Growth and Greenhouse Gas Mitigation in California," Roland-Holst, August 2006, ([http://calclimate.berkeley.edu/Growth\\_Strategies\\_Full\\_Report.pdf](http://calclimate.berkeley.edu/Growth_Strategies_Full_Report.pdf))

aggregate macroeconomic impacts through 2020."<sup>19</sup>

A fourth's in-depth analysis extinguished the myth that "addressing GHG emissions will severely strain the global economy." It further showed the range of emission reduction measures that yield an economic payback.<sup>20</sup>

The fifth and most recent economic analysis projects the following benefits to be realized by 2020 in California with the implementation of the climate protection measures outlined in the Draft Scoping Plan for AB32:

- Increasing production activity by \$27 billion
- Increasing overall Gross State Product by \$4 billion
- Increasing overall personal income by \$14 billion
- Increasing per capita income by \$200
- Increasing jobs by more than 100,000<sup>21</sup>

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<sup>19</sup> *Updated Macroeconomic Analysis of Climate Strategies Presented in the March 2006 Climate Action Team Report, Final Report*, Economic Subgroup, California Climate Action Team, Oct. 2007,

([http://www.climatechange.ca.gov/events/2007-09-14\\_workshop/final\\_report/2007-10-15\\_MACROECONOMIC\\_ANALYSIS.PDF](http://www.climatechange.ca.gov/events/2007-09-14_workshop/final_report/2007-10-15_MACROECONOMIC_ANALYSIS.PDF))

<sup>20</sup> *Global Mapping of Greenhouse Gas Abatement Opportunities*, Vattenfall, January 2007,

([http://www.vattenfall.com/www/cc/c/Gemeinsame\\_Inhalte/DOCUMENT/567263vattenfall/PO273261.pdf](http://www.vattenfall.com/www/cc/c/Gemeinsame_Inhalte/DOCUMENT/567263vattenfall/PO273261.pdf))

<sup>21</sup> *Economic Analysis Supplement Pursuant to AB32, The California Global Warming Solutions Act of 2006*, California Air Resources Board, Sept. 2008, ([http://www.arb.ca.gov/cc/scopingplan/document/economic\\_analysis\\_supplement.pdf](http://www.arb.ca.gov/cc/scopingplan/document/economic_analysis_supplement.pdf))

As mentioned earlier in this Plan, Sir Nicolas Stern concluded that we can minimize the worst effects of climate change at an estimated cost of 1 percent of world GDP, and that we will create millions of new jobs in the process. Closer to home, a recent economic study prepared for Sonoma County hints at the emerging importance of green services that are listed as part of the County's nine key economic clusters.<sup>22</sup>

### **FINANCING: FIRST GET THE ECONOMICS RIGHT**

If solutions exist and Sonoma County has pledged to protect the climate, what keeps us from aligning our actions with our pledge? In most cases the perceived hurdle is funding. But the money exists; locally we spend millions of dollars on fossil fuels. How do we shift our spending from fossil fuels to renewables?

Financing provides the means to do this. Innovative changes in public fiscal policies can stimulate our economy to switch from fossil fuel to renewables and implement the solutions that exist. Transforming our energy infrastructure creates new opportunities for this community to invest in itself.



*Financing provides the means to escape the fossil fuel trap to a renewably-powered future.*

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<sup>22</sup> "The Sonoma County Economy (draft)," Moody's Economy.com, January 2008, ([http://www.co.sonoma.ca.us/edb/pdf/innovation/innovation\\_draft\\_economic\\_report.pdf](http://www.co.sonoma.ca.us/edb/pdf/innovation/innovation_draft_economic_report.pdf))

## HOW BIG IS THE INVESTMENT WE NEED TO MAKE?

Though several of the solutions identified in this Plan do not yet have projected costs associated with them, we estimate that we must invest \$3.5 to \$4 billion over the next few decades to accomplish the most essential priorities. This investment will make possible the shift in spending from fossil fuels to renewable energy. The Plan addresses the need for financing and new investment mechanisms (see section below) for this energy system transformation.

To put this investment into perspective and test it against reality, we examined related County expenditures:

- The 2007 Gross Metro Product for Sonoma County was \$18.5 billion.<sup>23</sup>
- The annual total cost of car, truck, and motorcycle travel in Sonoma County is more than \$5 billion, including about \$850 million in fossil fuels.<sup>24</sup>
- The budget for widening Highway 101 from Petaluma to Windsor (23 miles) plus the Narrows is over \$1 billion.<sup>25</sup>

<sup>23</sup> "The Sonoma County Economy," Prepared by Moody's Economy.com for the Sonoma County Innovation Council, January 2008, ([http://www.co.sonoma.ca.us/edb/pdf/innovation/innovation\\_draft\\_economic\\_report.pdf](http://www.co.sonoma.ca.us/edb/pdf/innovation/innovation_draft_economic_report.pdf))

<sup>24</sup> Calculated in the Transportation source document of the Plan from data provided by Victoria Transport Policy Institute, TDM Encyclopedia. In 2005, Sonoma County used 238 million gallons of gasoline and diesel, which would cost at least \$850 million at a gasoline price of \$3.50 per gallon and diesel price of \$4.00 per gallon.

<sup>25</sup> 2007 Measure M Strategic Plan, Sonoma County Transportation Authority,

- The annual cost of new construction is approaching \$1 billion.<sup>26</sup>
- The County's annual electricity bill is almost \$500 million and our natural gas bill is about \$200 million.

### Sonoma County Data for 2005

- Population = 466,477
- Residential Energy Accounts = 186,571
- Housing Units = 193,353
- Commercial Space = 54,000,000 ft<sup>2</sup>
- Total Auto Registrations = 274,950
- Automobile Trips Every Day = 1,332,627
- Vehicle Miles Traveled Per Year = 3.8 billion

These numbers illustrate that a public works project such as described in this Plan, financed wisely and amortized over time, is a realistic magnitude given what we already spend in this County. Making this investment will give us a more stable and secure energy system that keeps County energy dollars in the County, creates jobs, and attracts new technology research and industry.

The scope of this Plan requires as broad a range of financial tools as possible to cover projects in both public and private sectors. Accessing low-cost capital is one of the most important goals of this Plan. One promising opportunity lies in municipal bond financing, a proven and effective approach for implementing public works projects. Innovative financing methods are required to increase uptake of measures to reduce GHG

([http://www.sctainfo.org/measure\\_m\\_strategicplan.htm](http://www.sctainfo.org/measure_m_strategicplan.htm))

<sup>26</sup> Sonoma County 2007 – 2008 Economic and Demographic Profile, Sonoma County Economic Development Board, (<http://www.sonoma-county.org/edb/reports.htm>)

emissions beyond what has been historically achieved. We examined several emerging approaches that deliver returns on public and privately invested monies realized through the savings achieved by both efficiency improvements and the development of renewable energy sources.<sup>27</sup>

2. Cost effective
3. Under local control
4. Politically feasible

Each criterion is addressed briefly in the sections that follow.

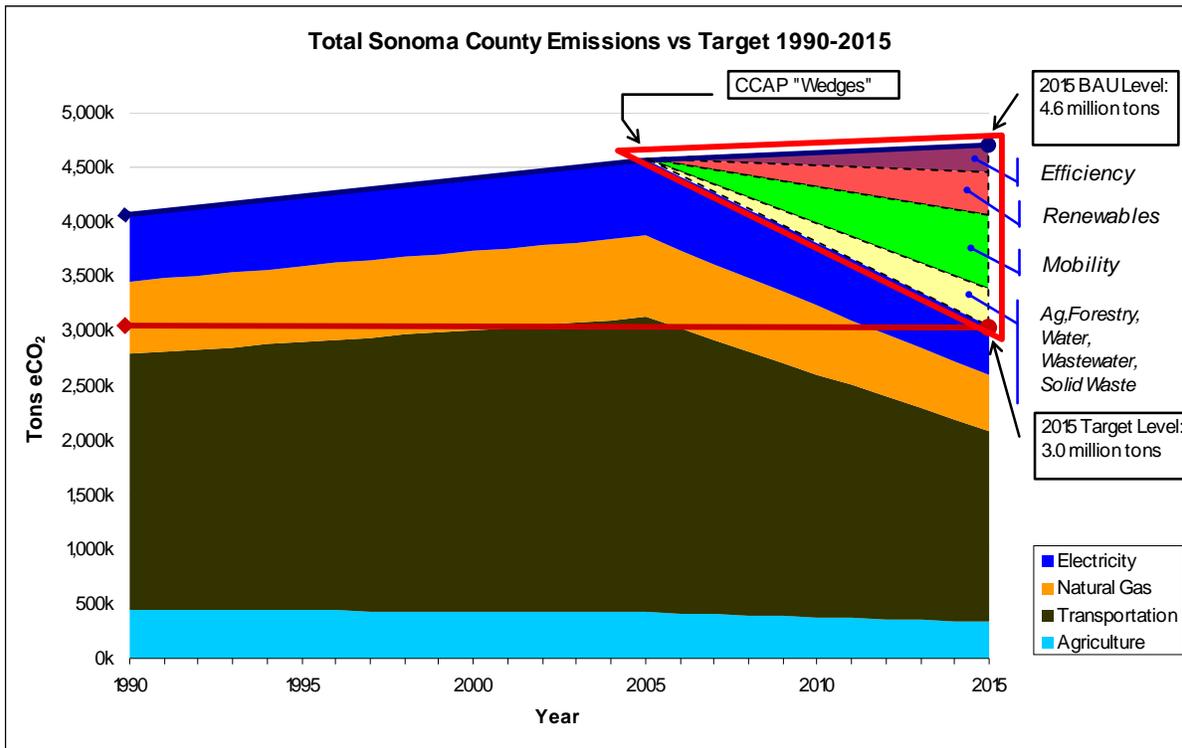
## HOW WERE SOLUTIONS DEVELOPED AND ORGANIZED FOR THIS PLAN?

To evaluate solutions for the Plan, four criteria were used:

1. Significant and rapid GHG emission reductions

### 1. Significant and rapid GHG emission reductions

To achieve the maximum reductions in the least amount of time, the largest sources of emissions were addressed, as reflected in the following table.



<sup>27</sup> Where appropriate, investment analyses of efficiency and renewables in the Plan use net present value and internal rate of return. A discount rate is applied that is appropriate for a typical interest rate for the funding source plus an inflation factor. Investments are ranked by net present value and internal rate of return. Cost per ton of carbon emissions avoided or reduced is averaged over the life of the investment lifecycle cost.

Source	1990	2005	2005 vs. 1990	2015 BAU	2015 BAU vs. 1990	2015 Target (25% below 1990 levels)
Electricity	618,535	701,623	+13%	600,060	-3%	463,901
Natural Gas	637,011	710,942	+12%	748,800	+18%	477,758
Transportation	2,340,667	2,585,641	+10%	2,789,559	+19%	1,755,500
Agriculture	444,690	425,040	-4%	405,390	-9%	333,518
Total	4,040,903	4,423,246	+9%	4,543,809	+12%	3,030,677

The chart above compares emission volumes and percentages from 1990 to 2005 and projects changes out to 2015 assuming that we: (1) take no new actions and follow a business as usual (BAU) scenario; or (2) implement actions to achieve our 2015 reduction target. Figures above are stated in equivalent carbon dioxide (eCO<sub>2</sub>); non-carbon dioxide gases are converted to eCO<sub>2</sub>.

A carbon model,<sup>28</sup> a mathematical representation of emissions sources, was developed and used for the Plan to quantify the effects of emissions reduction measures in transportation and electricity/natural gas sectors. The model is composed of several sub-models:

- Electricity and natural gas end use — models the effect of efficiency improvements on end uses of electricity and natural gas in the residential and commercial sectors
- Electricity fuel mix — estimates the effect of changing the percentage of non-emitting electricity generation sources used to produce electricity supplied on the grid. Non-emitting sources could include renewable energy like wind, solar and geothermal
- Transportation — models the effect on carbon emissions from changes in our transportation system. Mea-

asures that are modeled include mode share shift,<sup>29</sup> land use change, and non-emitting vehicle use

Also, opt-out solutions — those that are implemented unless a customer explicitly declines an offered service or measure — were favored over those that are opt-in because of the higher level of adoption rate with opt-out measures. The higher the adoption rate, the greater are the reductions in energy demand and GHG emissions. Opt-in solutions generally rely on costly marketing efforts to achieve significant results. Opt-out solutions help ensure that solutions are deployed at the widespread scale needed.

<sup>28</sup> A description of the Carbon Model is provided in the Source Material section of this Plan at ([www.coolplan.org](http://www.coolplan.org))

<sup>29</sup> Mode share is the percentage of total transportation miles that are accomplished using each mode of transportation (e.g., walking, bicycling, driving, or use of public transportation). Shift is the percent of change from one mode to another.

## 2. Cost effective

To the extent possible, the cost to implement the recommended solutions was estimated. In many cases, thorough economic analyses exceeded the bounds of this study, as did an economic analysis of the impact on the County of the package of all proposed solutions.

The hierarchy we used in evaluating cost effectiveness for reducing GHG emissions (i.e., net cost per ton of carbon avoided, in order of most to least cost effective) is as follows:

1. Conservation including demand reduction
2. Energy efficiency
3. Renewable, distributed, and localized energy sources
4. Offsets as a last resort when other options are not feasible<sup>30</sup>

Within each level of the hierarchy cost-effectiveness is maximized by:

- Using the best available technology
- Using the lowest cost capital for financing
- Lowering or removing the initial capital barrier
- Capturing the created revenue stream for repayment of financed costs
- Continuing to move up the supply curve for this measure until marginal

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<sup>30</sup> This hierarchy parallels the ranking for efficiency measures or “loading order” adopted by the California Energy Commission, *Implementing California’s Loading Order for Electricity Resources*, California Energy Commission, 2005, (<http://www.energy.ca.gov/2005publications/CEC-400-2005-043/CEC-400-2005-043.PDF>)

cost is equal to lowest marginal cost of next level in the hierarchy.

## 3. Under local control

We live in an interconnected world. Not all sources and causes of climate change are under local authority; neither are all of the solutions. For example, local governments do not control fuel efficiency standards for vehicles even though these standards greatly impact local production of GHG emissions. Yet, much is within the individual and collective jurisdiction of Sonoma County. Moreover, local solutions are expected to provide co-benefits such as increasing local resilience and security and creating green jobs. All of the solutions proposed in this Plan can be implemented by local government or local business.

## 4. Politically feasible

Political feasibility is a function of priorities and public will. When perceptions of risks and benefits shift, action follows. The abolition of slavery, human rights, and universal suffrage demonstrate how through time grand change happens. As well, mobilization for change can happen quickly when seemingly impossible action suddenly becomes mandatory such as noted above in describing U.S. engagement during World War II. The political context for climate protection is changing rapidly as knowledge and awareness of the climate crisis accelerates daily, as does the conviction that strong action must be taken not only for us but also for our children and our children’s children.

As a result of using these four criteria, the solutions outlined in this plan identify ways to:

- Lower economic barriers to adoption of high performance energy efficiency measures
- Develop cost effective ways to transition to electricity and heating/cooling from renewable, non-emitting energy sources
- Create cost effective and convenient automobile alternatives by promoting the development of less carbon intense or non-carbon emitting transportation modes
- Develop land use policies to minimize GHG emissions
- Redesign municipal services to emphasize demand reduction
- Change agricultural and forestry practices to further reduce carbon impact
- Adopt the lowest cost financing methods to replace fossil fuel-based energy with renewables.

Proposals for GHG reductions, outlined in the remainder of this plan, are organized by the four major sectors originally used for Sonoma County's GHG emission inventory<sup>31</sup> — electricity/natural gas, transportation, agriculture, and solid waste.

Each of the four solutions sections includes an overview and background, a short analysis of viable solutions, and a summary table of the solutions. A discussion of financing is included for electricity/natural gas and transportation/land use.

Underlying all solutions is Source Material available online at ([www.coolplan.org](http://www.coolplan.org)).

Resources for developing solutions in each sector were allocated in proportion to the amount of emissions produced in that sector and its potential for GHG emission reductions. Consequently, electricity/ natural gas and transportation/land use, are more developed relative to the other two sectors, agriculture/forests and solid waste.

Also please note that the quality of data used for this Plan varied greatly. Therefore while figures in this Plan may appear to be accurate beyond 2 to 3 significant figures, this is often not the case. Nevertheless, given the scale of the problem, figures herein provide a strong foundation and direction for the solutions outlined in the subsequent part of this Plan.

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<sup>31</sup> *Greenhouse Gas Emission Inventory for All Sectors of Sonoma County, California*, Climate Protection Campaign, January 2005, ([http://www.climateprotectioncampaign.org/news/documents/AP\\_INVEN.PDF](http://www.climateprotectioncampaign.org/news/documents/AP_INVEN.PDF))

## ELECTRICITY AND NATURAL GAS

### Overview<sup>32</sup>

This section addresses not only the overview of electricity and natural gas usage in Sonoma County, but also looks at the impacts of efficiency, existing buildings, new construction, and water and wastewater on electricity and natural gas usage.

In Sonoma County in 2007, electricity was responsible for 23 percent of GHG emissions, and natural gas for an additional 17 percent, making a total of 40 percent.<sup>33</sup> To achieve Sonoma County's reduction target in this sector we must reduce electricity and natural gas emissions combined by approximately 400,000 tons below the projected 2015 business as usual level (BAU for electricity and natural gas = 1.37 million tons) or nearly 500,000 tons below the 2005 level (2005 level for electricity and natural gas = 1.45 million tons).<sup>34</sup>

The solutions described in this section will result in GHG emission reductions of approximately 750,000 tons by 2015 relative to business as usual projections. This is 37 percent below 1990 levels and thus exceeds Sonoma County's target in these sectors. Achieving greater reductions in this sector will make up for anticipated shortfalls in the challenging transportation sector.

Most electricity and natural gas consumed in Sonoma County is provided by Pacific Gas and Electric Company (PG&E). The carbon content of electricity provided by PG&E is one of the lowest of any utility in the nation, primarily because of its nuclear and hydro energy sources, and the high percentage of electricity (44 to 47 percent) from natural gas fired power plants.<sup>35</sup> PG&E has made a public commitment to reducing GHG emissions and is a national and global business leader for climate protection. PG&E administers and implements the California Public Utility's energy efficiency programs in its territory. Locally, PG&E has offered its partnership to Sonoma County to reduce GHG emissions.<sup>36</sup>

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<sup>32</sup> This section is drawn from material developed by Community Climate Action Plan consultants as well as other source material provided as part of this Plan including "Energy Solutions," "High Performance Efficiency," "Water," "Wastewater," "New Construction," "Carbon Model," "Analysis of PG&E's Long Term Procurement Plans," and "PG&E Letter of Partnership."

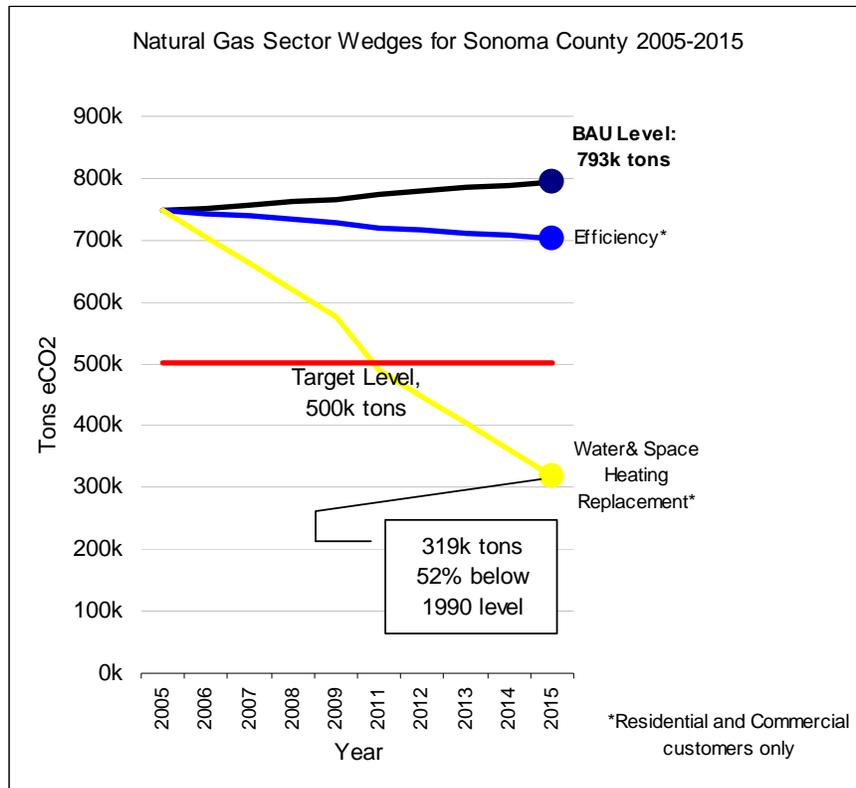
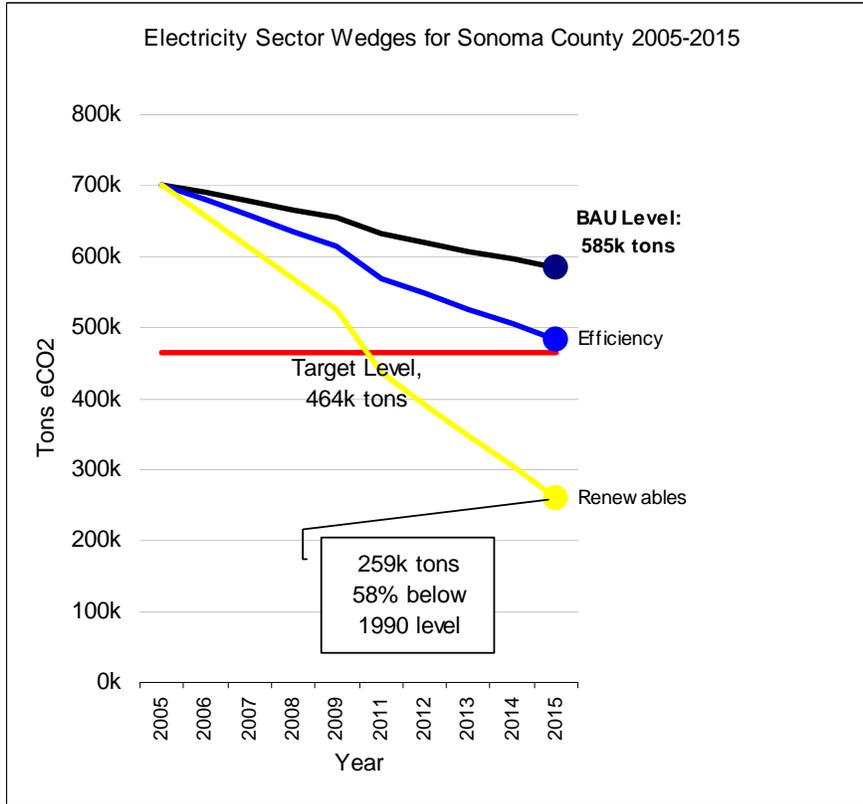
<sup>33</sup> *Climate Protection in Sonoma County: Highlights of Status*, Climate Protection Campaign, May 2008, (<http://www.climateprotectioncampaign.org/reports/sonoma-county-status-2008.pdf>)

<sup>34</sup> Although emissions from natural gas consumption are projected to continue to increase in the county, emission from electricity use are projected to decline, based on estimates from PG&E's Long-Term Procurement Plan.

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<sup>35</sup> Very little electricity (less than 5 percent in any given year) supplied by PG&E is generated using coal, compared to 50 percent nationally.

<sup>36</sup> Please see the letter to County of Sonoma Board of Supervisors from Nancy McFadden, PG&E, entitled PG&E Letter of Partnership in the online Source Material.



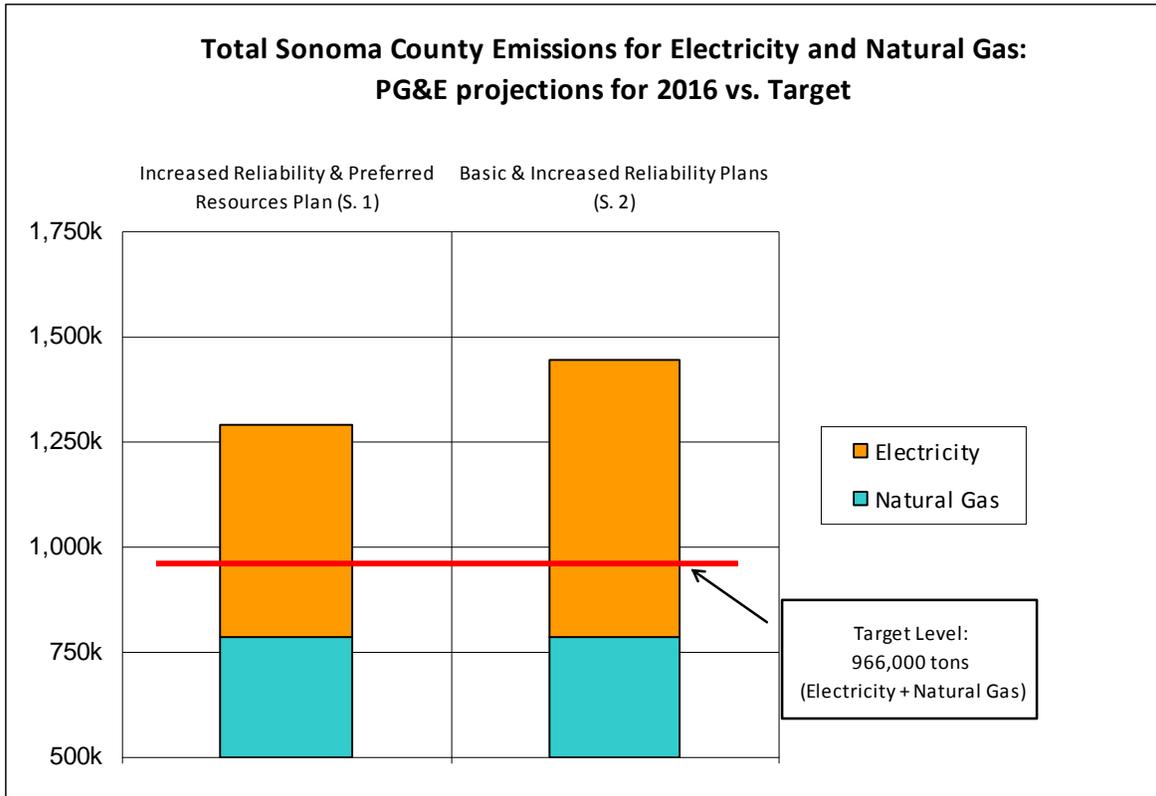
As part of this Plan, thorough analyses of PG&E's long-term energy procurement and efficiency plans were conducted to determine the company's ability to help Sonoma County achieve its target.<sup>37</sup> In addition, the team writing this Plan is engaged in ongoing discussions with upper level PG&E staff to determine the accuracy of our analyses and projections, and to compare approaches to GHG emission reductions.

Findings reveal that through PG&E, Sonoma County's GHG emissions from

electricity are projected to decrease by 3 percent while emissions from natural gas will actually increase 18 percent. As reflected in the graph that follows, Sonoma County will overshoot its target by an average of over 40 percent in the electricity and natural gas sector if it stays with PG&E given the company's long term plans for energy procurement and efficiency. While we plan to continue dialogue with PG&E about meeting Sonoma County's GHG goal, we also explored other alternatives in the electricity and natural gas sector.

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<sup>37</sup> Please see "Energy Solutions" and "High Performance Efficiency" in the online Source Material at ([www.coolplan.org](http://www.coolplan.org)). Also see discussion of 2015 projected electricity use and corresponding GHG emissions in "Analysis of PG&E's Long Term Procurement Plans" in the online Source Material.



Energy Source	1990	2005	2005 vs. 1990	2015 (BAU) <sup>38</sup>	2015 Target (25% below 1990)	2015 (BAU) vs. 1990
Million kWh/year	2,186	2,870	+31%	3,288		+34%
Electricity GHG <sup>39</sup>	618,535	701,623	+13%	584,630	463,901	-5%
Million therms/year	108.9	121.5	+12%	128		+18%
Natural Gas GHG	669,678	747,401	+12%	793,350	502,258	+18%
<b>TOTAL GHG</b>	<b>1,288,213</b>	<b>1,449,024</b>	<b>+13%</b>	<b>1,377,516</b>	<b>966,160</b>	<b>+6%</b>

<sup>38</sup> BAU refers to a “business as usual” scenario in which present trends continue. A discussion of how these projections were calculated is included in “High Performance Efficiency” in the online Source Material at ([www.coolplan.org](http://www.coolplan.org)).

<sup>39</sup> Greenhouse gas emissions (GHG) expressed in tons of equivalent carbon dioxide (eCO<sub>2</sub>)

## Overall Goals

The two fundamental means for reducing emissions from electricity and natural gas are decreasing consumption through efficiency and switching from fossil to renewable sources.<sup>40</sup> Goals for the electricity and natural gas sector are to upgrade the efficiency of at least 80 percent of residential and commercial buildings to the highest feasible level and thereby reduce demand for energy in existing buildings, and to lower the carbon footprint of electricity and energy used as cost effectively as possible.

## Efficiency

Efficiency rightfully receives much attention because it is the most cost-effective approach for reducing GHG emissions. Efficiency lowers energy demand and can be considered “virtual energy.” Reduction in energy demand is equivalent to replacing emitting energy sources with non-emitting sources. Thus, an efficiency retrofit of existing buildings that lowers energy consumption is equivalent to building virtual windmills.

Despite California’s reputation for being very energy efficient, a considerable gap exists between current per capita energy consumption and what is technically or even economically feasible. Through the energy efficiency study conducted for this Plan, we confirmed that the energy efficiency upgrade deliv-

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<sup>40</sup> Other means to reduce emissions are demand response programs and offsets. Although utilities are developing demand response programs, estimates for their impact in Sonoma County were not available. Because purchasing offsets is a much-debated solution, we did not include it as a solution in this Plan. Instead we focus on solutions that produce actual reductions that Sonoma County can implement.

ery programs in California fall far short of achieving potential efficiency improvements.<sup>41</sup> Methods for overcoming economic barriers to adoption of efficiency measures that go beyond what has been done to date are addressed further in this section.

## Existing Buildings

In Sonoma County today over 90 percent of electricity and natural gas is used by the County’s approximately 200,000 residential and 30,000 business accounts. The most cost-effective means to reduce GHG emissions in the electricity/natural gas sector is to increase the energy efficiency of these existing buildings.<sup>42</sup> Although efficiency improvements to building shells and plug loads generally pay for themselves over the life of the measure or sooner, the uptake of efficiency improvements is relatively low. This Plan proposes a retrofit program that overcomes the major barrier to adoption of best-in-class efficiency measures: initial cost.

The maximum GHG reduction we assume for an aggressive efficiency retrofit program is based on an 80 percent adoption rate or approximately 150,000 residential electric accounts and 20,000 commercial accounts. Although this level of adoption is unprecedented in efficiency programs that have been developed by utilities, experience with the market-based efficiency retrofit programs described later in this section shows that much higher adoption rates are possible.

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<sup>41</sup> “High Performance Efficiency” available in online Source Material at ([www.coolplan.org](http://www.coolplan.org)).

<sup>42</sup> Using science-based building performance evaluation methods a building’s energy savings opportunities can be identified and its remediation targets confirmed by testing.

## New Construction<sup>43</sup>

From 1990 to 2000 GHG emissions in the residential, commercial, and industrial building sectors grew appreciably, and will continue to grow if current trends continue. To meet Sonoma County's GHG target, a change in current construction practices is required. Emissions in the residential sector must be cut by 45 percent, 55 percent in the commercial sector, and 50 percent in the industrial sector below what they would be in 2015 following a business as usual strategy. This is a 49 percent reduction in the combined residential, commercial, and industrial buildings sectors.<sup>44</sup>

If green building policies were instituted in Sonoma County, the total GHG emissions that could be expected in residential, commercial, and industrial new construction would be 15 to 33 percent below levels resulting from state building codes alone. However, this still represents a net increase in emissions over the target. In order for new building to not increase net emissions, it has to

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<sup>43</sup> This section taken from "New Construction" available in online Source Material at ([www.coolplan.org](http://www.coolplan.org)).

<sup>44</sup> 2015 BAU projections in the residential sector are based on estimates of the number of houses that will be built in Sonoma County between 2005 and 2015, multiplied by the average number of tons of emissions per household in the 2005 inventory. We anticipate, however, that Title 24 policies will continue to reduce emissions (in the residential sector) below the projected 2015 BAU emissions estimates. 2015 BAU projections in the commercial and industrial sectors are based on estimates of the number of new jobs that will be created in Sonoma County in each sector between 2005 and 2015, multiplied by the average number of tons of emissions per employee in each sector in the 2005 inventory.

be *carbon neutral*.<sup>45</sup> Carbon neutral new development will ultimately be required, but aggressive green building ordinances, such as many Sonoma cities have adopted, move in the right direction.

Every new building, no matter how energy efficient it is, will still add to emissions if it uses natural gas or grid electricity or if it increases fossil fuel-powered transportation. Plainly, a means to mitigate all new construction in Sonoma County so that it is at least "carbon neutral" must be developed. Installing energy generation — solar, wind, or other renewable source of power — as part of the building is one way to zero out the GHG emissions from the building. Another is offsetting energy consumption attributable to the building by reducing GHG emissions elsewhere.

An extraordinary example of a green community is in Vauban, Germany, where all houses are built with a minimum improved low energy standard. There are also "passive houses" and "plus energy" houses that produce more energy than they use.<sup>46</sup> Similarly, Sonoma Mountain Village is aiming for ultra energy efficient homes that adhere to the "One Planet Community" standard, the highest achievement in sustainable design and operation.<sup>47</sup>

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<sup>45</sup> *Carbon neutral* means the building produces no net GHG emissions to the atmosphere.

<sup>46</sup> "Vauban district, Freiburg, Germany," (<http://www.vauban.de/info/abstract.html>)

<sup>47</sup> "One Planet Communities: Canada & USA," (<http://www.bioregional.com/oneplanetcommunities/na>)

## Water and Wastewater

The biggest single purpose uses of electricity in Sonoma County today are related to pumping, conveyance, treatment, and disposal of water and wastewater. Most water in Sonoma County is moved from the Russian River to the subcontractors in the Sonoma County Water Agency's service territory. The subcontractors move it again via pumps and water mains to the customers. Wastewater flows to wastewater facilities in the County where it is treated and discharged back to nature via irrigation or stream discharge, or is pumped to the Geysers geothermal field.

In Sonoma County water and wastewater pumping, conveyance, treatment, and disposal account for approximately 40,000 to 60,000 tons of GHG emissions per year, approximately 2 percent of Sonoma County's total emissions.

Recent studies of Sonoma County's water and wastewater systems uncovered a more significant source of GHG emissions than pumping, conveyance, treatment, and disposal. The end use of water (e.g., water heating) accounts for over four times the amount of energy and emissions produced by other parts of the water/wastewater cycle. These results echo similar studies done for the State of California.<sup>48</sup>

Therefore, to achieve maximum emission reductions in water and wastewater, priority should be placed on reducing demand from homes and businesses.

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<sup>48</sup> Please see "Water" and "Wastewater" reports in the online Source Material at ([www.coolplan.org](http://www.coolplan.org)).

## Barriers to Efficiency

The effectiveness of energy, water, and wastewater efficiency programs is limited by the number of customers that "opt-in" or "buy" the program. Utilities and other program implementers promote brands and incentive programs to consumers to encourage them to buy efficient appliances like Energy Star or upgrade the efficiency of their buildings and homes. Tax rebates help offset the cost of solar systems for property owners. It is left to the customer to make a decision, arrange the financing, and have the work done.

The rate of penetration of such programs depends largely on the effectiveness of their marketing. Even though the program may make financial sense, the number of customers who actually implement efficiency measures has been relatively small compared with the level required to meet GHG emission reduction goals.

Barriers include:

- Availability of trusted and accurate information on efficiency upgrades
- Uncertainty that energy/water/wastewater savings will pay for investments
- Lack of capital (or competing demands for capital)
- Limited debt capacity
- Uncertainty about length of occupancy (for building owners)
- Building owner is not the bill payer (e.g., new development or rental property)<sup>49</sup>

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<sup>49</sup> This analysis from online Source Material: "High Performance Efficiency" (*Resource Efficiency: Opportunities for Greenhouse Gas*

Suppliers of energy and water/waste-water services, who typically generate revenue for their services, face an additional barrier to providing efficiency options to ratepayers. Known as *perverse incentives*, reducing use of the supplied resource decreases the supplier's revenue. This revenue reduction can significantly impact the supplier's ability to continue to operate. Although this has been addressed at the state level by "shareholder incentive payments" to investor-owned electric utilities, elsewhere suppliers remain entangled by perverse incentives.

### Renewable Power

As swiftly as possible, Sonoma County must decrease its use of electricity that is generated by fossil fuels as well as decrease its use of natural gas. This can be accomplished if PG&E alters its energy portfolio or if Sonoma County decides to purchase green power independent of PG&E, as AB117 enables it to do.

Sonoma County would develop its renewables using the following design criteria:

- As stated previously, treat demand reduction as a "virtual resource" in the electricity supply and develop it as part of the portfolio.
- Minimize transmission (and thereby minimize "line loss" inefficiency) by building new supply as close to load as possible.
- Use resources opportunistically by using what is available in the vicinity of the load based on surveys of conditions on the ground.

- Tune the portfolio of renewable resources so that the characteristics of each type of renewable generation match the load profile.
- Use the lowest cost financing available to make smaller scale projects cost effective.

### Financing

Having a set of complementary, versatile tools and knowing when and how to use them optimizes performance. A set of financing tools applied where best suited can overcome barriers and maximize uptake of both demand reduction measures and the deployment of small scale renewable generation. This will enable maximum GHG emission reduction most quickly at the lowest cost.

Descriptions of the best and most applicable financial tools we found for the electricity/natural gas sector follow.

### Community Choice Aggregation (CCA)

Community Choice Aggregation allows cities and counties to determine their own electric energy supply. With Community Choice the local government does not go into the business of supplying electricity but contracts with an experienced electric service provider. The local government's role is primarily as a planning and authorizing agency.

This is one of the most potent tools in the financial toolbox for a number of reasons.

It is currently the only financing tool that is "opt-out" for customers within the CCA's jurisdiction and therefore does not require a significant marketing component to be effective. As mentioned previously, opt-out systems have a

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*Emissions Reduction in Sonoma County*, Ned Orrett, February 2008

greater chance than opt-in systems to achieve the scale of impact needed.

Another powerful feature of a CCA is its ability to access one of the least costly financing sources, municipal revenue bonds also called *H-Bonds*. A CCA can issue these bonds without voter approval. They are not General Obligation bonds, so they do not put the municipality's General Fund at risk. H-Bonds are repaid from the electricity rates set by the CCA and charged to its customers. This financing enables communities to develop new renewable energy sources at a very low cost and to retrofit a major portion of its residential and commercial buildings for high performance efficiency. In Sonoma County, the anticipated annual revenue from energy sales is \$250 to \$300 million, which would enable the CCA to secure approximately \$4 to \$6 billion in 30-year bonds.<sup>50</sup> This would be far more funding for renewable development and efficiency retrofits than is otherwise available.

Currently, establishment of a CCA is the only way for localities to establish competition for energy supply. If the electricity procurement franchise were put out for competitive bidding, as is done for waste management franchises, financial benefits could be expected. In addition, there are other probable advantages to public financing and ownership of electric power generation. Although CCAs and Municipal Utility Districts are not the same, local public power agencies,

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<sup>50</sup> Our projected electricity use is 3,088 GWh. The current market price referent is 8 to 10 cents per kWh, which is \$80,000 to \$100,000 per GWh. That's a total electric sales revenue of \$250 to \$300 million. At 3 percent interest over 30 years, that will secure \$4.8 to \$6.0 billion. At 5 percent interest over 30 years, that will secure \$3.7 to \$4.7 billion.

which serve 25 percent of the electric load in California, have enjoyed the combination of low rates and broad choice of energy sources for many years. The CCA can also serve as a marketing channel for all the opt-in programs mentioned below.

For the purpose of this Plan the possible CCA is given the placeholder name of Sonoma Energy Agency or SEA.

#### *AB811 (Financing Initiative for Renewable and Solar Technology)<sup>51</sup>*

AB811 became California law in July 2008. This legislation modified the California Streets and Highways code to allow local government to establish voluntary assessment districts. Local governments can then loan money to property tax payers (residential and commercial) who opt-in to install on their buildings permanent energy efficiency improvements as well as small scale electric generation and solar hot water systems.

AB811 allows local governments to set up contracts with property owners who opt-in to finance energy efficiency or distributed generation renewable energy projects. These projects are secured with a lien on the property where they are located; annual property tax increases to cover the cost. There is no up-front cost to the property owner. The local government is empowered to develop funding sources to provide capital for improvements. AB811 does not cover properties that are being developed. It does not cover any improvement not permanently connected to the property such as appliances.

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<sup>51</sup> Please see "AB811 Analysis" in online Source Material at ([www.coolplan.org](http://www.coolplan.org)).

In Sonoma County currently the County of Sonoma, the Sonoma County Water Agency, and Solar Sonoma County are actively involved in launching AB811.<sup>52</sup>

#### *Tariffed (utility-based) On-Bill Efficiency Purchase<sup>53</sup>*

This financing mechanism can be used by any utility. Customers pay for efficient appliances by agreeing to make monthly payments on their utility bill. Customers have no up-front payment, no debt obligation, no credit checks, and no liens. There is a guarantee that their monthly charges will be less than their estimated savings on energy and water, and that failed measures will be repaired with no increase in their monthly payments. Because the cost/savings obligation is attached to a property and not a person, customers have the assurance that they will pay only while they remain at the location. Subsequent users may opt-out. Pay As You Save (PAYS®) is the prime example of this category of financing tool.

#### *Community Facilities District Funding*

Also known as Mello-Roos, this mechanism provides a means through which local government agencies obtain funding for public improvements, such as water and wastewater systems, roads, schools, etc. The district sells bonds to finance the improvements, and taxes from real property owners in the district pay off the principal and interest on the

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<sup>52</sup> The Green Energy Loan program will also assist in facilitating partnerships between local lenders and municipalities to provide funds for AB811 programs within the County.

<sup>53</sup> A thorough treatment of PAYS is provided in the “High Performance Efficiency” section of this Plan’s online Source Material at ([www.coolplan.org](http://www.coolplan.org)).

bonds. Formation requires a two-thirds majority vote of residents within the boundaries of the district. These bonds can pay for facilities that transmit and distribute electricity.

#### *Leasing and Power or Efficiency Purchase Agreements*

Currently being marketed to businesses and consumers, this is an alternative to purchase from traditional vendors of products and services. Leasing of major appliances, HVAC systems, and demand response from “virtual capacity” or energy management firms can be a major tool for reducing emissions cost-effectively. For example, the company Sun Edison actively promotes this method of financing for property owners to obtain solar power.

#### *Green Mortgage Options*

Three federally sponsored efficiency financing programs offer options for green mortgages. The Energy Efficiency Mortgage, offered through the Federal Housing Administration (FHA) and Veterans Administration (VA), allows the home buyer (or home owner wishing to refinance) to add up to \$8,000 to the mortgage total for energy efficiency upgrades. The borrower must have the home evaluated by a Home Energy Rating Services (HERS) rater, obtain a signed contract before the close of escrow, and complete the upgrades within three months of closing escrow. The U.S. Housing and Urban Development (HUD) department provides a Weatherization Mortgage that allows the borrower to add up to \$5,000 to the mortgage within the HUD lending limit for specific weatherization upgrades. If the Weatherization Mortgage amount is over \$3,501, a HUD inspector is required to

perform an onsite inspection. The FHA Renovation Mortgage 203(k) program allows the borrower to add funds for renovation improvements, including energy efficiency upgrades and solar system installation, within the FHA/VA lending limit for the county in which the borrower resides.

*Applying the Financial Tools:  
Three Major Focus Areas*

**1. Community Scale, High Performance Building Efficiency**

To retrofit existing buildings for efficiency, the best financial tool is AB811 combined with SEA bond financing and marketing to upgrade building envelopes and add solar hot water systems. Building energy efficiency upgrades such as building shell and duct sealing, additional insulation, and high efficiency HVAC systems can present an attractive value proposition for the consumer. Our analysis reveals that financing a building efficiency upgrade using AB811 will reduce the consumer's energy bills by more than the annual cost of the financing. AB811 overcomes the initial capital barrier by extending loans without requiring credit checks or increasing indebtedness. SEA can be used as a marketing channel and potentially a funding source for providing project capital. A particularly promising application of AB811 is the installation of solar hot water systems. These present an attractive value proposition, and eliminate the source of 44 percent of emissions in the residential natural gas sector.

**2. Community Scale, High Performance Water Efficiency**

To enable consumers to purchase "best available" water efficient appliances and outdoor irrigation systems, the best fi-

nancial tool is tariffed on-bill efficiency purchase administered through local water utilities. Most electricity consumed in the residential sector is used by appliances and air conditioners. Installing high performance appliances can be costly and the value proposition for most consumers is not very attractive. Although the investment pays back, it can take years or even decades. A tariffed on-bill efficiency purchase program is exemplified by the program referenced in this Plan.<sup>54</sup> This type of program eliminates the barriers to uptake of efficient hot water appliances such as dishwashers and clothes washers.

**3. Community Scale, New Renewable Energy Resources**

Develop a community scale "minimum carbon" energy portfolio using municipal revenue bonds available through SEA to curb our reliance on the electricity market. Minimizing the carbon impact of electricity and natural gas use requires the large scale application of demand reduction and renewable energy. Development of these resources is treated as a "portfolio" that is matched to the energy requirements of the community. Investment to construct new renewable electricity generation and natural gas replacement can be financed through bonds secured by the income stream from energy ratepayers.

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<sup>54</sup> Pay-As-You-Save or PAYS®, developed by Energy Efficiency Institute of Vermont, ([www.eeivt.com](http://www.eeivt.com)).

### *Options for Addressing GHG Emission Reductions*

Currently there appear to be only two<sup>55</sup> viable overall options for addressing GHG reductions in the electricity and natural gas sector at the necessary scale and speed:

- Continue with PG&E on the premise that the company will rapidly and significantly revise its long-term energy procurement and efficiency plans to align with the scientific imperative, and
- Create Sonoma Energy Agency (SEA) so that the County may explore alternative procurement and access to low-cost financing.

Another approach is collaboration to leverage the strengths of both PG&E and SEA business models. Roles for PG&E in this collaboration could include: (1) PG&E's procurement of renewable energy from future Sonoma County sources to increase their renewables portfolio; (2) PG&E, through a competitive bidding process, could contract with SEA as its Energy Service Provider; and (3) PG&E could help finance and/or partially own new renewable energy facilities in Sonoma County.

This hypothetical collaborative scenario represents the sort of innovative solution that the climate crisis demands. The reverberations of such an advance would be felt throughout California and probably the nation. It would be similar to the successful experiment that began in 1978 when energy rates were decoupled from profits in California to en-

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<sup>55</sup> Another option, municipalization whereby local governments assume complete control of the electricity and natural gas system for their community, was deemed to be not viable.

courage utilities to promote vigorous conservation.

However, this is only a theoretical possibility because it requires the willing partnership of PG&E.<sup>56</sup> Although PG&E supported the concept of Community Choice Aggregation when state legislation was passed in 2002 to enable it, more recently PG&E has reversed this position and has actively campaigned against CCA initiatives.<sup>57</sup>

The most prudent strategy is to swiftly investigate options in parallel and pursue the one that will most significantly and rapidly reduce GHG emissions with lowest cost and risk.

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<sup>56</sup> At the beginning of June 2008 the Climate Protection Campaign made a formal invitation to PG&E to collaborate in developing this theoretical alternative. As this Plan is being drafted, the Campaign is engaged in preliminary conversations with PG&E representatives to determine if collaboration would be fruitful.

<sup>57</sup> Please see a June 2008 PUC decision regarding a settlement agreement between PG&E and San Joaquin Valley Power Authority, a CCA: (<http://docs.cpuc.ca.gov/published/GRAPHICS/84217.PDF>). As part of the settlement agreement, PG&E stated that it changed its previously neutral position on CCA in January 2007. PG&E's revised position regarding CCA programs includes marketing its energy supply services to retain customers.

## List of Solutions

### **Solution #1 — Maximize energy efficiency throughout Sonoma County**

Complete a full retrofit<sup>58</sup> of existing residential and commercial electricity/natural gas customers to achieve the highest level of energy efficiency available. Efficiency is treated as “virtual energy” that costs less than fossil fuel generated energy.

Municipal revenue bonds, accessed through Sonoma Energy Agency (SEA), and other available bond types can be used to provide low-cost financing for the programs since they are secured by revenues from rates charged to electricity customer. Efficiency upgrades for SEA customers will be funded in the same way as new generation. In addition, SEA will be able to provide much more generous rebate programs than currently offered by utilities. In addition to taking over the administration of the Public Good Charge<sup>59</sup> funds currently administered by the Investor Owned Utility (IOU), SEA will be able to fund rebates from revenues as part of its rate structure. This funding method

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<sup>58</sup> 80 percent adoption rate is required. A survey of best-in-class end use technologies and average improvement in building shell performance revealed that a 20 percent improvement in overall electricity and natural gas efficiency is achievable. Although these estimates are used to quantify the reduction potential available in the electricity and natural gas sectors, the actual reduction amount depends on adoption rate. If the 80 percent level is not achieved, then the GHG reduction will need to be increased in other sectors.

<sup>59</sup> A Public Good Charge appears on a utility customer’s bill as a surcharge on the volume of consumption of electricity and natural gas; the funds are used to underwrite public-purpose programs in energy efficiency, research and development, low-income assistance, and renewable energy development.

allows a much higher rebate level than the relatively low levels allowed by the Public Good Charge. The SEA could also serve as a marketing channel for efficiency financing such as that provided by AB811.

*Implementer: SEA (Sonoma Energy Agency) Sonoma County Water Agency, water contractors, sub-regional system partners, municipal utilities, PG&E*

*Feasibility: Challenging*

*Potential GHG reductions by 2015:  
195,000 tons*

*Investment: \$1.5 billion<sup>60</sup> (no cost to public agencies)*

### **Solution #2 — Maximize end-user water efficiency throughout Sonoma County**

Complete a full retrofit of existing residential and commercial water customers to achieve the highest level of water efficiency available. Energy use, particularly natural gas, will also be reduced by water efficiency measures. Implement the proposed Pay As You Save (PAYS<sup>®</sup>)<sup>61</sup> system for water utility customers to overcome economic barriers for widespread adoption of water efficiency improvements. Proposed efficiency upgrades for water customers will employ best available technology for end uses of water (especially hot water and urban irrigation) of all end users (residential, commercial, and industrial). Reduce flows throughout the water cycle to reduce the amount of energy used by the water supply and waste-

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<sup>60</sup> Cost estimate based on retrofitting 80 percent of residential and commercial electricity and natural gas accounts. In 2005, this amounted to approximately 150,000 households, and 20,000 businesses. Retrofit includes building shell, HVAC, and plug loads.

<sup>61</sup> See “High Performance Efficiency” in online Source Material at ([www.coolplan.org](http://www.coolplan.org)).

water treatment systems. Use municipal revenue bonds and other available bond types to provide low cost financing for the program.

*Implementer: Cities*

*Feasibility: Moderate*

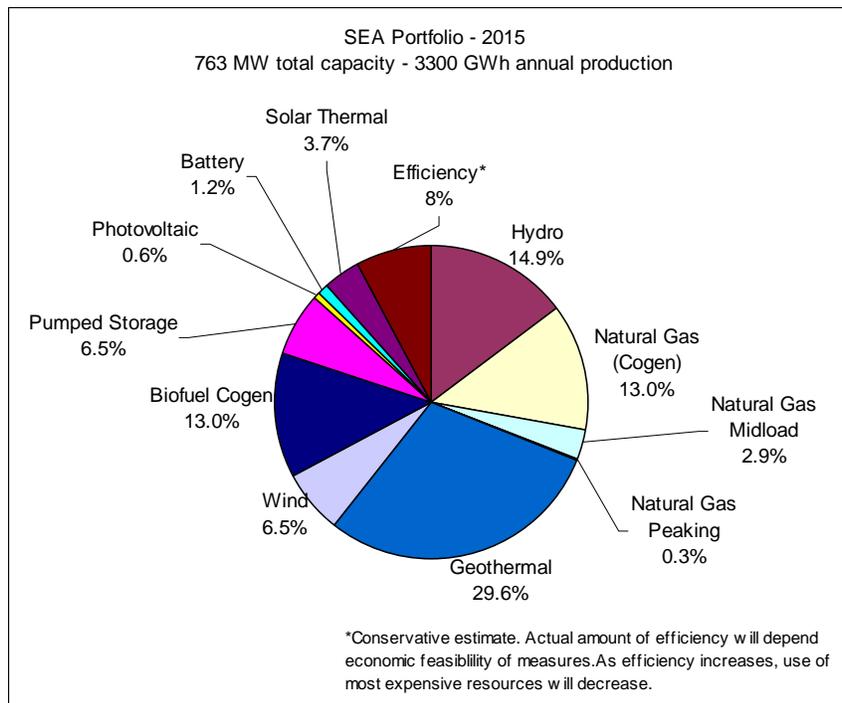
*Potential GHG reductions by 2015:*

*14,000*

*Investment: \$160 million (financed amount paid back through PAYS® system)*

### **Solution #3 — Switch electricity generation from fossil fuel to renewable sources**

Using bonds issued by SEA,<sup>62</sup> construct a portfolio of new, local renewable energy sources as shown in graph below. This is a large scale public works project, similar to building a new bridge or wastewater treatment plant. The new portfolio will provide 100 percent of the electricity for Sonoma County’s electric supply from more than 80 percent non-emitting generator types. This gives a *carbon efficiency*<sup>63</sup> for the electric supply that is approximately half of PG&E’s projected carbon efficiency for 2016.



<sup>62</sup> Also known as *H-Bonds* (implemented in San Francisco), these municipal revenue bonds can be issued by the local government agency and do not require voter approval.

<sup>63</sup> *Carbon efficiency* refers to the carbon dioxide emissions rate of electricity consumption. The carbon efficiency is measured in pounds of carbon dioxide per kilowatt hour. The lower the carbon efficiency rate, the lower the GHG emissions generated by the electricity source.

Features of the proposed portfolio:

- Delivers over 300 megawatts of new renewable generation
- Generates power from nearly 70 percent renewable sources and 80 percent non-emitting (including large hydroelectric) (0.16 lb eCO<sub>2</sub>/kWh).
- Fully supplies Sonoma County electric load, currently supplied by PG&E, with a carbon efficiency 50 percent higher than PG&E's projected 2016 level.<sup>64</sup>
- Matches Sonoma County's load profile while minimizing the use of fossil resources
- Utilizes a phased rollout of new generation resources to minimize risk and take full advantage of emerging technologies
- Minimizes levelized cost of electricity from new resources through municipal revenue bond funding
- Creates incentives for wide adoption of small-scale renewable installations such as photovoltaic, small wind, and small hydro

*Implementer: SEA*

*Feasibility: Challenging*

*Potential GHG reduction by 2015:*

*260,000 tons*

*Investment: Approximately \$1.4 billion<sup>65</sup>*

**Solution #4 — Replace natural gas and propane space and water heating with electric heat pumps and solar hot water heaters**

Use SEA as a marketing channel for an “opt-up” gas aggregation program to

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<sup>64</sup> Lowest projected carbon efficiency for 2016 from the PG&E 2006 Long Term Procurement Plan is 0.311 lb CO<sub>2</sub>/kWh; the highest is 0.409 lb CO<sub>2</sub>/kWh.

<sup>65</sup> For discussion of the calculation of these estimates, please see “Energy Solutions” in the online Source Material at ([www.coolplan.org](http://www.coolplan.org)).

replace 80 percent of residential natural gas furnaces with heat pumps, district heat from cogeneration, or waste-to-energy where available. Also, replace 80 percent of natural gas water heaters with solar hot water heaters.

*Implementer: SEA*

*Feasibility: Challenging*

*Potential GHG reduction by 2015:*

*320,000 tons*

*Investment: \$1 billion<sup>66</sup>*

**Solution #5 — Institute a mandatory green building ordinance throughout Sonoma County similar to Rohnert Park's ordinance; remove barriers to green building; require zero-energy “inclusionary” quotas for multiple building projects**

Build incentives into the regulation to encourage developers to exceed the requirements and take the opportunity to build “zero-energy” homes and buildings. Review all local building codes to look for opportunities to remove barriers to green building projects. Within the new countywide green building regulation, require “inclusionary” projects for developers who build multiple buildings that make a certain number of those buildings zero-energy, such as are done with low-income housing projects.

*Implementers: County and cities*

*Feasibility: Moderate*

*Potential GHG reduction by 2015: To be determined (likely less than 1 percent reduction below business as usual [BAU])*

*Investment: To be determined*

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<sup>66</sup> 100,000 residential natural gas accounts (50 percent adoption rate) at average of \$10,000 per heat pump and solar hot water system installation.

**Solution #6 — Improve efficiency of pumping operations for water and wastewater, and improve distributed generation and energy efficiency at wastewater treatment facilities**

Coordinate pumping schedules between the Sonoma County Water Agency and its contractors to decrease peak flows and overall energy use. For municipal operations, increasing the amount of electricity generated from biogas (e.g., produced at the Laguna Treatment Plant) is the most cost effective option for creating more “carbon-free” electricity. Use the heat created in co-generation to reduce the amount of energy required for wastewater treatment. Augment existing digester capability (if any) with specialized high solids food waste digester.

*Implementers: Sonoma County Water Agency and cities/water subcontractors*

*Feasibility: Moderate*

*Potential GHG reduction by 2015: 8,000 to 13,000 tons annually by 2015 (assuming no plant expansion)*

*Investment: To be determined (likely relatively low cost compared to building new renewable generation resources)*

**Solution #7 — Track progress and issue an annual report card on the amount of GHG emissions reduced in the Electricity and Natural Gas Sector in Sonoma County**

*Implementer: County, cities, Climate Protection Campaign*

*Feasibility: Easy*

*Potential GHG reduction per year:*

*None directly*

*Investment: Minimal*

Summary Table of Solutions

<b>Electricity and Natural Gas</b>	<b>Implementer</b>	<b>Feasibility</b>	<b>Potential Tons GHG Reduced by 2015 Below BAU Projection</b>	<b>Estimated Investment</b>
#1 — Maximize energy efficiency	SEA	Challenging	195,000	\$1.5 billion
#2 — Maximize end-user water efficiency	Cities <sup>67</sup>	Moderate	14,000	\$160 million
#3 — Switch electricity generation from fossil fuel to renewable sources	SEA	Challenging	260,000	\$1.4 billion
#4 — Replace natural gas with renewable energy	SEA	Challenging	320,000	\$1 billion
#5 — Institute a countywide mandatory green building ordinance, remove barriers to green building, require zero-energy “inclusionary” quotas for multiple building projects	County and cities	Moderate	To be determined (likely less than 1 percent reduction below BAU)	To be determined
#6 — Improve efficiency of pumping operations for water and wastewater	SCWA, cities, and water subcontractors	Moderate	8,000 – 13,000	To be determined
#7 — Track progress and issue an annual report card on the amount of GHG emissions reduced in the electricity and natural gas sector in Sonoma County	County, cities, Climate Protection Campaign	Easy	None directly	Minimal

<sup>67</sup> Applies to those cities that operate a water utility. Estimate of 80,000 households, with a water efficiency upgrade of \$2,000 installed cost. Please see “High Performance Efficiency” in the online Source Materials for details of estimate at ([www.coolplan.org](http://www.coolplan.org)).

## TRANSPORTATION AND LAND USE

### Overview<sup>68</sup>

Transportation and land use patterns are tightly coupled. Building new roads can lead to sprawl which leads to more development farther from urban centers. Through transit-oriented development policy, development can be channeled to urban centers. As urban centers become more densely populated, transit, walking, and biking become more attractive and can successfully displace auto travel. Conversely, lower population density leads to an overall per capita increase in personal automobile use. A Sonoma County study showed that the further residents live from city centers, the more driving they do.<sup>69</sup> In contrast, the City of Portland, Oregon, has demonstrated that aggressive and early management of land use and transportation can lead to success in reducing a community's GHG emissions due to personal auto use.

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<sup>68</sup> This section is drawn from the "Transportation" and "Land Use" consultant reports written as part of this Plan. Reports are available online in Source Material at ([www.coolplan.org](http://www.coolplan.org)).

<sup>69</sup> "Sonoma County VMT per capita," Joel Woodhull, (<http://www.sonomatlc.org/Transportation/VMT.htm>)

## Transportation

Transportation in Sonoma County is the fastest growing source of GHG emissions, and accounted for about 59 percent of total emissions in 2007.<sup>70</sup> Nearly four out of five trips made in Sonoma County are by single occupant, fossil fuel powered automobiles.<sup>71</sup> Approximately \$850 million leaves the County per year as payment for the fossil fuel that powers our vehicles.<sup>72</sup> Given population growth projections, by 2015 the amount of dollars leaving the County for fossil vehicle fuel will rise by almost 13 percent — more if fuel cost increases are added.

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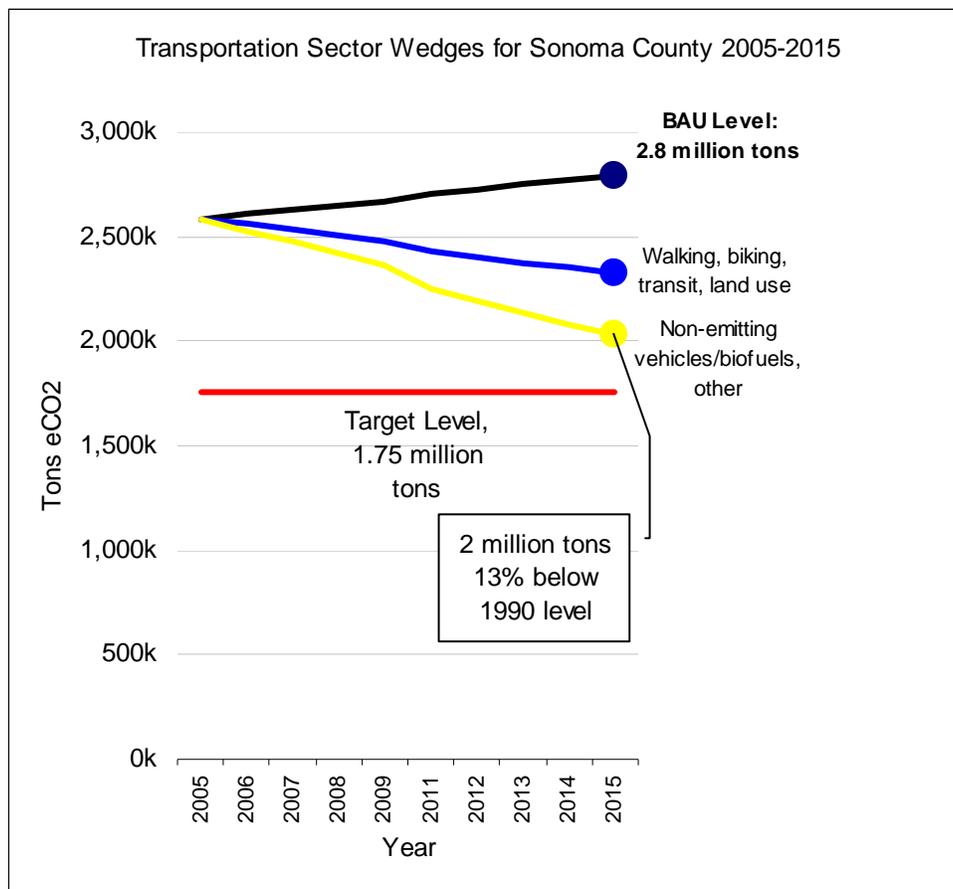
<sup>70</sup> *Climate Protection in Sonoma County: Highlights of Status*, May 2008, Climate Protection Campaign, (<http://climateprotectioncampaign.org/reports/sonoma-county-status-2008.pdf>)

<sup>71</sup> Metropolitan Transit Commission 2005 Travel Forecast

<sup>72</sup> *Transportation Cost Analysis: Techniques, Estimates and Implications*, Todd Litman, Victoria Transport Policy Institute, June 2002; *Greenhouse Gas Emission Inventory for All Sectors of Sonoma County*, Climate Protection Campaign, 2005, ([www.climateprotectioncampaign.org/news/documents/AP\\_INVEN.PDF](http://www.climateprotectioncampaign.org/news/documents/AP_INVEN.PDF)). For calculation of cost of fossil fuel, see Reference #23.

## GHG Emissions from Transportation

	1990	2005	2005 vs. 1990	2015 BAU	2015 vs. 1990	2015 Target (25% below 1990 level)
Transportation GHG tons	2,340,667	2,585,641	+10%	2,789,559	+19%	1,755,500
Vehicle Miles Traveled (VMT) (million miles/year)	3,007.9	3,933.0	+31%	4,440.9	+48%	



To achieve our reduction target in the transportation sector we must reduce transportation emissions approximately 1,000,000 tons below business as usual (BAU) projections for 2015 or 800,000 tons below the 2005 level.

The proposed solutions will achieve the following reductions:

- Public Sector Reductions = 400,000 tons

- Public/Private Sector Reductions = 200,000 to 250,000 tons (depending on biofuel production)
- Private Sector = 100,000 to 400,000 tons (depending on taxes, fees, and incentives)
- Total = 700,000 to 1 million tons below BAU (10 – 22% below 1990)<sup>73</sup>

## Land Use

Despite the planning that has occurred in Sonoma County, continued growth pressure, historical land use patterns, market preferences for a rural lifestyle, and propensity of workers to commute long distances have all contributed to substantially increased vehicle miles traveled both on an absolute and on a per capita basis. Between 1990 and 2000, total vehicles miles traveled in the County increased by more than 40 percent while population increased by only 18 percent.<sup>74</sup> This additional travel has resulted in a substantial increase in GHG emissions, impacts on air quality, and continued major investments in highway infrastructure. Going forward, land use policies must be strengthened to encourage even more urban-centered, transit-oriented development.

Recently passed State legislation, SB375, would offer incentives to local planning agencies to steer public funds away from sprawled development. The state spends about \$20 billion a year on transportation, and under the new law, projects that meet climate goals and reduce vehicle miles traveled would get

priority. If passed, SB375 is the nation's first law to address GHG emissions by curbing sprawl.

## Sonoma County Transportation Authority

The Sonoma County Transportation Authority (SCTA) serves as the coordinating and advocacy agency for transportation funding for Sonoma County. Additionally, every four years the SCTA updates Sonoma County's 25-Year Comprehensive Transportation Plan (CTP). SCTA issued its most recent CTP in October 2008. One new goal for the upcoming CTP is to reduce greenhouse gas emissions. Consequently, SCTA staff and consultants have studied approaches to implementing this goal.<sup>75</sup>

The SCTA and the Climate Protection Campaign conferred regularly as both the CTP and this Plan were developed. Solutions advanced in both plans are aligned. The challenge remains to identify the means to fund the solutions called for by both plans. Consultants who helped developed this Community Climate Action Plan noted that sources of funding such as gas taxes, sales taxes, and parking and congestion fees currently fall far short of what is needed to implement the solutions needed to attain Sonoma County's GHG emission reduction target. *Funding transportation solutions, including mobilizing public support for them, is one of the greatest challenges in curbing GHG emissions at the local level.* It may be that the options for transportation funding solutions at the local level are so limited that the best use of local energy is to associate

<sup>73</sup> Assumes full funding of walking, biking, and transit measures using public funding sources.

<sup>74</sup> *Greenhouse Gas Emission Inventory for All Sectors of Sonoma County*, Climate Protection Campaign, 2005, ([www.climateprotectioncampaign.org/news/documents/AP\\_INVEN.PDF](http://www.climateprotectioncampaign.org/news/documents/AP_INVEN.PDF))

<sup>75</sup> "Sonoma County Transportation Authority Greenhouse Gas Reduction White Paper" in online Source Material at ([www.coolplan.org](http://www.coolplan.org))

with other local communities and advocate at the state and perhaps even the federal level for transportation funding solutions.

### *Sonoma-Marin Area Rail Transit (SMART)*

The Sonoma-Marin Area Rail Transit Project is a proposed 70-mile passenger rail service connecting Sonoma and Marin counties. SMART will be on Marin and Sonoma voters' ballots in November 2008 asking for approval of a one-quarter cent increase in sales tax to fund SMART. In 2006, a similar ballot measure was approved by 65.3 percent of the voters — 1.4 percent short of the super-majority required to pass. The Climate Protection Campaign endorsed SMART after studying its impact on GHG emission reductions. SMART is included in this Plan as a key solution for reducing emissions in the transportation sector.

### *Low Carbon Energy and Mobility*

In the electricity/natural gas section, a financing tool called Community Choice Aggregation was described, and given the placeholder name Sonoma Energy Agency (SEA) to use in this Plan. SEA could have application in the transportation sector, providing financing for the construction of biofuel manufacturing plants. SEA could finance electrification of public transportation infrastructure, and make available opportunities for public-private partnerships to create manufacturing facilities for electric vehicles. Finally, there would be opportunities for SEA to market "opt-up" services such as electric vehicle leasing, online ordering and delivery services, and other transportation-related services.

### List of Solutions

#### **Solution #1 — Fully build out transit including SMART and applicable recommendations in Sonoma County's Comprehensive Transportation Plan for walking and bicycling networks in urban areas**

Implement applicable portions of the SCTA Comprehensive Transportation Plan to achieve a minimum 13 percent mode share shift from private vehicles to public transit, walking, and biking. Implement the SMART rail plan including connectivity with bus service. Work toward electric rail system and high efficiency hybrid buses.

*Implementer: Sonoma County Transportation Authority (SCTA), SMART, County, cities*

*Feasibility: Challenging*

*Potential GHG reduction by 2015:*

*200,000 tons*

*Investment: \$1 billion*

#### **Solution #2 — Institute transportation demand pricing policies in cities**

Ensure that private vehicle use pays its fair share by reflecting the true cost of automobile use to the community.<sup>76</sup> Road use and parking fees are examples of full cost pricing. Achieve a 3 percent mode share shift to non-automobile modes. Reinvest revenues from demand pricing in public transportation enhancement, and walking and bicycling infrastructure improvements. Access fees in central city areas, such as London and other cities have implemented, are another method for reducing auto trips and generating revenue.

<sup>76</sup> Includes both "internal" (paid by user) cost and "external" cost (paid by community or deferred).

*Implementer: County, cities*  
*Feasibility: Moderate*  
*Potential GHG reduction by 2015:*  
*To be determined*  
*Investment: Revenue positive. Revenue levels TBD.*

**Solution #3 — Create a fleet of 30,000 PHEV cars and trucks**

Creation of a fleet of plug-in hybrid electric vehicles (PHEV) and other electric vehicle types for short-term rentals could potentially be partially funded by SEA municipal revenue bonds. Vehicle battery storage can be grid-connected and used to back up renewables. Batteries and charging bays incorporating solar PV or other grid-tied generation technology could thus be purchased as part of the SEA renewable portfolio. Additional private activity bonds<sup>77</sup> could be issued through SEA to build manufacturing facilities for vehicle conversion. This solution could achieve 10-15 percent mode share shift from fossil fuel powered vehicles to non-emitting vehicles.

*Implementer: SEA, “fourth party” transportation developers*  
*Feasibility: Challenging*  
*Potential GHG reduction by 2015:*  
*370,000 tons*  
*Investment: \$300 million<sup>78</sup>*

**Solution #4 — Replace fuel used in public transit and municipal fleets with locally-produced biofuels<sup>79</sup>**

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<sup>77</sup> Private activity bonds are issued by a municipality to generate funds that will be used by a private entity. The funds are not tax-exempt and the liability belongs to the private entity.

<sup>78</sup> Conversion of hybrid vehicles to PHEV can be accomplished now for about \$10,000 per vehicle. Special purpose NEVs, scooters, and other electric vehicle types can be purchased for under \$2000. We used an average cost of \$10,000 per vehicle.

*Implementer: SEA, County, cities*  
*Feasibility: Moderate*  
*Potential GHG reduction by 2015: A reduction of 10,000 tons per million gallons<sup>80</sup> of fossil fuel displaced. If used in PHEV, the fossil fuel displacement is equivalent to reducing VMT of fossil fuel powered conventional vehicles by 100 million miles per million gallons of fossil fuel displaced.*  
*Investment: \$10 million initial investment<sup>81</sup>*

**Solution #5 — Implement Commuter Choice program**

Develop and expand existing pre-tax Commuter Choice program through employer education. Achieve a 9 percent mode share shift from private vehicles to transit, car/van pool and work at home.

*Implementer: SCTA, County, cities, employers*  
*Feasibility: Easy*  
*Potential GHG reduction by 2015:*  
*135,000 tons if widely implemented*  
*Investment: To be determined*

**Solutions #6 — Develop and implement innovative means to incentivize the private sector to support and develop alternatives to private fossil-fuel powered vehicles**

Develop innovative approaches, e.g., the Housing Equity and Transportation Efficiency solution described in the “Solutions submitted by the public” section

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<sup>79</sup> Biofuels are also mentioned in the Agriculture and Forestry section. Biofuel solutions in these sections are related but distinct. The distinction lies in the source of feedstock used to produce the biofuel.

<sup>80</sup> Based on 20 lb of CO<sub>2</sub> per gallon of gasoline displaced by net zero biofuel.

<sup>81</sup> Cost of biofuel manufacturing facility, private conversation with Lisa Mortenson, CEO, Community Fuels.

of this Plan. Aim for a 5 to 20 percent reduction in single occupancy, fossil fuel powered trips.

*Implementer: SCTA, County, cities in partnership with private employers and investors*

*Feasibility: Moderate*

*Potential GHG reduction by 2015: A reduction of 100,000–400,000 tons below 2005 levels<sup>82</sup>*

*Investment: To be determined.*

**Solution #7 — Strengthen General Plans to promote GHG emission reductions**

Study the County’s and cities’ General Plans to determine the extent to which they promote GHG reductions. Include regulatory support for permitting sites for renewable power generation. Recommend areas where improvements can be made. Revise General Plans accordingly.

*Implementer: County, cities*

*Feasibility: Easy*

*Potential GHG reduction by 2015: To be determined. Depends on the rate of densification of urban centers, rate of VMT growth, ability of cities to improve water efficiency, transition of municipal services to less energy intense infrastructure, ability of County and cities to promote the construction of facilities to support broad use of renewable energy.*

*Investment: To be determined*

**Solution #8 — Strengthen all Environmental Impact Reports on proposed projects to promote GHG emission reductions**

Ensure that all Environmental Impact Reports (EIR) on proposed projects in Sonoma County assess the impact of the project on the County’s GHG emission reduction target and thoroughly describe mitigations of any associated GHG emission increases. Encourage developers to pursue zero-energy status for new developments.

*Implementer: County, cities*

*Feasibility: Easy*

*Potential GHG reduction by 2015:*

*To be determined*

*Investment: To be determined*

**Solution #9 — Strengthen city-centered, transit-oriented development**

Continue to emphasize urban revitalization and infill, mixed-use, and transit-oriented development along major transportation and transit corridors. Ultimately achieve a 5 percent reduction in average trip length. Increase walking and bicycling mode share to 12 to 15 percent (from 9 percent). This is a longer term solution that will begin to reach its maximum effect as density increases in urban areas and population shifts toward city centers. Incorporate broader definition of building standards that includes neighborhood development principles.<sup>83</sup>

*Implementer: County, cities*

*Feasibility: Moderate*

*Potential GHG reductions by 2015:*

*To be determined. Less than 10,000;*

*Maximum 200,000 tons by 2025.*

*Investment: To be determined*

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<sup>82</sup> Based on a one-to-one correspondence between percentage of trip reduction and percentage GHG reduction.

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<sup>83</sup> For example, see Leadership in Energy and Environmental Design for Neighborhood Development (LEEDND) ([www.usgbc.org](http://www.usgbc.org))

**Solution #10 — Maintain existing or adopt urban limit lines**

Ensure that current urban growth limits in eight Sonoma cities are maintained and that Cloverdale adopts an urban growth boundary.

*Implementer: Cities*

*Feasibility: Easy*

*Potential GHG reduction by 2015:*

*To be determined*

*Investment: To be determined*

**Solution #11 — Strengthen zoning laws to protect lands that sequester carbon, and to support local resource-based industries including agriculture and timber resources**

Support local agriculture and forestry to discourage new residential development in rural areas. Consider adopting policies to encourage transfer of development rights that exchange potential development in rural areas for development in urban areas.

*Implementer: Sonoma County*

*Transportation Authority, cities*

*Feasibility: Moderate*

*Potential GHG reduction by 2015:*

*To be determined*

*Investment: To be determined*

**Solution #12 — Encourage mixed-use economic development in unincorporated urban service areas by eliminating segregated zoning and including appropriate land use policies for these areas in the County General Plan.**

A mix of uses in unincorporated urban service areas minimizes the need for nearby residents to travel greater distances to access goods and services.

*Implementer: County*

*Feasibility: Easy*

*Potential GHG reduction by 2015:*

*To be determined*

*Investment: To be determined*

**Solution #13 — Develop improved metrics for tracking GHG emissions from transportation at the local level**

*Implementer: Sonoma County*

*Transportation Authority*

*Feasibility: Easy*

*Potential GHG reduction by 2015:*

*To be determined*

*Investment: To be determined*

**Solution #14 — Track progress and issue an annual report card on the amount of GHG emissions produced by transportation**

*Implementer: Sonoma County*

*Transportation Authority, Climate*

*Protection Campaign*

*Feasibility: Easy*

*Potential GHG reduction by 2015: None directly*

*Investment: Minimal*

Summary Table of Solutions

<b>Transportation and Land Use</b>	<b>Implementer</b>	<b>Feasibility</b>	<b>Estimated GHG Reduction by 2015 Below BAU Levels</b>	<b>Estimated Investment</b>
#1 — Fully build out transit including SMART as well as walking and bicycling networks in urban areas	SCTA, SMART, County, cities	Challenging	200,000	\$400 million
#2 — Institute demand management pricing policies in cities	County, cities	Moderate	To be determined	To be determined
#3 — Create a fleet of 30,000 PHEV cars and trucks	SEA	Challenging	370,000	\$300 million
#4 — Replace fuel used in public transit and municipal fleets with locally-produced biofuels	SEA, County, cities	Moderate	Less than 50,000	\$10 million
#5 — Implement Commuter Choice program	SCTA, County, cities, employers	Easy	135,000	To be determined
#6 — Develop innovative means to incentivize the private sector to support and develop alternatives to private fossil-fuel powered vehicles	SCTA, County, cities in partnership with private employers and investors	Moderate	100,000 – 400,000 tons below 2005 levels	To be determined
#7 — Strengthen General Plans to promote GHG emission reductions	County, cities	Easy	To be determined	To be determined
#8 — Strengthen all Environmental Impact Reports on proposed projects to promote GHG emission reductions	County, cities	Easy	To be determined	To be determined
#9 — Strengthen city-centered, transit-oriented development	County, cities	Moderate	<10,000; max 200,000 by 2025	To be determined
#10 — Maintain existing or adopt urban limit lines	Cities	Easy	To be determined	To be determined
#11 — Strengthen zoning laws to protect lands that sequester carbon and support local resource-based industries (e.g., agriculture/timber resources)	County, cities	Moderate	To be determined	To be determined

<b>Transportation and Land Use</b>	<b>Implementer</b>	<b>Feasibility</b>	<b>Estimated GHG Reduction by 2015 Below BAU Levels</b>	<b>Estimated Investment</b>
#12 — Encourage mixed-use economic development in unincorporated urban service areas	County	Easy	To be determined	To be determined
#13 — Develop improved metrics for tracking GHG emissions from transportation at the local level	SCTA	Easy	To be determined	To be determined
#14 — Track progress and issue an annual report card on the amount of GHG emissions produced by transportation	SCTA, Climate Protection Campaign	Easy	To be determined	To be determined

## AGRICULTURE AND FORESTS

### Overview<sup>84</sup>

Globally, about 25 to 30 percent of annual GHG emissions are due to deforestation.<sup>85</sup> The carbon dioxide sequestered in soil, trees, and other vegetation is released into the atmosphere when land is converted to other uses, including for agriculture. While the agriculture and forest sectors represent less than 20 percent of GHG emissions in Sonoma County, they have the potential, with new practices, to act as a sink, tying up or sequestering GHG emissions from the atmosphere in the form of soil and wood carbon.<sup>86</sup>

### Agriculture

Total GHG emissions from the agricultural sector are a result of a complex network of sources including livestock, agricultural equipment, fertilizer application, soil tillage, crop residue burning, land conversion for agricultural use, processing, refrigeration, and distribution. For this reason, calculating the GHG emissions from the agricultural sector of Sonoma County is more demanding than for other sectors in this Plan.

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<sup>84</sup> This section is drawn from the “Agriculture” and “Forests” consultant reports written as part of this Plan and available in the online Source Material at ([www.coolplan.org](http://www.coolplan.org)).

<sup>85</sup> “Deforestation causes global warming,” Food and Agriculture Organization of the United Nations, 2006, (<http://www.fao.org/newsroom/en/news/2006/1000385/index.html>)

<sup>86</sup> Lal, R. “Soil Carbon Sequestration Impacts on Global Climate Change and Food Security,” pp. 1623-1627, *Science*, June, 2004.

In 2005, the GHG Emission Inventory for Sonoma County<sup>87</sup> determined that the complexity of calculations would prevent inclusion of agricultural activities other than livestock, which were determined to be 11 percent of the County’s emissions. Methane, the main GHG from livestock and manure, is 23 times more potent than CO<sub>2</sub>. Converting open-air lagoon systems used to digest manure to closed-system anaerobic digestion has the potential to eliminate most lagoon emissions while conserving more nutrients and also producing a renewable energy source.

The proposed solutions will not only reduce emissions from current agricultural practices, but will also act to remove and sequester carbon dioxide from the atmosphere. That is, the solutions move toward a net reduction of atmospheric carbon dioxide. This is a feature that makes agriculture and forestry unique: they can act as carbon “sponges” to soak up carbon dioxide. So these solutions not only reduce emissions to zero, they go “beyond zero” to create carbon sinks.

### Forests

Forests are a natural reservoir for CO<sub>2</sub>, while conversion of forestland to development and agriculture releases CO<sub>2</sub> and also diminishes the future capacity of the forest to remove CO<sub>2</sub> from the atmosphere. Sonoma County has approximately 480,000 acres of forestland<sup>88</sup> within its boundaries, including

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<sup>87</sup> *Greenhouse Gas Emission Inventory for All Sectors of Sonoma County*, Climate Protection Campaign, 2005, ([www.climateprotectioncampaign.org/news/documents/AP\\_INVEN.PDF](http://www.climateprotectioncampaign.org/news/documents/AP_INVEN.PDF))

<sup>88</sup> “Forestland” is broadly defined and includes all forest types in the county. Figures for

oak woodlands and timberland. The County has roughly 375,000 acres of land that is capable of growing timber, with 230,000 acres that are currently functioning as timberland.<sup>89</sup> These lands can be conserved to minimize the CO<sub>2</sub> emissions associated with conversion of timberland to other uses, such as vineyards. Additionally, land can be restored and managed to remove additional CO<sub>2</sub> from the atmosphere, while also providing wood products and many other public benefits. The proposed solutions to preserve, restore, and manage the County's forestlands and change impactful agricultural practices will result in minimizing emissions and maximizing carbon uptake.

#### List of Solutions

##### **Solution #1 — Improve soil and irrigation practices**

Encourage sustainable farming practices that improve nitrogen management to reduce nitrous oxide (N<sub>2</sub>O) emissions. Enhance carbon sequestration above native soil levels by overcoming the moisture limitation to increased plant biomass production using proper drip irrigation and time of watering practices. Promote other practices such as no till farming that sequester significant amounts of carbon dioxide

*Implementer: Sonoma County Wine-grape Commission, County including Agriculture Commissioner, cities*

*Feasibility: Moderate*

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timberlands and oak woodlands are subsets of this larger definition. Because of differences in definitions, figures do not total 480,000 acres.

<sup>89</sup> Sonoma County Permit and Resource Management Department, Memorandum from David Schiltgen: Regulating the conversion of timberlands to non-timber uses, June 20, 2002.

*Potential GHG reduction per year:*

*To be determined (thousands)*

*Investment: \$50,000 to \$80,000 per year (per vineyard)*

##### **Solution #2 — Increase agricultural waste composting**

View agricultural “waste” as a resource that can be used to create additional revenue, increase soil health, and increase yields. Create on-farm and centrally located facilities to process all residential “green can” waste, as well as equestrian and agricultural waste. Process this waste in anaerobic digesters and use in energy production and soil management. Replace most, if not all, commercial fossil-fuel-based nitrogen (N<sub>2</sub>O) fertilizer with compost, thus reducing N<sub>2</sub>O emissions, keeping agricultural money in the local economy, and reducing pollution in local waterways. Burning of agricultural wastes should be discouraged, as the net carbon impact may be positive.

*Implementer: County, cities, compost businesses*

*Feasibility: Moderate*

*Potential GHG reduction per year: Up to 1.5 tons per acre-foot per year*

*Investment: \$350,000 to \$500,000 per centrally located facility*

##### **Solution #3 — Use methane digesters to produce energy on dairies**

Encourage or require dairies that have on-site manure storage ponds to complete a ranch plan with the inclusion of a biogas digester. Seal off waste storage ponds or lagoons, capture the gas and heat, and use it to power a generator for on-farm energy needs or reduce heating needs.

*Implementer: County, cities, dairy operators*

*Feasibility: Moderate*

*Potential GHG reduction per year: 180 tons per year per dairy*

*Investment: \$125,000 per dairy for on-site digester (after rebates and incentives)*

**Solution #4 — Build a utility scale biogas digester plant and waste collection system to produce energy**

As an alternative to on-farm digesters (Solution #3), collect and transport agricultural and other wastes (e.g., dairy, equestrian, food service, residential “green can” waste, and wastewater treatment sludge from wineries and other sources) to a utility scale biogas digester that produces energy as part of the proposed Sonoma Energy Agency (SEA).

*Implementer: Sonoma Energy Agency, Sonoma County Water Agency*

*Feasibility: Challenging*

*Potential GHG reductions per year: 4,000 to 9,500 tons*

*Investment: \$14 million to \$26.5 million (funding from revenue bonds with little or no cost to local dairies)*

**Solution #5 — Produce biodiesel from local oil production in facility co-located with biodigester in Solution #4**

Cultivate oil-producing cover crops such as mustard and canola. Use their oil in the local food industry and then recycle the oil to produce biodiesel. Use by-products from processing cover crops as natural pesticides, animal feed, and fertilizers. Produce biodiesel in facility co-located with biodigester described above. Collect agricultural “waste” (e.g., orchard and vineyard prunings, pomace, lees, and manure) and use as feedstock to augment biogas production. Apply

compost byproduct of the digester to the agricultural fields in place of nitrogen fertilizer.

*Implementer: Private investors, municipalities, Sonoma County Water Agency*

*Feasibility: Challenging*

*Potential GHG reductions per year: 40,000 to 60,000 tons<sup>90</sup>*

*Investment: \$7 million to \$14 million (if biodiesel production co-located with digester)*

**Solution #6 — Improve processing and operational efficiency of agricultural producers**

Improve operational efficiencies associated with water pumping. Improve processing efficiencies with everything from simple measures (e.g., changing light bulbs and turning off coffee machines) to substantial improvements (e.g., changing wine storage facility design).

*Implementer: Wineries, dairies, chicken processors, other agricultural operations*

*Feasibility: Easy*

*Potential GHG reductions per year: To be determined (thousands)*

*Investment: To be determined (most savings pay for capital costs in 3 to 5 years)*

**Solution #7 — Increase CO<sub>2</sub> sequestration and fixation in and around agricultural operations**

Maximize and diversify vegetation (e.g., use cover crops, maintain or plant hedgerows or windbreaks, seed unpaved roadways and other areas, and plant trees and shrubs). Integrate native

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<sup>90</sup> Based on production of 6 million gallons per year.

trees into pastures to make a more productive system, increase soil health, create windbreaks, provide shade, and increase wildlife habitat. Increase stream setbacks and restoration of riparian habitats. Minimize tillage to reduce CO<sub>2</sub> from decomposing plant tissues. Gasify green waste to help offset emissions from fossil fuels. Increase CO<sub>2</sub> sequestration in livestock operations with “silvopasture.” Use tax incentives to place agricultural land in conservation easements. Introduce pyrolysis, in which biomass is burned at a high temperature in the absence of oxygen and yields both a charcoal by-product that can be used as a fertilizer or bio-oil to generate heat or electricity. The charcoal by-product, commonly called “agrichar” or “biochar,” could sequester carbon for thousands of years and boost agricultural productivity.

*Implementer: Private investors/individual ag operators, SEA*

*Feasibility: Moderate*

*Potential GHG reduction per year: Up to 300,000 tons*

*Investment: \$50 to \$80 per acre per year for collection and hauling of green waste.*

#### **Solution #8 — Restore and increase forest carbon stocks**

Implement incentives and policies to encourage forest management practices to increase overall forest carbon stocks that will remove additional carbon dioxide from the atmosphere. Increase overall forest carbon stocks by restocking under-stocked areas and managing older forests while still producing wood products. Use established GHG accounting protocols (e.g., California Climate Action Registry) to quantify benefits of reforestation.

*Implementer: County, Sonoma County Agriculture Preservation and Open Space District (SCAPOS)*

*Feasibility: Moderate*

*Potential GHG reduction per year:*

*To be determined*

*Investment: To be determined*

#### **Solution #9 — Establish a minimum level for the biomass of the County’s agriculture and forestland**

Establish a minimum level for biomass by enhancing, or using as a model, the County’s recent ordinance (No. 5651) to mitigate timberland conversion. Require emissions mitigation for any lands that are converted to non-forest use. Amend the County’s General Plan and revise the timber production zoning district to disallow conversion of timberland and do comparable zoning for oak woodlands and other critical natural resource areas. This will reduce emissions by limiting forestland conversion and mitigate emissions resulting from future conversions.

*Implementer: County, Sonoma County Agriculture Preservation and Open Space District (SCAPOS)*

*Feasibility: Easy*

*Potential GHG reduction per year:*

*To be determined*

*Investment: To be determined*

#### **Solution #10 — Facilitate the increased use of conservation easements through zoning, dedication of public funds, and mitigation fees**

Enhance zoning laws to promote cluster development to encourage greater use of easements. Identify and establish “climate reserve” zones on forestlands that are secured with conservation easements. Establish conversion mitigation fees and invest the revenue in forest-based GHG mitigation projects.

*Implementer: County, Sonoma County  
Agriculture Preservation and Open  
Space District (SCAPOS)*

*Feasibility: Moderate*

*Potential GHG reduction per year:*

*To be determined*

*Investment: To be determined*

**Solution #11 — Adopt the Coast Forest District’s Southern Subdistrict Harvest Rules**

Increase the retention of overall forest carbon stocks on timberlands compared to the current applicable rules for Sonoma County by adopting the Coast Forest District’s Southern Subdistrict Harvest Rules.

*Implementer: County*

*Feasibility: Easy*

*Potential GHG reduction per year:*

*To be determined*

*Investment: To be determined*

**Solution #12 — Establish a countywide forest carbon baseline, track progress, and issue an annual report card**

Conduct an inventory of converted forestland and subsequent carbon sequestered in vineyards to estimate net CO<sub>2</sub> emissions caused by forest conversion and depletion. Conduct an analysis

based on the specific forest carbon inventories of the converted forestland and subsequent carbon sequestered by the vineyard to better estimate the net CO<sub>2</sub> emissions and foregone future sequestration caused by these conversions and depletion of forest carbon stocks. Use aerial surveys or satellite imagery substantiated with sample plot data. Join the California Climate Action Registry and use its Forest Protocols to estimate and track forest carbon stocks. Encourage large private landowners to join the California Climate Action Registry for the same purpose. Track countywide emissions and reductions within the agriculture and forest sector relative to Sonoma County’s target and issue an annual report of the results. Use the target as an incentive to develop policies and programs that include the agriculture and forest sector in climate change mitigation objectives.

*Implementer: County, Sonoma County  
Agriculture Preservation and Open  
Space District (SCAPOS), private  
investors, Climate Protection  
Campaign*

*Feasibility: Easy*

*Potential GHG reduction per year: None*

*Investment: Minimal*

## Summary Table of Solutions

Agriculture and Forests	Implementer	Feasibility	Potential Tons GHG Reduced by 2015 Below BAU Projection	Estimated Investment
#1 — Improve soil and irrigation practices	Sonoma County Winegrape Commission, County, cities	Moderate	To be determined (thousands)	\$50,000 to \$80,000/yr/vineyard
#2 — Increase agricultural waste composting	County, cities, Sonoma Compost	Moderate	Up to 1.5 tons per acre ft/yr	\$350,000 to \$500,000 per facility
#3 — Use methane digesters to produce energy on dairies	County, cities, dairy operators	Moderate	180 tons per dairy	\$125,000 per dairy <sup>91</sup>
#4 — Build a utility scale biogas digester plant and waste collection system to produce energy	Sonoma Energy Agency	Challenging	4,000 to 9,500 <sup>92</sup>	\$14 million to \$26.5 million <sup>93</sup>
#5 — Produce biodiesel from biomass	Private investors and municipalities	Challenging	40,000 to 60,000	\$7 million to \$14 million <sup>94</sup>
#6 — Improve processing and operational efficiency of agricultural producers	Agricultural producers	Easy	To be determined (thousands)	To be determined (most savings pay for capital costs in 3–5 yrs)
#7 — Increase carbon dioxide sequestration and fixation in and around agricultural operations	Private investors, individual ag operators, SEA	Moderate	Up to 300,000	\$50 to \$80 per acre/year <sup>95</sup>
#8 — Restore and increase forest carbon stocks	County, SCAPOSD	Moderate	To be determined	To be determined

<sup>91</sup> Average cost per facility after rebates and incentives.

<sup>92</sup> The low numbers for this proposed Solution correspond to a 4.2 megawatt digester plant and the high numbers in this range are for a 10 megawatt digester plant. Potential CO<sub>2</sub> reductions estimated assuming biogas plant is carbon neutral, operating an average of 12 hours a day for 300 days a year offsetting current PG&E CO<sub>2</sub> emission level of 0.529 lbs/kWh produced.

<sup>93</sup> The low numbers for proposed Solution #4 correspond to a 4.2 megawatt digester plant and the high numbers in this range are for a 10 megawatt digester plant. Estimated costs are capital costs prior to any rebates or incentives.

<sup>94</sup> Based on cost of \$7 million for a 3 million gallon per year facility.

<sup>95</sup> For collection and hauling of green wastes.

<b>Agriculture and Forests</b>	<b>Implementer</b>	<b>Feasibility</b>	<b>Potential Tons GHG Reduced by 2015 Below BAU Projection</b>	<b>Estimated Investment</b>
#9 — Establish a minimum level for the biomass of the County’s agriculture and forestland	County, SCAPOSD	Easy	To be determined	To be determined
#10 — Facilitate the increased use of conservation easements through zoning, dedication of public funds, and mitigation fees	County, SCAPOSD	Moderate	To be determined	To be determined
#11 — Adopt the Coast Forest District’s Southern Subdistrict Harvest Rules	County	Easy	To be determined	To be determined
#12 — Establish a countywide forest carbon baseline, track progress, and issue an annual report card	County, SCAPOSD, private investors, Climate Protection Campaign	Easy	None	Minimal

## SOLID WASTE

### Overview<sup>96</sup>

Modern solid waste management uses a hierarchy of approaches in order of greatest to least environmental and climate benefit:

- First — **REDUCE** the amount of waste created through efficient use of resources, more durable products, less packaging, buying less stuff, etc.
- Second — **REUSE** products and packaging as much as possible (i.e., thrift stores, coffee mugs instead of single-use cups, reusable produce crates/pallets, etc.)
- Third — **RECYCLE** discards, including products, packaging, and organics (through composting).
- Finally, after doing all the above, landfill what's left, and then collect and use the landfill gas productively through energy production.

From a climate protection perspective, the ideal is to reach “zero waste” where nothing is landfilled and no fossil fuel is used to manage or transport waste. In fact, the goal is for “waste to equal food” because if waste equals food, then there is no such thing as waste.<sup>97</sup>

Collecting, processing, and putting municipal solid waste in landfills requires a significant amount of energy. Emissions from these activities are compounded by

<sup>96</sup> This section is drawn from the Solid Waste report found in the online Source Material for this Plan at ([www.coolplan.org](http://www.coolplan.org)).

<sup>97</sup> “Waste Equals Food: Our Future and the Making of Things,” William McDonough, 1998, (<http://www.ratical.org/globalize/waste=food.html>)

emissions from landfill gas. Although proper management of landfills can significantly reduce these emissions, landfills still leak methane, a very potent greenhouse gas. It is important to reduce methane emissions and use the “waste” as a significant source of feedstock for waste-to-energy processes.

### List of Solutions

#### **Solution #1 — Reduce the amount of waste generated**

- Encourage the efficient use of resources through buying less stuff, more durable products, and less packaging.
- Reduce the volume of organics handled by the solid waste collection system through on-site and home composting, which reduces the emissions associated with moving this material from the generator to the compost facility or disposal site as well as the emissions generated by production of synthetic fertilizers offset by use of organic soil amendments.
- Support legislation at local, state, and federal levels that extends producer responsibility for waste disposal.
- Encourage purchasing locally manufactured products.
- Give preferences for purchasing locally produced items with recycled content.
- Educate residents and businesses on purchasing decisions.
- Identify and display the carbon emission content of products.
- Enact a local carbon tax on products with significant associated emissions.

- Eliminate, through local ordinance, the use of polystyrene takeout food containers.
- Ban plastic bags.

*Implementer: Sonoma County Waste Management Agency (SCWMA), County, cities*

*Feasibility: Moderate*

*Potential GHG reduction per year:*

*To be determined*

*Investment: To be determined*

**Solution #2 — Reuse products and packaging**

Encourage the reuse of products. Encourage or require reusable packaging. Discourage the use of disposables.

*Implementer: Sonoma County Waste Management Agency, County, cities*

*Feasibility: Moderate*

*Potential GHG reduction per year: To be determined*

*Investment: To be determined*

**Solution #3 — Recycle or compost discards including products, packaging, and organic matter**

Make recycling and composting systems mandatory for large waste generators. Require multi-tenant commercial/residential building owners/managers to provide on-site access to recycling and composting containers/service.

*Implementer: Sonoma County Waste Management Agency, County, cities*

*Feasibility: Moderate*

*Potential GHG reduction per year:*

*To be determined*

*Investment: To be determined*

**Solution #4 — Landfill remaining “waste” locally and produce energy**

After implementing Solutions 1, 2, and 3, landfill what remains at local disposal sites, and then collect and use the landfill gas for energy production.

*Implementer: Sonoma County Waste Management Agency*

*Feasibility: Challenging*

*Potential GHG reduction per year:*

*To be determined*

*Investment: To be determined*

**Solution #5 — Fully implement the Countywide Integrated Waste Management Plan**

Implement construction and demolition debris recycling, and expanded yard waste and organics collection. Work with refuse collection companies to establish collection services for segregating food wastes from commercial sources. Expand the floor sorting and drop-off recycling facility at the Central Landfill. Build an anaerobic digester to convert the organic waste that is concurrently landfilled to produce biogas. Use the new food waste stream along with other organics as feedstock for an anaerobic digester that would increase the biogas production from local waste products.

*Implementer: Sonoma County Waste Management Agency, County, cities*

*Feasibility: Moderate*

*Potential GHG reduction per year:*

*To be determined*

*Investment: To be determined*

**Solution #6 — Track progress and issue an annual report card on the amount of GHG emissions reduced in the Solid Waste sector in Sonoma County**

*Feasibility: Easy  
 Potential GHG reduction per year: None directly  
 Investment: Minimal*

*Implementer: Sonoma County Waste Management Agency, Climate Protection Campaign*

Summary Table of Solutions

<b>Solid Waste</b>	<b>Implementer</b>	<b>Feasibility</b>	<b>Potential Tons GHG Reduced by 2015</b>	<b>Estimated Investment</b>
#1 — Reduce the amount of waste generated	SCWMA, County, cities	Moderate	To be determined	To be determined
#2 — Reuse products and packaging	SCWMA, County, cities	Moderate	To be determined	To be determined
#3 — Recycle discards including products, packaging, and organics	SCWMA, County, cities	Moderate	To be determined	To be determined
#4 — After implementing Solutions 1-3, landfill what remains and produce energy	SCWMA	Moderate	To be determined	To be determined
#5 — Fully implement the Countywide Integrated Waste Management Plan	SCWMA, County, cities	Moderate	To be determined	To be determined
#6 — Track progress and issue an annual report card	SCWMA, Climate Protection Campaign	Easy	None	Minimal

## NEXT STEPS: MOVING FROM PLAN TO IMPLEMENTATION

The true test of the commitment of our community and the power of this Plan will be what happens next. While great effort was put into developing this Plan, implementing it requires an effort that is orders of magnitude greater. Meeting the climate crisis will not happen unless we reprioritize our time, attention, and money.

What this Plan makes abundantly clear is that nothing short of transforming our energy and transportation systems is required. We emphasize that with this transformation will come great rewards — energy security and price stability, green job creation, new business and investment opportunities, public health protection, and greater sustainability in many arenas. Finally, it will make Sonoma County a leader nationwide in demonstrating what a community can do to meet the great challenge of climate change.

Success in meeting Sonoma County's GHG emission reduction target will depend on widespread cooperation, innovation, and collaboration in implementing this Plan.

- Elected officials
  - Institute new ordinances, zoning laws, and pricing policies, and encourage mixed use, infill, and transit-oriented development.
  - Strengthen General Plans and Environmental Impact Reports to promote climate protection.
  - Create a competitive environment for energy efficiency improvement and local renewable energy development.

- Direct staff and resources to make climate protection a high priority.
- Business people
  - Take advantage of new market opportunities by bidding on contracts to achieve Sonoma County's GHG emission reduction target.
  - Set up employee incentives to reduce single-occupant vehicle commuting.
  - Seek and support opportunities for developing new and innovative funding sources for energy efficiency upgrades and renewables.
  - Individually and collectively support elected leaders in taking bold action for climate protection.
- Community members
  - Urge elected representatives to implement the Plan.
  - Support the investment for efficiency and renewables, and the use of additional tax dollars and the introduction of new pricing policies to generate revenues needed to implement vital solutions, particularly those that make it possible to reduce vehicle miles traveled.
  - Implement energy efficiency options once the financial tools make them feasible.

## Implementation Working Groups

The thirty-nine solutions have been clustered into eleven categories, each having a different group of stakeholders, implementers, and decision makers.

The Climate Protection Campaign is exploring the formation of an Implementation Working Group for each category charged with the following:

- Outline and clarify shared objectives and timelines
- Identify research needs, barriers, and opportunities
- Develop a plan for implementing the solution, including a timeline

In its role facilitating the transition of the Plan to the implementation phase, the Climate Protection Campaign (Campaign) can invest some resources to convene initial meetings, communicate with member stakeholders about agendas and outcomes, and develop momentum and a sense of direction. In some cases, Campaign staff initially could provide background research or consultants to furnish information and advice. The involvement of the Campaign will be directed toward developing team leaders and group cohesion so that each Implementation Working Group can function on a stand-alone basis while still staying connected to the overall implementation effort. In cases where the focus of an Implementation Working Group matches the mission of an existing agency (e.g., #9 Solid Waste Solution and the Sonoma County Waste Management Agency) possibilities for leadership with the subject Implementation Working Group will be explored and, as appropriate, encouraged.

Solutions in the Plan organize naturally into the following eleven Implementation Working Groups.

### 1. Local Government Initiatives

#### A. Transportation and Land Use Subgroup

*Solutions to Implement:*

- Promote urban infill, transit-oriented development

- Strengthen General Plans to promote GHG emission reductions in the transportation, building energy, and municipal service sectors
- Strengthen all Environmental Impact Reports on proposed projects to promote GHG emission reductions
- Maintain existing or adopt urban limit lines
- Institute parking pricing policies in cities
- Strengthen zoning laws to protect lands that sequester carbon, and to support local resource-based industries including agriculture and timber resources
- Encourage mixed-use economic development in unincorporated urban service areas so that new jobs are located close to housing

#### B. Green Building Subgroup

*Solutions to Implement:*

- Institute a countywide mandatory green building ordinance
- Remove barriers to green building and green remodeling, including financial barriers both for builders and homeowners
- Require zero-energy “inclusionary” quotas for multiple building projects
- Define a path toward zero-energy new development and zero-energy existing buildings

#### C. Agriculture and Open Space Subgroup

*Solutions to Implement:*

- Establish a minimum level for the biomass of the County’s agriculture and forestland
- Facilitate the increased use of conservation easements through zoning, dedication of public funds, and mitigation fees

- Adopt the Coast Forest District’s Southern Subdistrict Harvest Rules
- Establish a countywide forest carbon baseline
- Encourage development of carbon sequestration projects in the County

## 2. Build Out Transit

### *Solutions to Implement:*

- Fully build out transit including the SMART Train and buses
- Repair and enhance the walking/biking environment in urban areas with sufficient density
- Develop improved metrics for tracking GHG emissions from transportation at the local level

## 3. Energy Efficiency

### **A. Natural Gas Subgroup**

#### *Solutions to Implement:*

- Improve building performance in 80 percent of Sonoma County homes and commercial spaces to highest cost-effective efficiency level
- Coordinate efforts with AB811 implementation

### **B. Electricity Subgroup**

#### *Solutions to Implement:*

- Improve plug load and appliance efficiency in 80 percent of Sonoma County homes and commercial spaces to highest cost-effective efficiency level

## 4. Water Delivery and Treatment Efficiency

### *Solutions to Implement:*

- Improve efficiency of pumping operations for water and wastewater

- Coordinate pumping operations with greater communication between water wholesaler and retailers
- Increase the amount of energy generated from biogas at wastewater treatment facilities
- Use co-generation to reduce energy required for wastewater treatment
- Augment existing digester capacity at subregional plant

## 5. End-User Water Efficiency

### *Solutions to Implement:*

- Maximize end-user water efficiency (improve efficiency in 80 percent of Sonoma County homes and commercial spaces to best available efficiency level)
- Explore the use of a PAYS system for water utility customers

## 6. Renewable Energy Development

### *Solutions to Implement:*

- Implement local renewable electricity generation portfolio
- Replace natural gas with renewables (replace 80 percent of natural gas furnaces with heat pumps or district heat from cogeneration or waste-to-energy where available; replace 80 percent of natural gas water heaters with solar hot water heaters)
- Create a fleet of 30,000 PHEV cars and trucks
- Replace fuel used in public transit and municipal fleets with locally-produced biofuels
- Build a biomass energy plant and waste collection system for agricultural and organic municipal solid waste

## 7. Business Leadership

### *Solutions to Implement:*

- Develop Commuter Choice Program
- Develop innovative incentives to support and develop commuting alternatives to single-occupant fossil-fuel powered vehicles
- Provide overall support and advocacy for Plan implementation

## 8. Agriculture and Forestry

### **A. On-Farm Practices Subgroup**

#### *Solutions to Implement:*

- Improve soil and irrigation practices
- Use methane digesters to produce energy on dairies
- Improve processing and operational efficiency of agricultural producers
- Increase CO<sub>2</sub> sequestration and fixation in and around agricultural operations

### **B. Systemic Agricultural Solutions Subgroup**

#### *Solutions to Implement:*

- Increase agricultural waste composting
- Produce biofuels from biomass where economically feasible
- Restore and increase forest carbon stocks

## 9. Solid Waste

### *Solutions to Implement:*

- Reduce the amount of waste generated
- Reuse products and packaging
- Recycle discards including products, packaging, and organics
- Landfill what remains and produce energy
- Fully implement the Countywide Integrated Waste Management Plan

## 10. Financing

SEA, AB811, and PAYS are financing solutions that could overcome the barriers associated with several of the solutions, and will be woven into implementation plans as appropriate. Additional legislative or privately financed opportunities may become available and should be analyzed and integrated as appropriate. In addition, dialogue with PG&E should be maintained and encouraged to explore their role as partners in achieving our objectives.

### *Solutions to Implement:*

- Explore the role and implementation of AB811, SB375, SEA, PAYS, and other mechanisms that arise in financing several of the Plan solutions:
  - Increase energy and water efficiency
  - Reduce carbon footprint of electricity generation below business-as-usual level
  - Replace natural gas with renewables or low carbon electricity
  - Create a fleet of 30,000 PHEV cars and trucks
  - Replace fuel used in public transit and municipal fleets with locally-produced biofuels
  - Build a utility-scale biogas digester plant and waste collection system

## 11. Public Education and Outreach

Public education will be needed both to galvanize support for implementing the Plan solutions, and to make the general public aware of new opportunities, programs, and incentives available to them once the solutions are implemented.

This team will need to work in close cooperation with the rest of the implementation teams.

*Possible tools and tactics:*

- Written handouts
- Presentations
- Speakers bureau
- Media
- Events

*Timelines and Contingencies*

It was beyond the scope of this Plan to propose specific timelines for implementation. However, there are some major milestones that must be reached, some sequences that are vital for the success of the Plan, and some dependencies that affect the solutions responsible for the most significant GHG reductions that must be prioritized. These are summarized below and timelines are suggested in the tables that follow.

*Major Milestones and Determinants:*

1. SMART and Comprehensive Transportation Plan (CTP) implementation — The ballot measure in November 2008 to apply a one-quarter cent sales tax to fund the remaining cost of a train through Sonoma and Marin counties is needed to provide the organizing skeleton for a comprehensive transportation infrastructure for the County. SMART and the related transit build out are responsible for as much as 60 percent of potential transportation-related GHG reductions.

2. Efficiency retrofits for building envelopes — the goal in the Plan is to retrofit 80 percent of the County’s homes and commercial spaces. The implementation of AB811, a state bill that helps finance efficiency retrofits, should be fast-tracked and applied most cost-effectively to building envelope retrofits (e.g., building shell and duct sealing, insulation, high-efficiency air conditioning systems).
3. Water efficiency — Implementation of the PAYS financing system by municipal water utilities should overcome some of the biggest barriers to the installation of water efficiency products by end users.
4. Sonoma Energy Agency (SEA) — SEA can provide low-cost financing by using ratepayer revenue to secure and pay back municipal revenue bonds. This low-cost money is needed to invest in a number of the most important GHG reducing solutions identified in the Plan, including the local renewable energy sources, the electric car share fleet, and the replacement of natural gas for space and water heating by renewables. Since it will require an estimated three years to begin building the physical projects, the feasibility of the Sonoma Energy Agency structure must be rapidly investigated and determined.

### Timeline for Major Milestones

<b>Task</b>	<b>Start</b>	<b>End</b>	<b>Dependency</b>
<b>SMART</b>			
Ballot measure to fund SMART		Nov. 2008	X
SMART construction	Jul. 2009	Jul. 2014	
Decide on local financing mechanisms for implementing aspects of the CTP	Jan. 2009	Jan. 2010	X
Implement CTP elements that shift transportation to walking, biking, and transit	Jan. 2010	Dec. 2015	
<b>Efficiency Retrofits</b>			
Establish AB811 assessment district to finance efficiency retrofits	Aug. 2008	Feb. 2009	
Implement PAYS at municipal water utilities	Nov. 2008	Dec. 2009	X
Promote programs to Sonoma County residents	Feb. 2009	Ongoing	
Begin implementation of building retrofits	Feb. 2009	Ongoing	
<b>Sonoma Energy Agency (SEA)</b>			
Feasibility study	Nov. 2008	Apr. 2009	
Decision to conduct SEA Implementation Plan		Apr. 2009	X
SEA Implementation Plan	Apr. 2009	Nov. 2009	
Local government ordinances to set up SEA	Jan. 2010	Mar. 2010	X
Implement SEA, transfer customers	Mar. 2010	Feb. 2011	
Construct local renewables (e.g., geothermal, solar, biodiesel, wind, tidal)	Feb. 2011	Dec. 2015	
Electric car share fleet	Jan. 2014	Dec. 2015	
Switch buses to biodiesel	Jan. 2014	Dec. 2015	
Replace natural gas and propane water and space heaters with renewables	Jan. 2012	Dec. 2015	

### Timeline for Other Solutions

<b>Task</b>	<b>Start</b>	<b>End</b>
Education and Outreach	Ongoing	Ongoing
Local Government Initiatives (transportation, land use, green building, agriculture, etc.)	Apr. 2009	Dec. 2010
<b>Water Delivery and Treatment Efficiency</b>		
Coordinate pumping schedules	Jan. 2009	Dec. 2009
Increase electricity from biogas	Jun. 2009	Jun. 2010
Use cogeneration to reduce energy for wastewater treatment	Jun. 2009	Jun. 2010
Add high solids food waste digesters	Jun. 2009	Dec. 2010
<b>Business Leadership</b>		
Implement Commuter Choice program	Jan. 2009	Dec. 2010
Private sector innovations to reduce commuting	Jan. 2009	Dec. 2015
<b>Agriculture &amp; Forestry</b>		
Develop strategic outreach plan targeting on-farm practices	Jan. 2009	Dec. 2009
Conduct outreach to improve practices, install methane digesters on dairies, etc.	Jan. 2010	Dec. 2015
Develop strategic plan for systemic agricultural solutions	Jan. 2009	Dec. 2009
Implement systemic solutions	Dec. 2009	Dec. 2015
Conduct local forest carbon baseline inventory	Jan. 2009	Dec. 2010
Establish forest conversion limits	Jan. 2011	Jul. 2011
Develop carbon sequestration project	Jan. 2010	Dec. 2011
<b>Solid Waste</b>		
Develop strategy and education plan to reduce, reuse, and recycle	Jan. 2009	Dec. 2009
Produce energy from landfill gas	Jan. 2010	Dec. 2015
Implement the Countywide Integrated Waste Management Plan	Ongoing	Ongoing

### To Conclude: Let's Get Started

There are many questions this Plan does not answer, and many details not yet clarified. But there are a few basic concepts that most of us can agree on:

- Climate change is happening.
- Unless we rapidly change, it will have devastating effects on our economy, civilization, and earth's ecosystems.
- Delaying will make the needed changes harder and more expensive later.
- Solutions exist.
- The crisis we face is rich with opportunity.

We are blessed with many advantages in Sonoma County, covering the spectrum from abundant potential for generating renewable energy, to a well-informed concerned citizens and elected representatives, to a relatively prosperous economic base. It is our responsibility to apply those advantages to climate protection, the greatest challenge of our time. Now is our defining moment.

## SONOMA COUNTY COMMUNITY CLIMATE ACTION PLAN PARTICIPANTS

### Steering Committee

Jane Bender, City of Santa Rosa Councilmember  
Jim Leddy, President, Santa Rosa City Schools  
Tanya Narath, Executive Director, Leadership Institute for Ecology and the Economy  
Chris Thomas, Deputy County Administrator, County of Sonoma (ex officio)

### Community Representatives

#### Government

Cloverdale — Bob Jehn  
Healdsburg — Gary Plass, George Small  
Petaluma — Karen Nau  
Rohnert Park — Jake Mackenzie, Vicki Vidak-Martinez  
Santa Rosa — Jane Bender  
Sebastopol — Sam Pierce, Larry Robinson  
Sonoma City — Steve Barbose, Raymund Gallian  
Windsor — Deb Fudge  
Sonoma County — John Haig, Vince McCann, Tamra Pinoris  
Sonoma County Water Agency — Cordel Stillman

#### Business

Cotati — Ken Fass, Corrie Snyder, Suzanne Whipple  
Healdsburg — Mary Barclay, Kathleen Palmer  
Rohnert Park — Isaac Freed, Matthew Malouf  
Santa Rosa — Justin Beck, Paul Bulger, Stuart Malkin, Ed Myers, Liz Yager  
Sebastopol — Melissa Brandeo, Paul Rosen  
Windsor — Denny Freeman  
Sonoma City — Kristina Tierney, Peter Posert

Special thanks to Lisa Wittke Schaffner, Executive Director, Sonoma County Alliance

#### Youth

Cloverdale — Mikhail Goutkin-Lopez  
Cotati — Kellan Arnold  
Healdsburg — Melati Citrauireja  
Santa Rosa — Patrick Meddaugh, Kelli Upshaw, Nicko Wilde  
Sebastopol — Corrina Munger  
Sonoma City — Hilary Cline, Jessica Guest  
Windsor — Micah Kiliman  
Sonoma County — Alexandra Carlson, Melissa Carlson

#### Community

Cloverdale — Gail Pardini-Plass  
Cotati — Chris Cone  
Healdsburg — John Essman  
Petaluma — Ellen Bichler, Jason Merrick  
Santa Rosa — Colleen Fernald, Skaidra Smith-Heisters  
Sebastopol — Damon Knutson  
Sonoma City — Laurine Gallian, Lisa Michelli  
Windsor — Shirley Johnson, Bob Legge  
Sonoma County — Nabeel Al-Shamma, Daniel Solnit

### Climate Protection Campaign

#### Board of Directors

Martha Kowalick, President  
Lawrence Jaffe, Vice President and Treasurer  
Jim McGreen, Secretary  
Elizabeth C. Herron, Director  
Carl Mears, Director

#### Authors

Ann Hancock, Executive Director  
Dave Erickson, Technical Director  
Richard Alden Feldon, Project Manager (to March 2008)  
Renata Brillinger, Project Manager (from April 2008)

#### Technical Consultants

Rebecca Benassini, Senior Associate, Economic Planning Systems  
Paul Fenn, Director and Founder, Local Power Inc.  
Robert Freehling, Research Director, Local Power Inc.  
Walter Kieser, Principal, Economic Planning Systems  
Jim McGreen, Inventor and Entrepreneur  
Edwin Orrett, Principal, Resource Performance Partners  
Michelle Passero, Policy Initiatives, Pacific Forest Trust  
Jerrell Ross Richer, Ph.D., Professor, Sonoma State University  
David Williard, Principal, Sustainability Systems  
Joel Woodhull, Chairman, Sonoma County Transportation and Land Use Coalition

#### Production and Logistical Support

Chris Cone — Technical Writing/Editing  
Lori Houston — Media Outreach  
Sam Shaboon — East/West Café  
Mary Munat — Green Mary

#### Volunteers

China Dusk, Barbara Gerber, Jacque Lefler, Paula Magyari, Natalie Peck

### Dedication to Joel Woodhull

April 26, 1937 — October 24, 2007

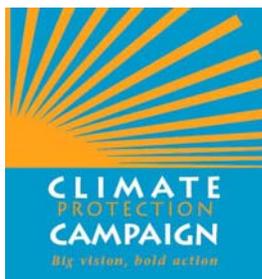
The Sonoma County Community Climate Action Plan is dedicated with deep appreciation to Joel Woodhull, a founding member of the Science and Technical Advisors committee of the Climate Protection Campaign. Joel also served as a consultant for the Transportation sector of the Community Climate Action Plan.

## Sonoma County Community Climate Action Plan

The Sonoma County Community Climate Action Plan is available online, along with the Source Material: ([www.coolplan.org](http://www.coolplan.org)).

### Source Material

1. Energy Solutions — Paul Fenn, Robert Freehling, and John Cutler, Local Power, Inc.
2. High Performance Efficiency — Edwin Orrett, Principal, Resource Performance Partners
3. Water — John Rosenblum, Rosenblum Environmental Engineering, and Dave Erickson
4. Wastewater — John Rosenblum, Edwin Orrett, and Dave Erickson
5. New Construction — Rebecca Benassini, Senior Associate, Economic Planning Systems
6. Land Use — Walter Kieser, Principal, Economic Planning Systems
7. Transportation — Joel Woodhull, Jim McGreen, and Dave Erickson
8. Agriculture — David Williard, Principal, Sustainergy Systems
9. Forests — Michelle Passero, Director of Policy Initiatives, Pacific Forest Trust
10. Solid Waste — Ken Wells, Guiding Sustainability
11. Carbon Model — Dave Erickson
12. Analysis of PG&E's Long Term Procurement Plans — Dave Erickson
13. PG&E letter of Partnership — Nancy McFadden, PG&E
14. AB811 Analysis — Dave Erickson
15. Climate Change and SMART — Sonoma Marin Area Rail Transit
16. GHG Mitigation Measures — California Attorney General
17. Sonoma County Transportation Authority GHG Reduction White Paper — Steve Colman, Dowling & Associates, and Chris Barney, SCTA
18. Solutions Submitted by the Public with Analyses by Jerrell Ross Richer, Ph.D.
19. Public Input from April 2, 2007



**About the Climate Protection Campaign** Our mission is to create a positive future for our children and all life by inspiring action in response to the climate crisis. We advance practical, science-based solutions for significant greenhouse gas reductions. Founded in 2001, the Campaign's motto is "big vision, bold action."

**What We Do** The Campaign works in partnership with governments, schools, businesses, community-based organizations, and media to advance innovative solutions to accelerate action for climate protection. We work at the local, regional, and state levels.

**Achievements** We encouraged all nine Sonoma County cities and the County government to publicly commit to protecting the climate, becoming the first community in the nation to have 100 percent of its local governments pledged to the Cities for Climate Protection program. In 2005 all nine Sonoma cities and the County adopted the most ambitious community greenhouse gas emissions reduction target in the country — 25 percent below 1990 levels by 2015. The Campaign has helped set four other national climate protection precedents. Our aim is to have such resounding success that we inspire communities nationwide.

In 2007 the Climate Protection Campaign was honored to receive the USEPA Climate Protection Award "in recognition of exceptional contributions to global environmental protection."