

Greenhouse gas emission tracking in Sonoma County:

An overview of current status and recommendations for future action

September 2010

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This opinions, findings, conclusions, and recommendations in this report, prepared under contract with the Sonoma County Water Agency, are solely those of the authors.

1. Executive Summary

The Sonoma County Water Agency contracted with the Climate Protection Campaign to produce an overview of the current status of greenhouse gas emission (GHG) tracking in Sonoma County, and to recommend possible actions to improve what now exists.

The intended audience for this report are energy and climate policymakers in Sonoma County. Its purpose is to assist in assessing the impact of Sonoma County energy and climate efforts so that the tracking as well as the programs themselves are efficient, effective and not duplicative.

Currently there is neither a requirement nor a standardized protocol for local communities to track their GHG emissions. Communities are therefore able to determine their own purpose, criteria and protocol for GHG emission tracking.

Local communities that track their GHG emissions do so to provide diagnostic information to support decisions regarding allocation of resources for programs and policies aimed at reducing emissions. Many business and local governments across the U.S. – including in Sonoma County – have used protocols developed by ICLEI – Local Governments for Sustainability. The Climate Protection Campaign followed ICLEI’s guidelines in 2003 to inventory GHG emissions from cities’ municipal operations, to produce Sonoma County’s “Greenhouse Gas Emissions Inventory” in 2005, to help quantify solutions in the plans for municipal operations produced in 2007, and in the Sonoma County Community Climate Action Plan issued in 2008. Several businesses in Sonoma County that are members of U.S. Climate Leaders also follow protocol developed by ICLEI.

Because Sonoma County is committed to being a climate protection leader with one of the most aggressive GHG emission reduction targets in the nation, it has a responsibility to translate words into action. Part of the pledge taken by all nine Sonoma cities and the County was tracking progress toward achieving the GHG target. The underlying logic is that you can only manage what you measure.

For this overview we considered criteria and protocol for tracking GHG emissions at the local level, local initiatives related to tracking GHG emissions and energy, and a report that ICLEI conducted of Sonoma County’s GHG emission tracking efforts. In general, we found that ICLEI’s protocol for tracking GHG emissions remains the best for Sonoma County to follow. We raised numerous considerations in doing so, and offered recommendations for refinement of the methodology. Resource constraints will dictate the level of uptake for many of these recommendations.

In addition, local governments must keep pace with a shifting context. For example, state legislation, especially AB32 and SB375; steps by the State Attorney General’s office; and recent efforts by the Bay Area Air Quality Management District foreshadow ways that local governments will be required to account for GHG emissions.

From this overview emerges a recognition of the challenge of measuring the impact that our local climate protection initiatives have on reducing GHG emissions. In addition, this overview clarifies the enormous force that the economy and population – and to a lesser degree weather and national, state and regional policies – have on local GHG emissions. In the face of these formidable forces, Sonoma County endeavors nonetheless to meet the scientific imperative for climate protection, and inspire other communities to do the same.

2. Background

In February 2010, the Sonoma County Water Agency contracted with the Climate Protection Campaign to produce an overview of the current status and recommendations for future action regarding greenhouse gas emission (GHG) tracking in Sonoma County.

Scope of the study:

1. Develop criteria for GHG tracking in Sonoma County
2. Compile a list and brief description of the various communitywide energy/GHG tracking efforts
3. Review the work produced by ICLEI under contract with SCWA
4. Identify existing/proposed approaches that best fit the criteria developed, and project the costs for doing so
5. Recommend how to implement recommended energy/GHG tracking
6. Produce the annual Sonoma County GHG report card for the Climate Protection: Everybody Profits conference
7. Produce a report on results of the above

In 2001 Sonoma County and its nine cities, in conjunction with the Climate Protection Campaign, committed to taking action to reduce greenhouse gas emissions. They followed the Cities for Climate Protection® program, a worldwide initiative led by ICLEI — Local Governments for Sustainability. In 2005, the County and cities adopted the GHG emission reduction target of 25% below 1990 levels by 2015. In October 2008, the Climate Protection Campaign, funded by local governments and private sources, issued the *Community Climate Action Plan* that contains a package of solutions to attain the 25% reduction goal. Sonoma County has achieved nine national climate protection precedents, and is increasingly known for its climate protection leadership.

Sonoma County's Regional Climate Protection Authority (RCPA), created by state legislation, officially commenced in January 2010. The RCPA Board held a workshop in January at which they named GHG emission tracking as one of their top three goals.

Development of protocols to measure GHG emissions has been driven primarily by the need for standardized methodology to gauge compliance with agreements such as those made through the Kyoto Protocol. The Intergovernmental Panel on Climate Change (IPCC) provides standards used worldwide as "reference protocols."¹

Corporations reporting emissions under the Kyoto Protocol follow "The Greenhouse Gas Protocol" by the World Resources Institute (WRI) and World Business Council for Sustainable Development. WRI's protocol is also used by the US EPA Climate Leaders voluntary program as well as by the 1605b voluntary GHG reporting program.²

¹ IPCC standards include: Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC/UNEP/OECD/IEA 1997), the IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC 2000), and the IPCC Good Practice Guidance for Land Use, Land-Use Change, and Forestry (IPCC 2003). Additionally, the U.S. emission inventory performed by the U.S. Energy Information Administration has begun to incorporate new methodologies and data from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006).

² Established by [Section 1605\(b\)](#) of the Energy Policy Act of 1992, the Voluntary Reporting of Greenhouse Gases Program encourages corporations, government agencies, non-profit organizations, households, and other private and

The U.S. Environmental Protection Agency has instituted a mandatory GHG reporting rule for specific emitters with defined calculation methodologies.³ These EPA rules are, in effect, protocols that specify a set of entities, sources, calculations and data to be reported. The EPA has also developed “Draft Regional Greenhouse Gas Inventory Guidance,” intended primarily for voluntary regional (multi-county) GHG accounting rather than for community scale inventories. For communitywide emissions, there is no nationally-accepted protocol; ICLEI currently provides the most standardized approach, according to the representative contacted.⁴

For California under AB 32, a set of capped entities must report their emissions and comply with the cap. The Climate Action Registry specifies the reporting protocols to be used. The California **Air Resources Board (CARB) developed a Local Government Operations Protocol⁵** that is intended for application with municipal operations, not for communitywide application.

Because local governments will not participate in carbon markets in the foreseeable future, no trigger exists for development of community scale GHG tracking protocol. However, on the horizon is California’s SB375 law that requires regions to align transportation, land use, and housing, and to set and enforce GHG reduction targets. As part of rolling out SB375, the California Air Resources Board is developing GHG emission protocols for transportation.

In developing this report, we contacted CARB GHG emissions experts to learn the status of present and anticipated GHG tracking protocol for local communities, and to compare views on the subject. We were told that the work Sonoma County is doing to track GHG emissions is ahead of the curve and often referenced as an example to other local communities seeking help. From CARB’s perspective, there are many moving parts and uncertain timelines in determining how to quantify GHG emissions at the community level. For the transportation sector the leader is CARB for SB375. Not much is expected to change for electricity and natural gas. Solid waste tracking will probably follow the Local Government Operations Protocol. The quantification and tracking in the Agriculture/Forestry sector is “a long way off.”⁶

For the past few years, California Attorney General Jerry Brown’s enforcement of environmental law including GHG emission reduction as part of the California Environmental Quality Act, compelling local governments across the state to scramble to be in compliance. Because calculating GHG emissions is part of compliance, the AG’s office offers information regarding how to make these calculations.⁷

Similarly, the Bay Area Air Quality Management District, a national climate protection leader among air districts, currently adopted CEQA Guidelines that specify air quality significance

public entities to submit annual reports of their greenhouse gas emissions, emission reductions, and sequestration activities.

³ In 2009 the USEPA issued the Greenhouse Gas Reporting Rule (40 CFR Part 98) that requires reporting of GHG emissions from large sources and suppliers in the United States.

<http://www.epa.gov/climatechange/emissions/ghgrulemaking.html>

⁴ U.S. Environmental Protection Agency, Municipal Clean Energy Program, State and Local Branch January 20, 2009. Draft and comments from Andrea Denny, Denny.Andrea@epamail.epa.gov.

⁵ “Local Government Operations Protocol: For the quantification and reporting of greenhouse gas emissions inventories, Version 1.1,” California Air Resources Board, May 2010.

http://www.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf

⁶ David Edwards, Ph.D., Air Pollution Specialist, dedwards@arb.ca.gov, March 2010.

⁷ “Climate Change, the California Environmental Quality Act, and General Plan Updates: Straightforward Answers to Some Frequently Asked Questions California Attorney General’s Office,” Rev. Sept. 2009, http://aq.ca.gov/globalwarming/pdf/CEQA_GP_FAQs.pdf

thresholds, analytical methodologies and mitigation measures for local agencies to use when preparing Air Quality impact analyses under CEQA. For projects subject to CEQA, the Agency updated analytical methodologies and mitigation measures for greenhouse gas emissions and toxic air contaminants.⁸

In the absence of both an outside requirement for local communities to track their GHG emissions and a standard local-level GHG protocol, communities are free to determine their own purpose, criteria and protocol for GHG emission tracking. For more than ten years, cities and counties across the U.S. have used protocols developed by ICLEI – Local Governments for Sustainability. The Climate Protection Campaign followed ICLEI’s guidelines to produce Sonoma County’s “Greenhouse Gas Emissions Inventory” in 2005.⁹ ICLEI and the State of California use this Sonoma County document as a model for others to follow. ICLEI plans to update their community protocol by 2012; their purpose is to develop a common accounting framework for voluntary reporting of GHG emissions reductions activities.¹⁰

ICLEI’s Five Milestone Program

1. Inventory GHG emissions
2. Set a target for reducing them
3. Create a plan for achieving the target
4. Implement the plan
5. Track progress and adjust as needed

The main parties involved in GHG emission tracking, categorized by jurisdictional level, are shown in the table that follows.

International	National	State	Regional	Local
<ul style="list-style-type: none"> • Intergovernmental Panel on Climate Change • World Resources Institute • World Business Council for Sustainable Development • ICLEI 	<ul style="list-style-type: none"> • US Environmental Protection Agency • Climate Registry • ICLEI 	<ul style="list-style-type: none"> • California Air Resources Board • California Public Utilities Commission • California Energy Commission • Attorney General 	<ul style="list-style-type: none"> • Bay Area Air Quality Management District • PG&E 	<ul style="list-style-type: none"> • County and cities • Sonoma County Water Agency • Climate Protection Campaign • Regional Climate Protection Authority • Sonoma County Transportation Authority • Sonoma County Waste Management Agency

Because Sonoma County is committed to being a climate protection leader with one of the most aggressive GHG emission reduction targets in the nation, it has a responsibility to translate words into action. Part of the pledge that all nine Sonoma cities and the County made in 2001 and 2002 is to track progress toward achieving their target. The underlying premise is that you can manage only what you measure.

⁸ Air Quality Guidelines, Bay Area Air Quality Management District, June 2010,

<http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Updated-CEQA-Guidelines.aspx>

⁹ “Greenhouse Gas Emission Inventory for all sectors of Sonoma County, California,” Climate Protection Campaign, January 2005, http://www.climateprotectioncampaign.org/ccap/AP_INVEN.PDF

¹⁰ “Local Government GHG Accounting and Quantification,” March 2010 ICLEI presentation, www.ghgprotocol.org/files/accounting-quantification_20100322_iclei.ppt

The purpose of GHG tracking is to provide government, business, and community leaders with feedback to support them in allocating resources and making programs and policies for reducing GHG emissions. Leaders must intervene with business as usual which is moving us toward a future of higher costs, fossil fuel dependency, poor public health, and global climate change that threatens life as we know it.

Calculating the aggregate GHG emissions for a region shows the cumulative impacts and assesses overall progress toward a reduction goal. Identifying the sources of pollution and allocating the amount of GHG emissions helps pinpoint opportunities for intervention. The more finely-tuned the analysis, the more pinpointed the intervention can be. Assessing the cost-effectiveness of locally-implemented programs complements regional GHG tracking. Showing trends and identifying the drivers of those trends informs decisions about how and where to allocate funds and implement programs.

3. Criteria for GHG emission tracking

Below are the criteria recommended for GHG emissions quantification. The first five criteria were established for the “Local Government Operations Protocol,” developed by CARB, the California Climate Action Registry, and ICLEI.¹¹ The remaining criteria were developed through this project.

1. **Relevance:** The greenhouse gas inventory should appropriately reflect the greenhouse gas emissions of the local government and should be organized to reflect the areas over which local governments exert control and hold responsibility in order to serve the decision-making needs of users.
2. **Completeness:** All greenhouse gas emission sources and emissions-causing activities within the chosen inventory boundary should be accounted for. Any specific exclusion should be justified and disclosed.
3. **Consistency:** Consistent methodologies should be used in the identification of boundaries, analysis of data and quantification of emissions to enable meaningful trend analysis over time, demonstration of reductions, and comparisons of emissions. Any changes to the data, inventory boundary, methods, or any relevant factors in subsequent inventories should be disclosed.
4. **Transparency:** All relevant issues should be addressed and documented in a factual and coherent manner to provide a trail for future review and replication. All relevant data sources and assumptions should be disclosed, along with specific descriptions of methodologies and data sources used.
5. **Accuracy:** The quantification of greenhouse gas emissions should not be systematically over or under the actual emissions. Accuracy should be sufficient to enable users to make decisions with reasonable assurance as to the integrity of the reported information.
6. **Understandability:** Information should be understandable to a lay audience.
7. **Purpose/cost-effectiveness:** The quantification system fulfills a clear purpose, and the cost of implementation is at least equal to the value derived from the information. As appropriate, a de minimus category should be included for emissions sources that are not actively quantified because they represent less than 5 - 20 percent of total emissions.
8. **Flexibility/adaptability:** Quantification system lends itself to conform to standardization imposed later by regional, state, or national entities. System also includes a well-defined method for updating the baseline year and calculating the “business as usual” scenario.
9. **Timeliness/directness:** Quantification system provides feedback in as close to real time and as close to actual emissions (rather than through indirect indicators or model projections) as possible.
10. **Versatility:** To the extent possible, quantification system allows for comparisons across sectors, sources, and other areas and levels.
11. **Sustainability:** Quantification system endures over time.

¹¹ “Local Government Operations Protocol: For the quantification and reporting of greenhouse gas emissions inventories, Version 1.1,” California Air Resources Board, May 2010.
http://www.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf

4. Current, Past and Proposed GHG Tracking Activities in Sonoma County

This section highlights the current, past and proposed GHG tracking efforts in Sonoma County.

Current

1. Sonoma County GHG Emissions Report Card

The Climate Protection Campaign has produced annual GHG emission report cards for the past five years. ICLEI's protocol is followed for this report. It is presented each year at the Climate Protection: Everybody Profits conference. In 2010 the Sonoma County Water Agency funded the production of the report. Prior to 2010, private funding and volunteer time funded it. The most recent report is shown in Appendix A, and is also posted online.¹² Estimate of cost: \$5400 – 9600. A breakdown of the steps and costs is shown in Appendix B.

2. Sonoma County Water Agency

Since 2006, the Sonoma County Water Agency (SCWA) has tracked GHG emissions from its operations following protocol prescribed by the California Climate Action Registry. SCWA is a member of the Registry. The Agency's goal is carbon-neutral water by 2015.

3. City of Santa Rosa

In 2010, the City allocated \$200,000 from federal Energy Efficiency Conservation Block Grant (EECBG) funding to develop a comprehensive GHG Reduction Program for the City to reach its GHG emissions reduction targets. GHG tracking is an integrated feature of this initiative.

4. Energy Efficiency Programs Run by PG&E

The California Public Utilities Commission administers billions of dollars of state public goods charges for energy efficiency programs. Investor-owned utilities such as PG&E administer these programs, including in Sonoma County. GHG tracking issues associated with PG&E's energy efficiency programs are described under #6, Discussion, of this report.

5. Sonoma County Energy Independence Program

The Sonoma County Energy Independence Program (SCEIP) is currently working with Energy Upgrade California on the development of the state-wide web portal. SCEIP will receive funds from the State to consult with the web portal designers on the development of functions that will support tracking and reporting of the energy savings and emissions resulting from SCEIP-funded projects.

6. Energy Upgrade in Sonoma County (formerly Sonoma County Retrofit and Renewables Program)

Energy Upgrade in Sonoma County (Energy Upgrade) sprang from a Climate Protection Campaign initiative. Assessment of the program's impact on reducing GHG emissions is integral to it. The local Energy Upgrade program is administered by the Sonoma County Regional Climate Protection Authority and is part of a statewide program called Energy Upgrade California™. Energy Upgrade will be tracking the GHG impacts of its building retrofit efforts through a California Public Utilities Commission incentive program for whole-house building performance energy renovation, American Recovery and Reinvestment Act (ARRA) reporting for the grant funding underwriting the Energy Upgrade program, and in coordination with SCEIP.

¹² http://climateprotection.org/pdf/Status_Report_Card_May_2010.pdf

The system for coordinating reporting for GHG tracking, funding reporting, and financing programs is currently under development.

7. Renewable-based Energy Secure Communities (RESCO)

RESCO is a 3-year, \$2 million collaboration funded by the California Energy Commission and led by the Sonoma County Water Agency with several partners - the Regional Climate Protection Authority, the Climate Protection Campaign, Local Power, and the Los Alamos National Labs. RESCO will design and model a multi-sector portfolio of strategies to reduce reliance on imported energy at a community level. Part of the project involves developing an advanced system dynamics simulation model, known as the CLEAR model. The lead on this portion of the project is Los Alamos National Labs. The system dynamics model represents all carbon-emitting activities in Sonoma County, along with the drivers for emissions. The model dynamically simulates the processes that produce carbon emissions in the County. Its output is a representation of both total and sectoral GHG emissions over time. The model is driven by actual data inputs, such as population, economic activity and weather that allow it to closely simulate changes in carbon emissions due to both macro drivers, and designed programs.

The scenario modeling capability enables the CLEAR model to project emissions over time, given a set of programs, policies, technologies and drivers. This allows a projection of Business As Usual emissions over time, given state and federal policies, as well as population changes, economic changes and even weather changes. This capability provides a much more accurate assessment of existing programs, and changes that can be expected given existing laws and the expected behavior of the private sector.

This capability enables policymakers to make choices about additional policies and programs that could be enacted at the local level to exceed reductions that might otherwise occur. The scenario modeling capability also allows decisions to be made based on the magnitude of the changes that could be expected for a particular program or measure.

8. Sonoma County Comprehensive Transportation Plan

The Comprehensive Transportation Plan was produced by the Sonoma County Transportation Authority and adopted by the SCTA Board in 2009. SCTA invested considerable resources in addressing GHG emissions in the CTP, and measuring current and projecting future GHG emissions from transportation as a result of adoption of the CTP.

9. Project DX

The City of Santa Rosa, in cooperation with Sonoma County, developed the Solar Sonoma County Solar Map to help residents, business owners, and decision makers calculate the solar potential power available at a given location. The mapping tool, developed by Project DX, was designed to be used by non-technical commercial and residential property owners to show the system costs, cost savings, payback rates, and GHG emission savings for three solar energy technologies. Developers offered the tool to Sonoma County for one year, after which they asked \$20,000/month.¹³ The future of Project DX is uncertain because no funding exists to develop it, it was originally intended to become the local web portal before SCEIP put up its own web site, and the Energy Upgrade site will incorporate many features of the local pilot.

¹³ "Analysis of Web-Based Solar Photovoltaic Mapping Tools," Kandt et al, June 2009, <http://www.solaramericacities.energy.gov/pdfs/Analysis-of-Web-Based-Solar-Photovoltaic-Mapping-Tools.pdf>

Past

10. Greenhouse Gas Emission Inventory, Countywide

This report was issued in January 2005 by the Climate Protection Campaign and was funded by the Bay Area Air Quality Management District.

http://www.climateprotectioncampaign.org/ccap/AP_INVEN.PDF

11. Baseline GHG Emissions Inventories, Municipal Operations

In 2002 the County of Sonoma and City of Santa Rosa produced GHG emission inventories for their municipal operations. In 2003, the Climate Protection Campaign produced GHG emission inventories for Sonoma's eight other cities.¹⁴

12. Ongoing GHG Tracking for Municipal Operations, Electricity and Natural Gas¹⁴

From 2005 to 2009, the Climate Protection Campaign reported on municipalities' emissions as part of the annual GHG report card. The Climate Protection Campaign has utilized three software tools for GHG tracking:

- ICLEI's Clean Air and Climate Protection software that provides data comparisons and summaries of GHG emissions from electricity, natural gas, transportation, solid waste, and other sectors.
- Utility Manager - a data analysis/reporting software program that creates and updates a database of all municipal accounts. All cities, the County and the Sonoma County Water Agency gave authorization to create logins to access their billing information. The PERL program is used to collect the billing information to keep the database up to date. Utility Manager provides a variety of reports on different criteria.
- A PERL script program developed by the Climate Protection Campaign to automatically collect commercial or governmental electricity and natural gas billing data available on PG&E's "Biz Tools" website (with written permission). This program can access an unlimited number of accounts, and aggregate the data so that it can be imported in one operation into Utility Manager.

13. Community Pulse

This web-based tool created by ViewCraft LLC aims to provide regular feedback and make connections among waste, water use, energy use and CO2 emissions. Its mission is to assemble and organize utility and agency information that is collected but rarely used to help people understand where we are at now, how far we are from where we want to be, and how we can get there. Sponsors shown on the site are the Sonoma County Water Agency and the Sonoma County Waste Management Agency. The most recent data on the site are from 2008.

www.communitypulse.org

Proposed

14. Greenhouse Gas Reduction and Implementation Program (GRIP)

A consortium of Sonoma County agencies, municipalities, and community-based organizations submitted a proposal for \$974,754 to the State of California Strategic Growth Council for a "Greenhouse Gas Reduction and Implementation Program. The County of Sonoma is the lead agency. Included in the proposal's work plan is an extensive GHG tracking component.

¹⁴ <http://www.climateprotectioncampaign.org/reports/index.php>

15. The Energy Alliance Association (TEAA) proposal

The written TEAA proposal describes a concept that centers on analysis and planning for a package of measures to reduce GHG emissions from municipal operations, with the intent of scaling such efforts citywide and countywide. It is unclear how much work will go toward municipal operations, how much toward citywide and countywide endeavors, and how much toward tracking GHG emissions. Explorations with TEAA to clarify these areas and to specify actual deliverables would enable interested parties to determine the value of this proposal for tracking Sonoma County GHG emissions. The TEAA proposal is shown in Appendix D.

5. Review of ICLEI's report "Analysis of Community Inventory Methodologies"

Starting in November 2009, ICLEI – Local Governments for Sustainability (ICLEI) undertook a study to examine approaches in which Sonoma County could complete the following two tasks:

- Complete a verifiable community inventory
- Quantify emissions in a way that would facilitate participation in carbon markets

ICLEI produced two reports, "Analysis of Community Inventory Methodologies," and "Analysis of Carbon Market Opportunities," delivered to the Sonoma County Water Agency in May 2010.

As requested by SCWA, this project reviewed ICLEI's "Analysis of Community Inventory Methodologies," shown in Appendix E. ICLEI's history as a leader and authority in climate protection at the local level, and Sonoma County's adherence to ICLEI's Cities for Climate Protection® program since 2001, underscores the importance of close consideration of their report.

In their report, ICLEI compared Sonoma County's 2005 community GHG emission inventory with the draft protocol framework ICLEI developed. ICLEI's findings that are most relevant to Sonoma County include:

- Of the sectors completed in Sonoma County's inventories, only the utility-delivered fuel and electricity sectors were calculated in a way that conforms to the direct measurement of fuel consumed that is used in AB 32. For these, new emissions factors should be applied.
- Sonoma County's community inventories should be updated to incorporate new emissions factors published in the Local Government Operations Protocol.
- The draft framework presents new calculation methodologies for Sonoma County's solid waste and transportation sectors.
- Sonoma County should expand the scope of its community inventory to incorporate as many of the sources included in the draft framework as possible, e.g., community decentralized fuel consumption, industrial processes, wastewater treatment, industrial processes, agriculture, and other mobile and off road sources.

The following table, excerpted from ICLEI's report, shows details of its analysis of Sonoma County's 2005 community inventory based on its draft protocol framework.

Community Protocol Sector	Community Protocol Subsector	Inventoried By Sonoma County	Did The County Use Draft Framework Recommended Methods?	Inventory Sectors that Need Improvement
Scope 1 Sources				
Stationary Combustion	Residential Utility Fuels	x	Yes	New emissions factors in the LGOP
	Commercial Utility Fuels	x	Yes	New emissions factors in the LGOP
	Industrial > 25,000 MTCO ₂ e Utility Fuels	x	Yes	
	Industrial < 25,000 MTCO ₂ e Utility Fuels	x	Yes	
Solid Waste	Comprehensive LFG Collection	x	No	Eliminate sequestration at site. Use LGOP methods
Mobile Sources	Vehicles Operated Within the Community Boundary	x	No	CalTrans, EMFAC, Normalize to State fuel data
Agriculture	Domesticated Animal Production	x	Yes	
	Manure Decomposition and Treatment	x	Yes	
Scope 2 Sources				
Purchased Electricity	Residential	x	Yes	New emissions factors in the LGOP
	Commercial	x	Yes	New emissions factors in the LGOP
	Industrial	x	Yes	New emissions factors in the LGOP

In general, we concur with ICLEI's findings and recommendations. The improvements they recommend reflect advancements in emission protocol since 2005 when the Sonoma County GHG emissions inventory was produced.

The aspects of ICLEI's findings and recommendations that deserve further consideration are described in the discussion that follows.

Inventory Boundary

The ICLEI document recommends using a geographic boundary for identifying sources and activities that produce emissions to be included in the inventory. Although this is generally a good recommendation, it should be qualified. The purpose of the boundary is to identify relevant sources that may be affected by emissions reduction activities that occur within the boundary. The regulated entities within the geographic boundary that are required to report may be outside of local influence. Large point source emitters (emit greater than 25,000 metric tons) are not

relevant to local activities to reduce community emissions and should be excluded from community GHG emission inventories. For Sonoma County, there is no known single point source producer of emissions exceeding 25,000 metric tons.

Scopes

The definitions of scopes in ICLEI's report are well-accepted. However, the inclusion of Scope 3 emissions in a community inventory is problematic. Although providing useful information about the impact of consumption patterns, the labor involved in calculating and updating Scope 3 emissions makes routine inclusion in community GHG tracking impractical.

Scopes Defined

Scope 1– All direct emission sources located within the geopolitical boundary of the local government.

Scope 2– Indirect emissions that result as a consequence of activity within the jurisdiction's geopolitical boundary limited to electricity, district heating, steam and cooling consumption.

Scope 3– All other indirect and embodied emissions that occur as a result of activity within the geopolitical boundary.

Mobile Sources

Accurate quantification of mobile source emissions on a community scale remains an important but elusive challenge. In a recent presentation on developing community-scale GHG emission tracking protocol, national ICLEI staff named “defining a methodology for transportation emissions” as their top challenge.¹⁵ The Climate Protection Campaign also addressed the problem of measuring GHG emissions in the transportation sector in a 2007 report.¹⁶

Perhaps because a method to accurately quantify mobile source emissions remains elusive, the topic also generates controversy. ICLEI's report rejects fuel use as a data source because of the problems with characterizing local distribution in terms of the location of occurrence of the emissions. ICLEI recommends using vehicle miles traveled estimates from local or regional authorities in conjunction with the EMFAC model to generate fuel use numbers. It then recommends normalizing or “tweaking” the fuel use numbers generated with actual fuel use numbers from the state Board of Equalization. Although this method might give marginally better results than the current method,¹⁷ it is still based on an estimate of vehicle miles traveled (VMT).

Unfortunately, VMT estimates are only distantly related to the physical reality of automobile use. In the ideal world, we would obtain accurate vehicle fuel combustion data with monitors on each tailpipe for carbon dioxide, methane and nitrous oxide. The only numbers that can be produced are estimates using indirect indicators.

Actual local fuel distribution numbers are the next best proxy to fuel used in the county. It is true, as ICLEI points out, that fuel distributed in the county is not necessarily used in the county. However, based on conversation with staff¹⁸ at Sonoma County Transportation Authority, trips that originate outside the county but terminate inside the county are considered to “net out” against trips that originate within the county, but terminate outside. Thus fuel distributions inside

¹⁵ “Local Government GHG Accounting and Quantification,” WRI Workshop, March 2010, www.ghgprotocol.org/files/accounting-quantification_20100322_iclei.ppt

¹⁶ Greenhouse Gas Emission Measurement in the Transportation Sector: Status, Problems and Possible Solutions,” Climate Protection Campaign, 2007, <http://climateprotection.org/reports/jehanrep07.pdf>

¹⁷ For the Sonoma County Community inventory, the CACP software was used to convert VMT into fuel use numbers, based on a presumed on-road vehicle inventory.

¹⁸ Chris Barney Sonoma County Transportation Authority, in person conversations, April and May 2010.

the county are likely to be a very good proxy for emissions that occur due to travel inside the county.

There are two other data points that can be used as a cross-check to verify emissions calculations based on fuel sales. These are:

- Number of vehicles registered in the county
- Trends in vehicle counts obtained from CalTrans

These indicators track actual conditions that directly reflect vehicle use in the county.

Further discussion of accounting for GHG emissions from mobile sources is in the next section of this report.

Solid Waste

The landfill gas collection system on the Central Landfill in Sonoma County can be used to estimate fugitive emissions from landfills. Fugitive emissions should be added to the ongoing emissions estimates from landfills inside and outside the County receiving the County's solid waste. Changes in where Sonoma County landfills its solid waste should be reflected in its quantification of emissions.

Wastewater Treatment and Septic Systems

Most municipal wastewater treatment in Sonoma County is in aerated ponds, with some facilities employing activated sludge with tertiary treatment. The vast majority of emissions associated with Sonoma County municipal facilities is due to their energy use. However, about 30% of the population uses residential septic systems. Emissions from U.S. residential septic tank systems are being studied. The emissions mechanisms of buried residential septic tanks involve complex aerobic and anaerobic processes, as well as interaction with the soil. Thus, fugitive emissions of methane from residential septic systems are difficult to quantify. Nonetheless, because these emissions may be significant, ongoing monitoring of endeavors to quantify emissions from septic systems should occur in case a reliable, practical method is found that could be used at the local level.

Electricity Emission Factor

The electricity emission factor that has been used in annual Sonoma County inventories has been the utility-specific factor available through Climate Action Registry reports. Although this applies to the electricity obtained from the incumbent utility, there are other sources of electricity supply that are used in the County, and these should be properly accounted for. To do this accounting, electricity consumption data must be broken down by supplier.

Non-utility delivered fuels

In Sonoma County and other counties with a rural population, non-utility delivered fuel sources may represent a significant source of emissions. Liquid propane gas falls into this category. An important feature of an ongoing inventory for Sonoma County will be to incorporate propane usage for residential, commercial, industrial and agricultural sectors.

Off Road Sources

Using any indicator other than off road fuel distribution is problematic. Unless off road fuel sales data can be obtained, this source should be left in the category of emissions sources that require further study in order to be quantified accurately.

Agriculture

Agriculture emissions sources discussed in ICLEI's report include enteric fermentation, manure management, agricultural soil management, burning agricultural residue, and harvested wood products (net change in forest). These areas are primarily important for the possible emissions of methane and nitrous oxide. The Sonoma County inventory prepared in 2005 estimated emissions from livestock cultivation. Other emissions sources, as noted above, are beyond the scope of a community emissions inventory due to technical complexity and data availability problems related to obtaining quantities of nitrogen fertilizers applied and method of application.

Sequestration

ICLEI's report does not mention sequestration as part of a community protocol. Evaluation of sequestration, in particular, forest carbon stocks, is part of the initial process to establish a "forest project protocol." Forest projects are currently one of the few avenues for a local community to generate carbon credits or offsets. In a region like Sonoma County with an active forest product industry, forest projects could provide benefits both in forest preservation and also as a means for local development projects to offset their emissions.

De minimis emissions, cost/completeness trade-offs

ICLEI's report favors completeness in its overall approach. However, a number of the sources it cites probably comprise a very small percentage of overall emissions and would be costly to inventory. They also are typically outside a local jurisdiction's ability to control, particularly air and marine transport. By contrast, it is appropriate to include such sources as public transportation, civil aviation, marine and freight transport in national GHG inventories because they represent a significant portion of national emissions.

Using a de minimis category simplifies the inventory process by avoiding the expenditure of a great deal of time accounting for emissions that comprise a small percentage of the overall total. The U.S. Energy Information Administration defines de minimis emissions as those from one or more sources and of one or more greenhouse gases that, in aggregate, are less than or equal to 3 percent of the total annual CO₂ equivalent emissions of a reporting entity.¹⁹ The U.S. E.P.A. suggests that local communities adopt an 80-20 rule so that 80% of the effort focuses on the most important emission sources such as energy and transportation. Otherwise a community can expend 80% of its effort tracking emissions that account for only 20% of the total. The EPA further recommends that regional organizations prioritize work on smaller emission sources according to their available time and resources.²⁰

¹⁹ U.S. Energy Information Administration, http://www.eia.doe.gov/oiaf/1605/FAQ_deMinimisA.htm

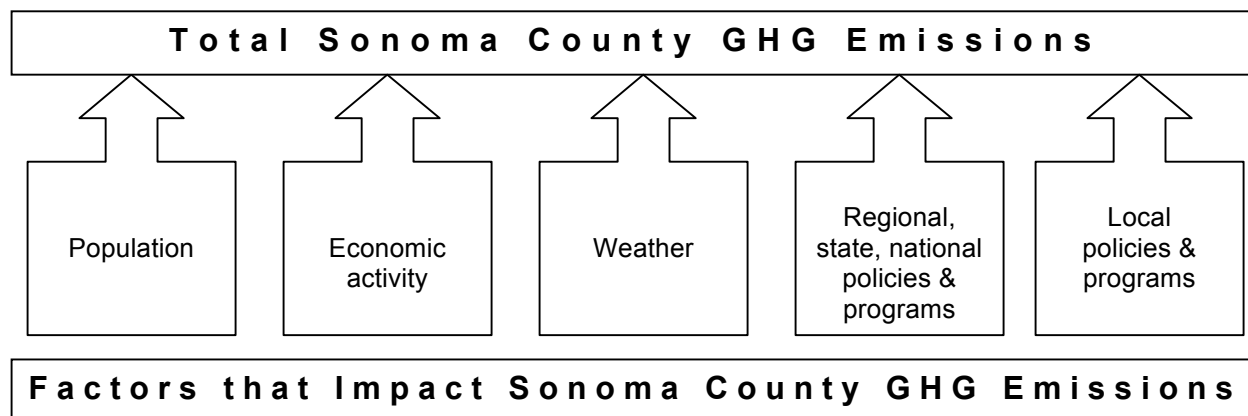
²⁰ "Greenhouse Gas Inventory Guidance," U.S. Environmental Protection Agency, Municipal Clean Energy Program, State and Local Branch, January 20, 2009.

6. Discussion

As noted previously, many challenges exist in tracking GHG emissions at the local level. Equally difficult is measuring and correlating GHG emissions with specific local efforts to reduce them. Communities seeking to determine if their policies and programs have an impact look for changes in GHG emissions. Are they up or down? How big and how fast is the change? What is causing it?

At present, the annual Sonoma County GHG report card indicates that the impact of local GHG emission reduction efforts is minor compared with the other forces effecting emissions. These forces are:

1. Population
2. Economic activity
3. Weather – which can impact the amount of heating and air conditioning used as well as the fuel mix of electricity supply in areas like PG&E’s region supplied at least in part by hydropower. More rain produces more hydropower which greens electricity’s fuel mix.
4. Regional, state and national policies and programs



Data uncertainty and imprecision can also obscure the impact of programs for both overall countywide GHG emissions and for emissions in each sector.

To identify possible causes of changes in GHG emissions, relevant data for major drivers can be checked for correlations with GHG changes. Examples of relevant data are:

- Population – local population data including school populations
- Economy – National and local GDP, unemployment rate, average income, number of utility accounts in all sectors (residential, commercial, industrial), vacancy rate of both residential and commercial property, business census including numbers of businesses for each NAICS code and numbers of employees, number of registered vehicles, total retail sales, total home sales, total construction projects started
- Weather – rainfall, mean high and low temperatures, heating and cooling degree days (indices reflecting the demand for energy)

Various regional and state programs and regulations aim to reduce energy consumption and emissions. These programs are run by the government, or more commonly, are run by the utilities as part of their state mandate to improve efficiency and increase renewables. Existence of these “external” programs can also cloud the ability to measure the impact of local efforts.

Changes in GHG emissions are usually expressed as a percentage relative to emissions in a baseline year. Questions remain about this approach. Does the baseline year capture the “typical” level for a region for that historical period? What is the best way to capture a “typical” emissions year? Does the difference between the baseline year emissions and subsequent years’ emissions capture a trend?

Resolving these problems is important for local governments and others in order to measure the effectiveness of their efforts. It is also necessary for planning the required level of reduction at the local level, given local emissions reduction goals.

Another challenge in determining the cause of changes in GHG emissions is that data sets for measuring communitywide GHG emissions are highly aggregated. This means, for example, that electricity consumption is not for individual accounts on a daily basis, but for all accounts for a city in a year. Given the highly aggregated nature of the generally available data sets, the ability to analyze is limited because there is little or no access to the information underlying the aggregated data.

A discussion of challenges with tracking transportation emissions, challenges with tracking electricity and natural gas emissions, and a note about adaptation follows.

Challenges with Transportation

The primary problem with assessing GHG emissions from the transportation sector is the unavailability of actual CO₂ emissions data at the vehicle tailpipe. This lack of “real” emission data means that vehicle GHG emissions have to be estimated from a set of indicators. The primary indicator in use for such estimates is Vehicle Miles Traveled (VMT). Using VMT in conjunction with a vehicle fleet inventory can provide a snapshot estimate of fuel use and the resulting GHG emissions for a region. However, VMT by itself does not provide a tracking indicator, because VMT estimates are generated by a model that does not use frequently updated inputs. Typically, the VMT estimate used for planning is based on annual growth rates and other projections, not actual data collected and updated on an annual basis. Thus, any changes to actual vehicle use in a region will not necessarily be reflected in annual VMT estimates available from Municipal Planning Organizations (MPOs), such as the Metropolitan Transportation Commission or other agencies.

The methodology for estimating GHG emissions from transportation has evolved since the first community inventory was conducted by the Climate Protection Campaign in 2005. The basic methodology used then was:

1. Obtain VMT data available for county from relevant local organization.
2. Convert Average Weekday Daily VMT (usual form of statistic) to annual VMT
3. Enter annual VMT into Transportation GHG Calculator. The calculator used in the 2005 Sonoma County inventory is contained in the Clean Air Climate Protection software developed by ICLEI. This software uses a motor vehicle inventory to allocate the VMT to vehicle types. It then uses an average fuel economy for each vehicle type to calculate a total amount of gasoline and diesel fuel combusted. Standard emission factors are then applied to calculate CO₂, CH₄ and N₂O emissions from fuel combustion.
4. Estimated annual VMT obtained from MPO is entered into this model each year. A Vehicle Stock Turnover model was used by ICLEI to compute changes in fuel economy in the fleet in each year.

This method was used to estimate annual GHG emissions because:

- There was no annually adjusted fleet inventory available on a county basis
- There was no annually readjusted VMT figure available from the MPO, only a growth rate estimate

In its report, “Developing a Community Protocol,” Agency, ICLEI recommends a modification to this procedure, as follows:

- Obtain best available local road VMT from CalTrans HPMS
- Obtain best available highway VMT from SCTA/MTC
- Adjust highway VMT by clipping road segments that cross jurisdiction boundaries
- Input total VMT into CARB’s EMFAC model for the jurisdiction and obtain daily CO2 emissions
- Adjust EMFAC CO2 emissions by the ratio of actual total state fuel use from Board of Equalization to EMFAC numbers for statewide VMT.

This modified procedure is intended to correct emissions calculated from VMT estimates by using actual fuel use to adjust for variations in vehicle activity.

A further modification to this procedure was recently suggested in communications with CARB staff²¹ that focuses more on year over year changes, and use of VMT data from only the MPO, without adjustment. We recommend that CARB’s procedure be implemented because it uses the most current, updated information on vehicle fleet composition for the region, VMT produced using a consistent modeling methodology from the regional MPO and trends in County fuel sales data.

CARB’s procedure generally follows ICLEI’s except for the last step for fuel use adjustment. Rather than normalizing a given year based on comparing the actual statewide fuel sales with the calculated fuel use from EMFAC, CARB recommends adjusting the calculated EMFAC number for the County by adjusting emissions by ratio of current year County fuel sales (available from California Energy Commission) to previous year fuel sales. If County fuel sales are not available, use the ratio of statewide annual fuel sales figures. Emissions will be adjusted up or down, based on whether fuel sales have increased or decreased, year over year. Use of this procedure will ensure that the resulting CO2 emissions figure tracks the change from one year to the next at the county level.

Challenges with electricity and natural gas

Current variations in calculating GHG emissions prevent proper identification of the causes of emission changes. To rectify this we need:

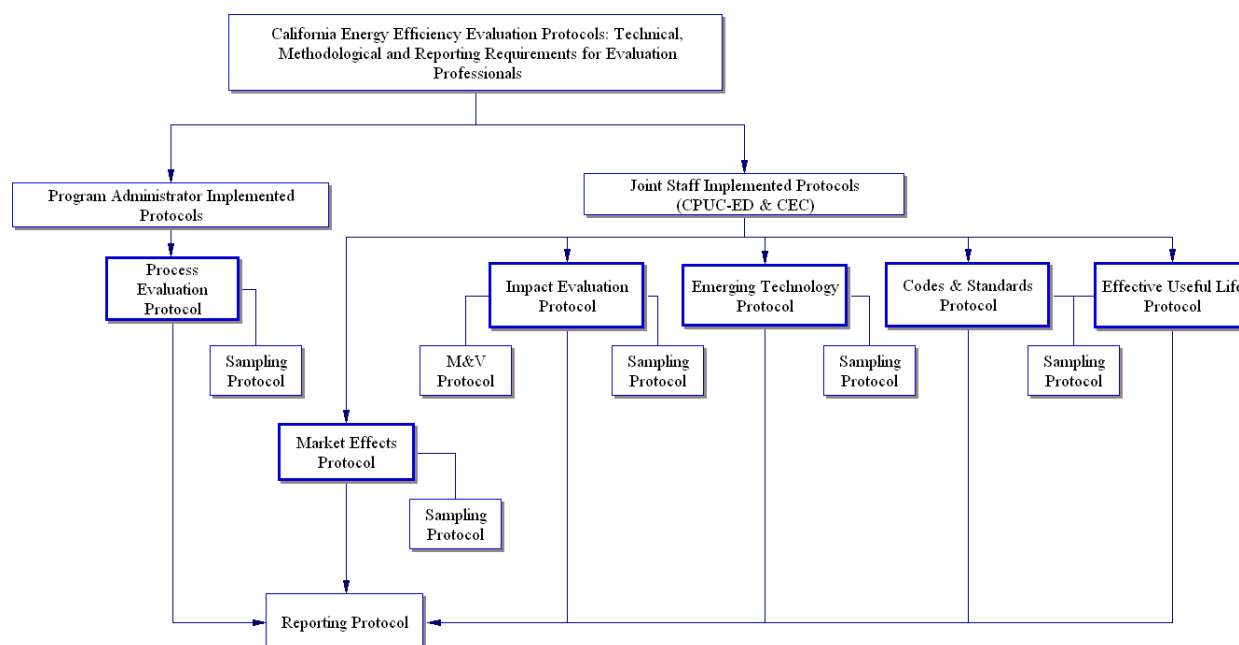
1. A standard set of emission factors that apply to the basic inventory, estimation of projected reductions and ongoing tracking of emissions
2. A standard for estimating anticipated GHG reductions from a given set of efficiency measures delivered across a given community sector, i.e., residential or commercial
3. A mechanism for evaluating pre- and post- installation consumption

The California Public Utilities Commission (CPUC) has made a significant effort over the past decade to verify that California ratepayers are receiving full value for the utility-administered energy efficiency programs. One CPUC decision states:

²¹ Michael Benjamin, Chief, Mobile Source Analysis Branch, Planning and Technical Support Division, California Air Resources Board, (916) 323-2915, mbenjamin@arb.ca.gov, June 2010 phone conversation.

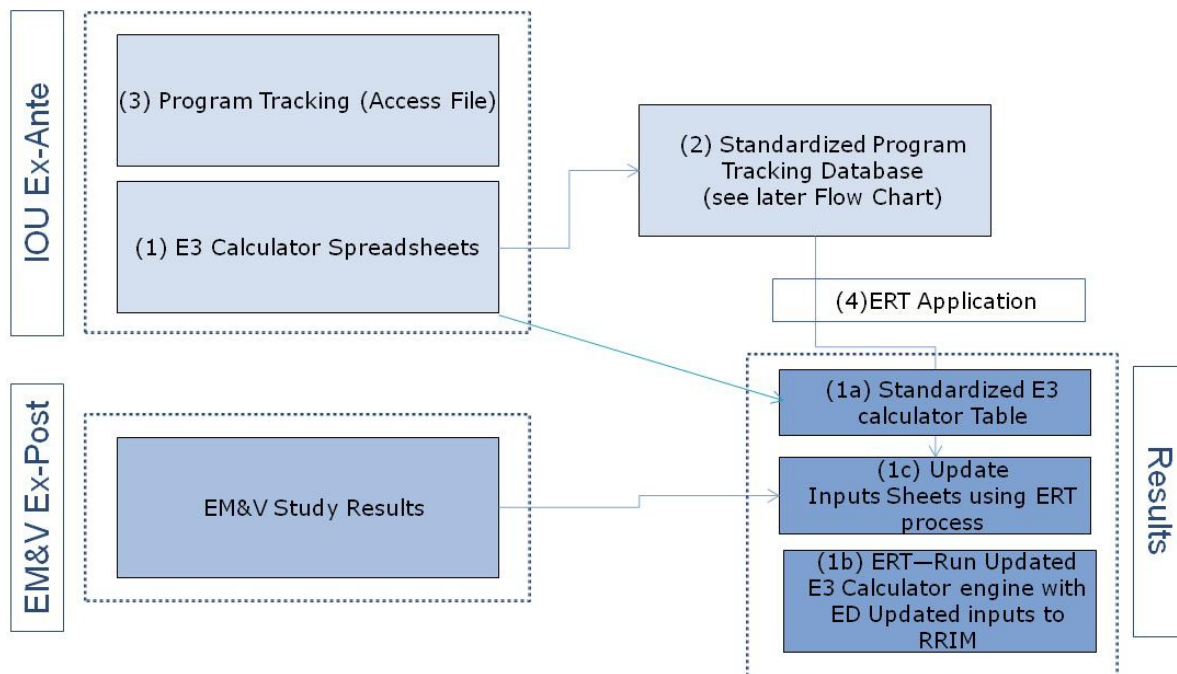
Ensuring sustained and successful commitment to energy efficiency is best accomplished by moving away from a cost-of-service compliance regulatory framework, to one that will create a “win-win” alignment of shareholder and ratepayer interests. Today’s decision creates incentives of sufficient level to ensure that utility investors and managers view energy efficiency as a core part of the utility’s regulated operations that can generate meaningful earnings for its shareholders. At the same time our adopted incentive mechanism *protects ratepayers’ financial investment, ensures that program savings are real and verified, and imposes penalties for substandard performance.*²²

The CPUC has invested in defining mechanisms for Evaluation, Measurement and Verification (EM&V) that utilities are required to employ to accomplish the goals of the decision quoted above. The chart below shows the EM&V protocols defined by the CPUC.



The CPUC sets goals for efficiency results, and creates the protocols for measuring and verifying the compliance of the utilities. The Investor Owned Utilities (IOUs) are required to submit Customer Energy Efficiency (CEE) proposals that address the goals, as well as report on the results. The figure below shows how the data for “before measure” (ex-ante) and “after measure” (ex-post) are collected and reconciled.

²² CPUC Decision 07-09-043, September 2007, http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/73172.htm



Although protocols exist for accurately estimating and tracking the kWh and therms savings from efficiency programs, no standard exists for evaluating the resulting emissions reduction. This situation has created a disparity between claims of GHG reduction by the utilities and emissions that are reported on an inventory. Utilities are allowed to use a “marginal” (non-baseload) emissions rate for kWh saved following the idea that most efficiency measures reduce peak energy use, and therefore reduce emissions from generation used for peak energy.²³ This approach might give a more accurate estimate of the impact of the load reduction from energy efficiency in that it gives peak reduction a higher emission impact. This is necessary at the state level because individual power plant emissions are tracked.

This disparity in emission factors creates a problem at the local level, however, because GHG emission reductions claimed by utilities do not match GHG emissions when calculated for the whole community where there is no differentiation between peak use and overall use. Instead, an average annual emission factor for the utility is used. The simplest way to correct this disparity is for utilities to use the same emission factor as the communitywide inventories when calculating reductions achieved by their efficiency programs.

A note about adaptation

To date, GHG programs and tracking focus on reducing GHG emissions to mitigate the impacts of climate change. Adaptation has a different orientation, to prepare for the inevitable changes caused by a changing climate. Adaptation means, for example, protecting vulnerable plant and wildlife species, adjusting our food supply to correspond to a warmer climate and disruptions in water supplies, fortifying our economy and infrastructure to cope with rising costs and diminishing supplies of fossil fuel, and rising sea levels. As we track GHG emissions, we may also want to track the impacts of climate change on the County as well as our progress in adapting to them. A recently-formed coalition, North Bay Climate Adaptation Initiative, is addressing these issues.

²³ According to a note in the CEE Calculator used by PG&E: “CPUC accepted E3 avoided cost methodology and marginal emission rate for use in PG&E’s 2009-11 CEE Program Proposal (1.1 lbs CO₂/kWh).”

7. Recommendations

Implementation of the recommendations below requires commitment, expertise, time and ultimately funds. Because resources are always limited, decision-makers prioritize competing alternatives to determine which to implement and fund.

The Sonoma County Regional Climate Protection Authority is the entity best suited to convene decision-makers to determine how to prioritize the recommendations below, who should implement those judged to be high priority, and how to fund them.

High priority

1. Focus on tracking significant sources of GHG emissions in the County. Continue to produce an annual report card for Sonoma County's communitywide GHG emissions that includes year-to-year trends and breakdowns for the major sources of emissions, i.e., electricity, natural gas, transportation, and solid waste. Follow the GHG emission accounting protocol recommended in this report. Present the report to the public, and use it to generate concern and support for climate protection endeavors. Please see Appendix B for estimated costs and tasks associated with implementing this recommendation.

Transportation

2. Develop a means to obtain transportation fuel sales data aggregated at the county level. One method for doing this is to obtain individual pump distribution data required for sales tax tracking. Obtain off road fuel sales data from distributors in the county. Use multiple data sources to verify calculated emission trends.

Electricity & natural gas

3. Use electricity and natural gas consumption data from the California Energy Commission in conjunction with data from PG&E to track the County's GHG emissions. Although the CEC does not break the data down below the county level, they do provide breakdowns for Direct Access, Self Generation and for each utility. This is required to be able to apply specific factors for each supplier. PG&E data does not include municipal utility use or all non-PG&E customer use. This is important to be able to reflect the effects of changing the fuel mix of the electricity supply.
4. Request that PG&E use the same emission factor as used for communitywide inventories when calculating and reporting reductions achieved by their efficiency programs.
5. Request that PG&E post on its website for public access monthly Sonoma County electricity and natural gas consumption data broken down as described under "aggregate" in "Data for Managing Greenhouse Gases" (noted in References), as well as by zip code. This information would support the County, cities, Regional Climate Protection Authority, and other interested parties seeking to determine if and by how much energy programs such as retrofitting and solarization are impacting energy consumption.
6. Request that PG&E provide city-by-city (using jurisdictional boundaries, not zip codes because jurisdictional boundaries and zip codes often do not match) and sector-by-sector breakdowns of annual consumption, and if possible, claimed savings in each jurisdiction.

7. Request that PG&E provide efficiency performance reports that it submits to the CPUC with the savings for the County broken out of service area totals.
8. Request that PG&E provide the number of service accounts in each sector that correspond to the consumption numbers.

Solid waste

9. Conduct a survey of literature on methane emissions from tank-type septic systems. Conduct a survey of Sonoma County municipal wastewater treatment plant operators to determine the likelihood of significant methane emissions from their facilities. If significant, include in the County's annual GHG emissions report. Otherwise, categorize them as a de minimus source.

Agriculture, forestry, and other land use

10. Create an inventory of carbon stocks in the county and track carbon uptake. Update carbon stock inventory on a periodic basis. Although a labor-intensive and potentially expensive process, it may be possible to enlist the timber producers in both the inventory process and the tracking process as part of a forest project program. The forest project program could be designed for generating potential investment-quality carbon offsets to be used in the County.

Municipal operations

11. Encourage Sonoma County Energy Watch to help municipalities track and report their GHG emissions from electricity and natural gas usage. Also, encourage those municipalities that are able, to join the Climate Registry²⁴ to track and report their GHG emissions through this program.

General

12. Determine a de minimis threshold and estimate these emissions sources using a due diligence effort for the baseline year. Survey these emissions sources every five years and report significant changes.
13. For evaluating the potential and actual emission reduction impacts from local programs, adopt an approach similar to the "ex-ante" and "ex-post" EM&V protocols used by the state.
14. Conduct a survey to determine all industrial and process emitters in the county that do not meet the 25,000 ton threshold and identify the type of process emissions or large point source emissions that might be quantifiable. The EPA list of candidate industries might serve as a starting point. This survey might be done as part of the development of a light industrial retrofit or emissions reduction program that is administered at a local level. This type of survey would give insight into what industries exist in Sonoma County that might account for emissions outside of fossil fuel combustion. Exclude regulated entities from the community emissions inventory when possible. Under AB 32 and EPA mandatory reporting, entities in listed industries and/or those with emissions greater than 25,000 metric tons per year are required to report.

Appendix C outlines information to be collected for very robust GHG analysis and tracking to be pursued if more resources are available.

²⁴ The California Climate Action Registry is now a program of the Climate Action Reserve. www.climateregistry.org

8. References

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<http://opr.ca.gov/ceqa/pdfs/june08-ceqa.pdf#page=15>

9. Appendices

- A. Sonoma County 2009 GHG emissions report card
- B. Estimate of costs to produce annual Sonoma County GHG emissions report card, data sources and data
- C. Desired information to be collected for a comprehensive GHG emission analysis
- D. The Energy Alliance Association proposal
- E. "Analysis of Community Inventory Methodologies," ICLEI*
- F. "Greenhouse Gas Inventory Guidance," USEPA (draft)*

* Given their large size, these appendices are in separate document files.

Appendix A: Sonoma County 2009 GHG emissions report card

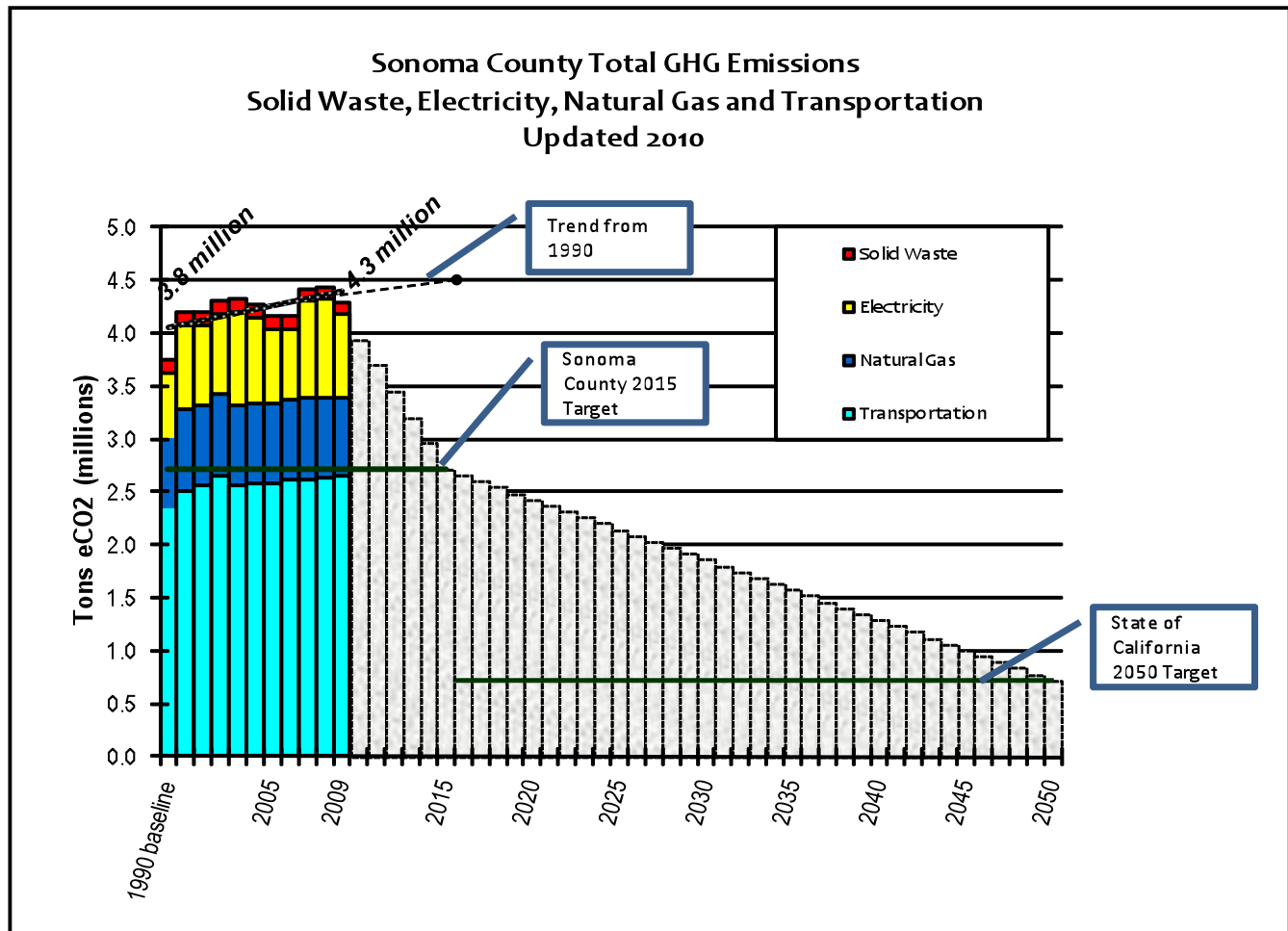
Climate Protection in Sonoma County

2009 Greenhouse Gas Emission Assessment ♦ Presented May 13, 2010

“Positive signs – and still a long way to go”

Summary

Total greenhouse gas emitted by Sonoma County in 2009 decreased. Although many possible causes for this change exist, the economic downturn is the probable main one. Despite last year's decrease in emissions, Sonoma County's quest to attain a 25% emission reduction by 2015 remains an enormous challenge. Concerted action is needed not only at the local level, but also at regional, state and national levels because many powerful emission reduction measures are not applicable at the local level.



The dip in emissions in 2005 and 2006 corresponds with an increase in the proportion of electricity from hydropower.

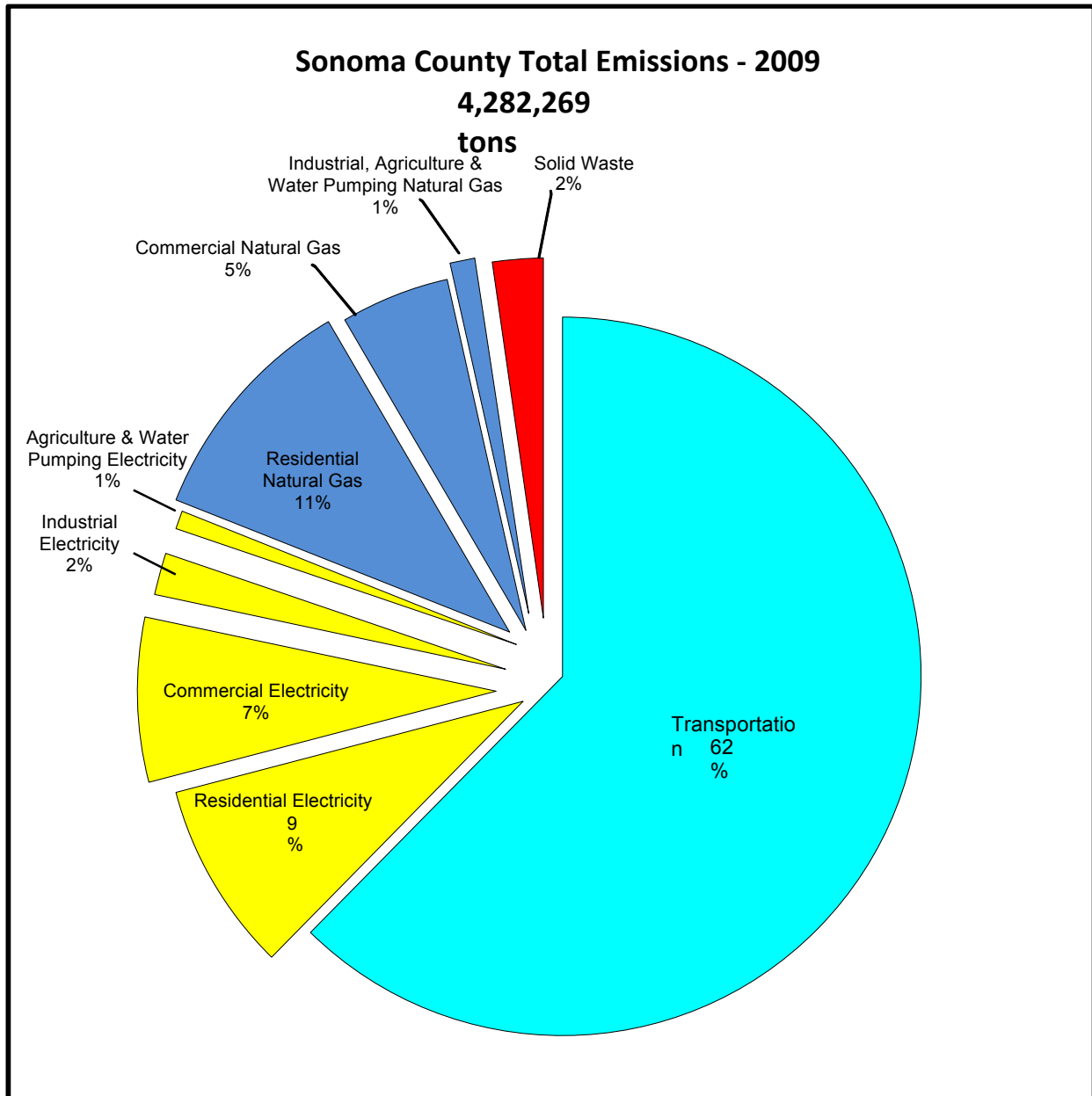
Background

Beginning in 2002 Sonoma County has taken many bold steps for climate protection – including several national precedents:

- All nine Sonoma cities, the County and the Water Agency pledged to reduce greenhouse gas (GHG) emissions.
- All nine cities, the County and the Water Agency completed inventories of the emissions produced by their internal municipal operations, and all set GHG emission reduction targets for their internal municipal operations.
- All Sonoma mayors signed the U.S. Climate Protection Agreement.
- In 2005 all nine cities and the County passed resolutions adopting a greenhouse gas emission reduction target aligned with the scientific imperative - 25% below 1990 levels by 2015.
- In 2007 and 2008 Sonoma County local governments, businesses, community representatives, and the Climate Protection Campaign developed a Community Climate Action Plan which identifies the most cost-effective local solutions for significant greenhouse gas reductions (www.coolplan.org).
- In 2009 all nine cities and the County began participating in the Sonoma County Energy Independence Program, and all began participating in the Sonoma County Regional Climate Protection Authority.

Reducing GHG emissions has vast co-benefits such as improving economic vitality, public health and energy independence.

The following chart details the relative contributions from major sectors to Sonoma County's GHG emissions in 2009.



NOTES

Accounting methods and scope of assessment

Standard GHG accounting protocol were used to produce this GHG report. It includes Scope 1 and Scope 2 emissions from sources within Sonoma County's geographic area, excluding aviation fuel. Scope 1 (direct) includes gasoline, diesel, and natural gas. Scope 2 (indirect) includes electricity (PG&E, Healdsburg Municipal Utility, California system). Not included: Propane, other fuel oil (bunker fuel, etc.), liquid fuels used for off road vehicles and stationary sources (methanol, red dye diesel, aviation fuels). Coal (except from delivered electricity), waste oil, process emissions or leakage (carbon dioxide, methane, nitrous oxide) from industrial processes, methane emissions from livestock cultivation or human waste, carbon dioxide or nitrous oxide emissions from agricultural practices (soil tillage, fertilizer application, or pesticide application).

Gases included in inventory are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). Not included are: PFC, HFC, SF₆. HFCs are refrigerants (e.g., R-134 is used for refrigeration and automobile air conditioning). PFCs are used primarily in the semiconductor manufacturing industry. They have very high global warming potential but relatively short atmospheric lifetimes. SF₆ is used as an insulator and is also used in semiconductor manufacturing. It has the highest known global warming potential: 23,900 times more potent than carbon dioxide.

GHG emission figures for municipal operations were not shown in this report because only electricity and natural gas data for municipal operations is currently available of a sufficient amount for a meaningful assessment, and because municipal operations account for a small fraction of Sonoma County's overall GHG emissions (about 1-2%).

GHG emission figures for individual cities and the unincorporated portion of Sonoma County were not included in this report because of the general lack of accurate data. Cities' transportation GHG emissions are calculated using cities' miles of roadways, a weak indicator of GHG emissions. Additionally, PG&E breaks down energy consumption by zip codes, but zip codes do not generally correspond to city jurisdictional boundaries.

Emissions from agriculture, forestry and other biomass were not included in this report due to the lack of an accepted, cost-effective protocol for accounting for GHG emissions in this sector.

Energy efficiency, solar plus more background on electricity, natural gas, propane and transportation

In February 2010, PG&E announced that since 2006, it had helped Sonoma County reduce energy consumption by over 33 megawatts and reduce carbon emissions by over 120,000 tons. These calculations are derived from deemed savings from energy efficiency projects. The 120,000 ton figure is cumulative since 2006, and represents the combined calculated GHG savings for electricity and natural gas efficiency programs. The PG&E calculation uses a figure of 1.1 lbs/kWh for the GHG reduction due to electricity savings.

For PG&E efficiency programs, in 2008 PG&E reports 102,771,310 kWh saved. This is approximately a 3.3 percent reduction below what would have been consumed had the efficiency measures not been implemented. PG&E reported 427,262 therms saved in 2008. This savings represents a 0.4 percent reduction in what would have been consumed had the measures not been implemented.

In March 2008 there were 13 megawatts of installed solar power systems in Sonoma County. Between March 2008 and December 2009 an additional 10.3 megawatts of solar were added to Sonoma County, not including solar thermal installations, totaling about 23 megawatts of solar. From the utility side of the meter, net metered solar photovoltaics (PV) reduce the apparent energy consumption of the customer. Thus the amount of electricity reported to the CEC by PG&E is reduced by the energy production of the installed solar PV. The amount of energy produced in Sonoma County by installed solar PV is about 40 million kWh (20% capacity factor). This production reduces the total grid electricity consumption of the County by about 1.5 percent.

Electricity Consumption

	(million kWh)						
	Residential	Commercial	Industrial	Agriculture & Water Pumping	Total	PG&E emission factor (lb./kWh)	GHG Emissions (Tons eCO ₂)
1990					2,186	0.56	612,080
2000					2,816	0.56	788,480
2001	1,126	1,088	375	105	2,694	0.56	754,249
2002	1,152	1,105	372	109	2,739	0.56	766,830
2003	1,216	1,125	368	112	2,822	0.62	874,688
2004	1,231	1,137	364	120	2,852	0.566	807,345
2005	1,249	1,145	360	115	2,870	0.489	701,910
2006	1,293	1,177	347	103	2,920	0.456	665,557
2007	1,285	1,159	351	122	2,917	0.635	926,200
2008	1,328	1,171	341	126	2,967	0.641	951,349
2009	1,302	1,126	287	124	2,840	0.558*	791,650

* Estimate based on average from previous five years.

Natural Gas Consumption

	(million therms)					GHG Emissions (Tons eCO ₂)
1990					109	669,735
2000					125	768,750
2001	75.8	33.7	10.6	1.4	121	746,919
2002	78.7	33.2	10.5	1.3	124	760,899
2003	79.2	34.4	9.5	1.8	125	768,080
2004	78.2	36.1	8.4	1.6	124	764,288
2005	77.1	36.8	6.6	1.1	122	747,401
2006	77.8	37.8	8.1	1.0	125	767,150
2007	76.2	39.2	9.3	1.1	126	773,110
2008	76.3	37.1	8.1	1.0	123	753,652
2009	76.8	35.4	8.1	0.9	121	745,679

Propane Consumption

2007	GHG Emissions
Residential	63,218
Commercial	22,316
Resellers	12,509
Internal combustion engines	9,113
Industrial	11,162
Agricultural	16,422
TOTAL	134,740

Figures indicate GHG magnitude of propane, but are not included in overall totals due to insufficient data.

Healdsburg's greenhouse gas emissions from electric consumption have risen sharply since 2003 due to increased consumption coupled with a reduced proportion of the city's electricity coming from renewable sources, primarily hydropower. Healdsburg is unique in Sonoma County because its electricity is provided through the city's Municipal Utility District by the Northern California Power Authority (NCPA) rather than through PG&E. NCPA has consistently supplied greener power than PG&E, reflected by the difference between the two entities' emission factors.

Healdsburg – Electricity Consumption

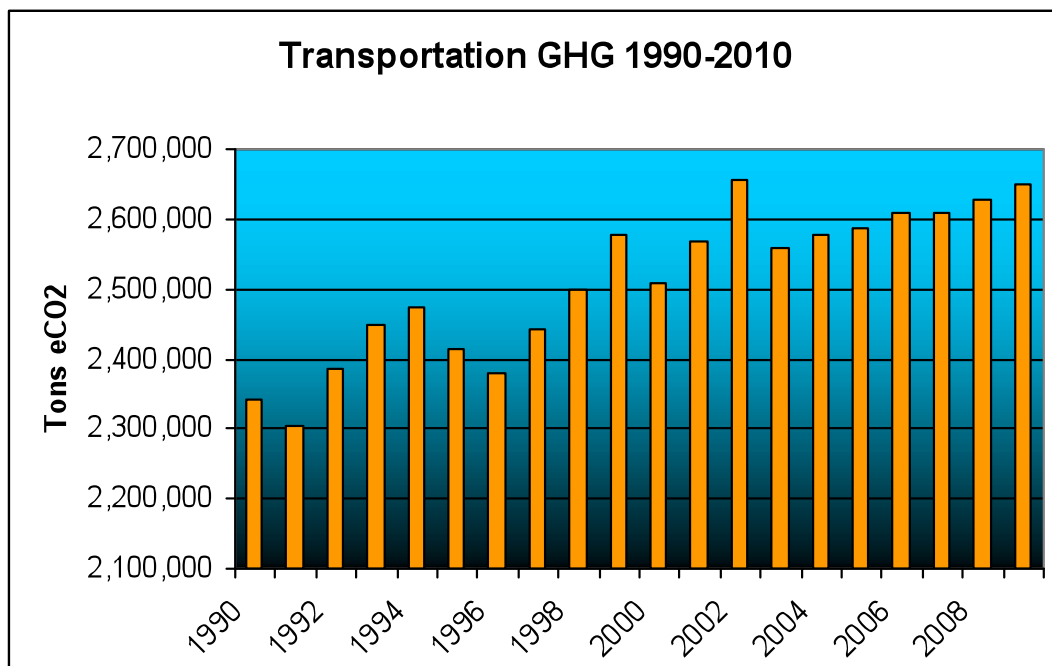
	Megawatt Hours	NCPA's Emission Factor	GHG (tons)
2000	65,620		
2001	68,945		
2002	67,443		
2003	68,847	0.158	5,429
2004	71,351	0.232	8,273
2005	73,364	0.325	11,928
2006	72,678	0.256	9,288
2007	74,613	0.432	16,110
2008	77,192	0.46	17,754
2009	77,045	0.46*	17,720

* Estimated

PG&E Renewable Portfolio Standard Periodic Compliance Report, March 2008

RPS Procurement and Targets (MWh)	Actual					Forecast		
	2003	2004	2005	2006	2007	2008	2009	2010
Bundled Retail Sales	71,099,363	73,616,302	72,726,639	76,692,370	79,450,904	79,981,029	81,148,828	82,303,173
Total RPS Eligible Procurement	8,828,065	8,574,976	8,650,362	9,113,616	9,047,125	11,518,780	12,276,771	13,808,131
Annual Procurement Target (APT)	7,096,147	7,807,140	8,543,303	9,270,570	10,037,493	10,832,003	11,631,813	16,229,766
Incremental Procurement Target	N/A	710,994	736,163	727,266	766,924	794,509	799,810	4,597,953
Prelim. Proc. Surplus/(Deficit)	1,731,918	767,836	107,059	(156,954)	(990,369)	686,777	644,958	(2,421,634)
APT Percentage	N/A	11.0%	11.6%	12.7%	13.1%	13.6%	14.5%	20.0%
Actual Procurement Percentage	11.7%	12.1%	11.8%	12.5%	11.8%	14.5%	15.3%	17.0%
Adjusted Procurement Percentage	N/A	12.1%	11.8%	12.7%	13.1%	14.5%	15.3%	20.0%

California law requires electric corporations to procure 20% from eligible renewable energy resources by 2010. As of this date, according to the California Public Utilities Commission, PG&E is supplying 14.4 percent of its electricity from renewable sources. There is a "flexible compliance" provision that allows a three year grace period to meet the 20 percent requirement. In 2008, Executive Order S-14-08 set a new Renewable Portfolio Standard of 33 percent by 2020. .



In 2009 the Sonoma County Transportation Authority approved the 2009 Comprehensive Transportation Plan (CTP). According to the Environmental Impact Report for the CTP, implementing this Plan will result in increased vehicle miles traveled and fuel consumption during the 25-year planning period – both factors in GHG emission increases. The EIR called these impacts “significant and unavoidable.” Elsewhere the CTP states that better fuel economy would reduce greenhouse gas emissions slightly below 1990 levels by 2035. Regardless of this possible contradiction, a slight reduction in GHG emissions is still far short of achieving Sonoma County’s 25% GHG reduction target.

REFERENCES & ACKNOWLEDGMENTS

Thank you to the following for data and assistance:

- Chris Barney, Sonoma County Transportation Authority, and Harold Brazil, Metropolitan Transportation Commission–transportation
- Andrea Gough, California Energy Commission – electricity and natural gas
- Joe Horak and Carol Foreman, Pacific Gas and Electric Company - electricity and natural gas including deemed savings from energy efficiency
- Elizabeth Kirkley, City of Healdsburg – electricity figures
- California Climate Action Registry – PG&E emission coefficients (Note: years 2000 through 2002 not available)
- Lawrence Berkeley National Lab study estimate for 1990 emission coefficient for IOU emissions
- U.S.EPA – emission coefficient for electricity from direct access
- California State Department of Finance – population figures
- California Public Utilities Commission - PG&E’s RPS compliance report
- Solar Sonoma County – Sonoma County solar electricity generation
- Western Propane Gas Association, American Petroleum Institute Survey, County estimate of sales – propane
- CalRecycle Disposal Reporting System – solid waste
- Cordel Stillman, Sonoma County Water Agency – overall support
- More information on GHG emission accounting – Sonoma County GHG Emissions Inventory, 2005 – www.climateprotection.org, and tools for local governments - www.coolcalifornia.org

**Report prepared by Dave Erickson, Technical Consultant, and Ann Hancock, Executive Director
Climate Protection Campaign, www.climateprotection.org, (707) 525-1665**



Appendix B

Estimate of costs to produce annual GHG emissions report card, data sources and data

Task	# hours	Cost
1. Collect and Aggregate Consumption and Usage Data (See list below.) a. Contact data sources and request data b. Monitor data source progress on request c. Receive data, include in spreadsheet (including data entry or reformatting)	15-25*	\$1500-2500
2. Obtain current emissions factors and convert data to equivalent CO2 emissions a. Obtain most recent utility emissions factor for all utilities and energy suppliers including estimates of methane and nitrous emissions b. Spot check current global warming potential (GWP) estimates for methane and nitrous oxide with IPCC c. Check current GWP estimates for any F-Gas data obtained (HFC,PFC, SF6)	5-10	500-1000
3. Calculate Total GHG Emissions by Sector**	5	500
4. Generate Reports	10-20	1000-2000
5. Peer Review	-	-
6. Basic layout and design of report	10-20	1000-2000
Sub-total	45-80	4500 - 8000
7. Contingency 20%		900 - 1600
Total Cost		\$5400 - 9600

* Depending on amount of manual data entry

** Transportation, Electricity and Natural Gas (Residential, Commercial, Industrial, Ag and Water Pumping), Solid Waste, Other (F-Gases)

Data Sources and Data

Required

- A. Metropolitan Transportation Authority and Sonoma County Transportation Authority
 - 1. Vehicle Miles Traveled estimate or annual change
 - 2. Vehicle registrations
- B. California Energy Commission
 - 1. Electricity aggregated by county & sector: a) Direct Access, b) Utility, c) Self Gen
 - 2. Natural Gas aggregated by county and sector
 - 3. County Gasoline and Diesel Sales
- C. PG&E - Customer Electricity and Natural Gas aggregated by jurisdiction
- D. CalRecycle
 - 1. Solid Waste to Landfill tonnage
 - 2. Destination Landfill - LFG Collection Technology

Desirable

- E. Independent Data Collection
 - 1. Data mining tool to obtain municipal energy account data
 - 2. Propane distributions from Western Propane Gas Association
 - 3. Livestock population from Agricultural Commissioner
 - 4. Acres under cultivation from Agricultural Commissioner
- F. Other possible data sources
 - 1. Independent Fuel distributor data
 - 2. Refrigerant manufacturer sales data (HFC)
 - 3. Chemical manufacturer sales data (PFC, SF6)
 - 4. Ag. Preservation & Open Space District or State Department of Forestry - forest inventory
 - 5. Sonoma County Transit Authority - bus, train fuel use
 - 6. EMFAC and URBEMIS models for estimates of off road fuel use

Appendix C

Desired information to be collected for a comprehensive GHG emission analysis

Inputs: What data do we want and how do we want it to be organized?

1. All electricity, natural gas, gasoline, diesel, propane (indirect, stationary and mobile direct) used
2. F gases (HFC, PFC, SF6)
3. Location of emission or consumption source (address, zip code, city)
4. Time of emission or use - hourly, if available, and rate schedule
5. Purpose
6. Source/Vendor (i.e. PG&E, Direct Access provider, propane company, etc.)
7. Water use and source

Outputs: What do we want to do with the data?

1. Have a reliable estimate of GHG emissions in all sectors, ideally according to IPCC protocol/new Community Protocol sectoral definitions
2. Track all six major greenhouse gases
3. Break down sectoral data by city, zip code or by arbitrary zone
4. Break down total data by economic sector, i.e., residential, commercial, industrial, other
5. Track specific programs, and relate their effects to aggregated data, i.e., generate effectiveness metrics
6. Compare annual results in a standardized way, and be able to distinguish "signal" (programs, actions, project effects) from "noise" (weather, economic activity, population change)
7. Quantify sinks, as well as changes in sinks due to land use, land use change and forestry
8. Ensure that tracking system methods and sources harmonize with standards in use in other localities and at the state level
9. Ensure that tracking system results comply with legal requirements, and can be used legally, i.e., CEQA/AB 32/any federal regulations

Examples for data to be collected for projects by category:

Retrofit and New Construction Projects:

1. Program Name
2. Project type (retrofit, solar PV, other generation, combined w/breakdown, transportation?, new construction, Ag/Forestry); project specs (gen size, building envelope improvement, water, wastewater changes i.e., toilets, low flow, etc.)
3. Economic Sector (residential, commercial, etc)
4. Cost
5. Financing
6. Anticipated savings/improvement/GHG reduction/water use
7. Actual use (annual, monthly) and GHG emissions
8. Usage history at address if available
9. Land use history at address if available

Transportation Projects:

- | | |
|----|--|
| 1. | Program name |
| 2. | Project type (land use change, roadway modification, walking/biking infrastructure change, low carbon vehicle support) |
| 3. | Project specifications (miles of path, roadway, number of charging stations, new transit routes added) |
| 4. | Anticipated mode share shift or annual reduction in fossil fuel powered vehicle use |

Appendix D

The Energy Alliance Association proposal



The Energy Alliance Association

Concept

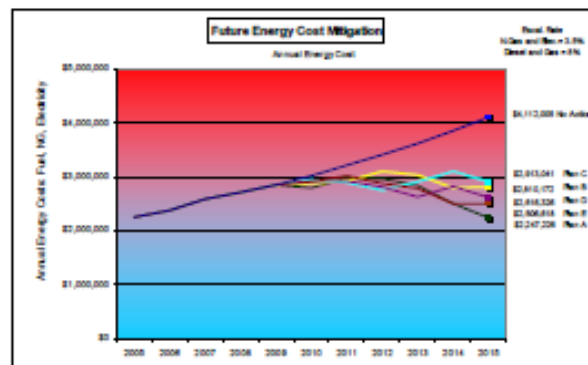
This project concept paper outlines a set of tasks that will support Sonoma County cities implementing GHG Climate Action Plans. The work will employ their existing analytical frameworks to evaluate the impacts of completed projects and county wide efficiency programs. Periodic reporting for the community wide GHG status will document the progress made toward meaningful emissions reduction. The cost and benefits of new projects will be quantified and integrated into the existing action plans. The analysis will enable “what if” scenarios to evaluate opportunities such as LED and induction street lighting, grant funding and CEC low interests loans. The reporting provides a net cash flow, internal rate of return, simple payback, and net present value for all potential actions to be considered for implementation. This investment information is provided for the projects individually and for the overall Climate Action Plan as a comprehensive package of measures. The results reporting will ensure progress is documented.

City and Community Support

The benefits of employing a comprehensive framework approach are numerous. The framework organizes and prioritizes the extensive information facing decision makers. The results allow a comparison of various options against multiple evaluation considerations.

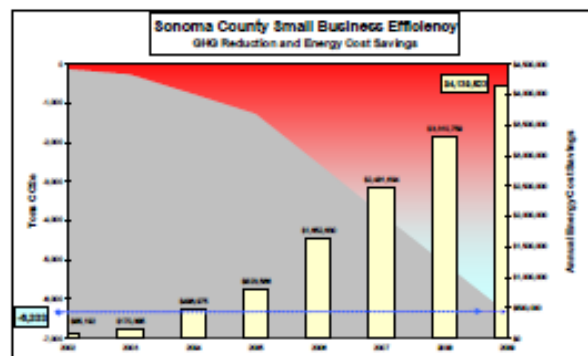
Key questions are addressed:

- What has been accomplished and how does it relate to our goals?
- How will the investment affect our budget now and in coming years?
- Are the measures or groups of measures effective, significant, and financially sound?
- What is the effect of the modifications or substitutions on our overall GHG strategy?
- What is the most beneficial implementation schedule for the options available?
- How do the various financing strategies compare? Should a CEC loan be pursued?
- Are we better off pursuing Strategy A or Strategy B from this point forward?



Community Demonstration of Success

There have been significant actions already completed reducing the GHG emissions throughout the County. For example, this chart demonstrates the beneficial impacts of the utility sponsored efficiency program targeting small businesses. This program saves business owners over \$4 million dollars annually in energy savings and has resulted in a reduction of over 6,000 metric tons of CO₂e annually. This is \$4 million dollars that remains in our local economy. The many successful energy efficiency programs are important examples available to inspire additional actions throughout the county.





Solutions

There is a need for extensive flexibility in the implementation of Climate Action Plans. The various types of measures included, the numerous implementation issues considered, and the range of reporting requirements require a robust and accommodating analytical framework. The Sonoma County Municipal Climate Action Plans are built from such a framework. Looking forward, our analytical framework provides the following capabilities (in order of complexity):

1. Financial and GHG impact analysis of new measures
2. Integration of new measures into existing climate action plans
3. Replacement of existing measures with new measures
4. Modification of existing measures with current information
5. Semi-annual status reporting with alternative plans looking forward
6. Integrate the impacts (positive) of the CA Renewable Portfolio Standard
7. Integrate the impacts (positive) of the CA Low Carbon Fuel Standard
8. Development of scenarios incorporating the new information
9. Presentation of results for individual measures and comprehensive plans
10. Presentation of financial results by funding type
11. Reporting Climate Action Plan information to the Local Government Operations Protocol (CA Climate Registry).
12. Expansion of analysis to all city sectors (residential, commercial and government)
13. Provision of detailed GHG status reporting by community (Windsor, Rohnert Park...)
14. Presentation of financial results by sector (residents, businesses, government)
15. Integrating all analyses to provide a detailed county wide analytical framework
16. Developing a web based analytical framework to allow real time modification and scenario building by each jurisdiction.

The Climate Action Plan Overview

The Energy Alliance Association is a small business specializing in the implementation of energy efficiency and the development of Climate Action Plans for cities and government agencies. These plans are highly detailed and uniquely crafted to meet the specific circumstances of municipal clients. The organizing principle for this work is the creation of an analytical framework that houses, organizes and applies all energy related information available to meet specific greenhouse gas reduction goals. The results provide an emissions impact estimate for multiple plans with the corresponding financial cost/benefits analysis.

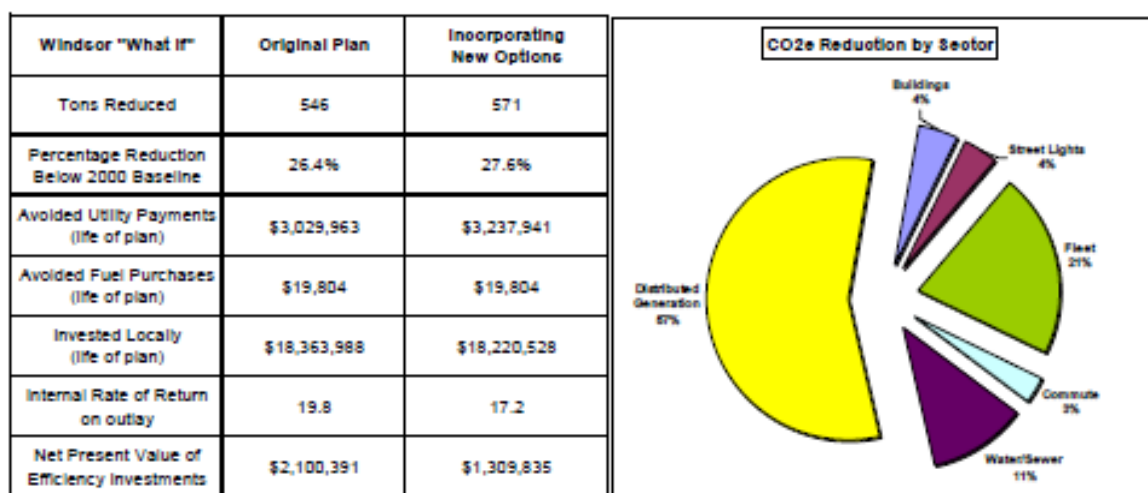
The Climate Action Plan ultimately selected by the jurisdiction provides a “roadmap” for implementation. This roadmap is flexible allowing substitutions and modifications as additional information and opportunities become available. These plans quantify the impacts of individual detailed efficiency projects applied to city fleets, buildings, street lighting, water and wastewater systems, power generation and employee commuting. These measures are assigned an implementation date, financing strategy, capital and annual O&M costs, and energy savings by fuel type. The total number of variables for each project can exceed 60 unique choices providing extensive flexibility.

As the jurisdiction moves forward new energy efficiency projects become available. With this analytical framework in place, they can seamlessly integrate the new opportunities and update their status and overall plan.



Town of Windsor "What if" Scenario

Windsor has adopted a Climate Action Plan expected to reduce emissions by 26% below 2000 levels. The Town is considering the conversion of streetlights from HPS to LED technology. They are applying for grant funding (EECBG) to cover 100% of the costs. This option would modify their plan. Furthermore, this option can be evaluated for a broader application using CEC energy efficiency low interest loans. These opportunities are integrated into their GHG plan with the following results. Most importantly, the new cash flow is a significant improvement over the current plan as indicated in the summary table below.



Climate Action Plan Scenario Results

Analysis	Option A: 231 LED Streets City Funded	Option B: 231 LED Streets EECBG Funded	Option C: 1155 LED Streets 1% CEC Loan Funded	Current Climate Action Plan (D)	Option E: Alternate MCAP Including B and C
Annual Net Cash Flow					
2009	\$0	\$0	\$0	\$0	\$0
2010	(\$118,241)	\$0	\$0	(\$178,255)	(\$178,255)
2011	\$10,875	\$10,875	\$0	(\$17,395)	(\$6,520)
2012	\$11,310	\$11,310	(\$6,209)	(\$9,578)	\$29,348
2013	\$11,762	\$11,762	(\$3,961)	(\$32,515)	\$4,586
2014	\$12,232	\$12,232	(\$1,622)	(\$15,281)	\$19,945
2015	\$12,722	\$12,722	\$810	(\$7,707)	\$25,591
2016	\$13,231	\$13,231	\$3,339	\$135	\$31,454
2017	\$13,760	\$13,760	\$5,969	\$8,256	\$37,540
2018	\$14,310	\$14,310	\$8,705	\$179,802	\$43,860
2019	\$14,883	\$14,883	\$11,550	\$188,508	\$50,420
2020	\$15,478	\$15,478	\$14,509	\$206,435	\$66,143
2021	\$16,097	\$16,097	\$17,586	\$269,633	\$127,077
2022	\$16,741	\$16,741	\$23,207	\$281,592	\$199,133
2023	\$17,411	\$17,411	\$26,535	\$291,601	\$206,756
2024	\$18,107	\$18,107	\$29,997	\$301,965	\$214,670
2025	\$18,831	\$18,831	\$33,597	\$312,697	\$222,887



Town of Windsor Example: Climate Action Plan Update

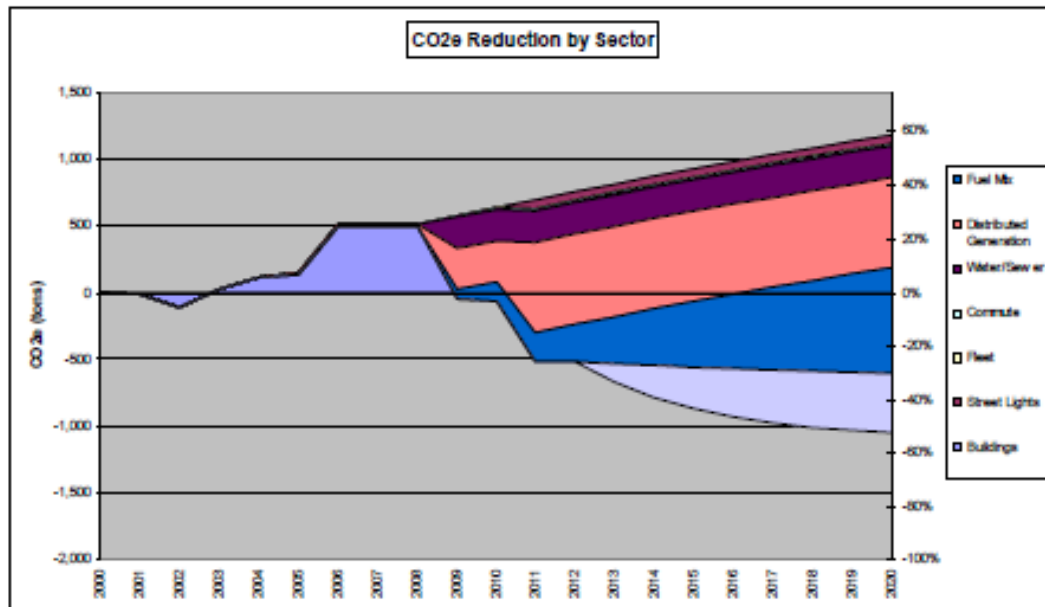
The need to update the action plan prior to integrating elements into the budget planning process resulted in a refinement of the town data:

The following modifications have been incorporated into Town of Windsor GHG analysis:

- 1) Commute Measure reduced cost and benefit (.25FTE = \$12.5k, materials = \$7.5k)
- 2) Contracting cost added to 1 MW Photovoltaic System PPA (\$200k)
- 3) Vending Machine Measure removed
- 4) BioDiesel B05 added to diesel fleet fuel mix
- 5) Second Photovoltaic System (implementation date 2011) reduced to 1.37 MW
- 6) PGE fuel mix trend added to analysis (conversion factor: lbs CO₂e / kWh)
- 7) Calculation date of GHG reporting changed to 2012 (affecting the date percent change calculated)
- 8) Cost of fuel modified (\$3.40 gasoline, \$3.74 diesel) based on long term trend
- 9) Continued Action Trend added to years 2013 to 2020 based on level of action from 2008 to 2012

The inclusion of the PG&E fuel mix has a significant impact on the greenhouse gas emissions of the Town in future years. This reduces the Town's emissions associated with electrical energy use and reduces the greenhouse gas benefits of measures affecting electrical energy consumption¹.

Plan D:	546	Tons CO ₂ Avoided	26.4%	% Reduction
Community Benefit (over 25 year life of plan)			Financial Metrics	
\$\$\$ Avoided Utility Company Payments	\$3,029,963		SPB	8.5
\$\$\$ Avoided Fuel Purchases	\$19,804		IRR	19.8%
\$\$\$ Invested Locally in GHG Projects	\$18,363,988		NPV	\$2,100,391



¹ The value for lbs/kWh declines from 0.489 in 2008 to 0.356 in 2015 per calculations published by the Climate Protection Campaign in the Community Climate Action Plan issued in November 2008.



Communicating Opportunity and Scale to the Public

The analytical framework is based on individual measures which allow a great deal of flexibility in the reporting of context, plan impacts and cost/benefit analysis. Therefore, the analysis has the capability to present information and results at the following scales.

- Individual measure
- Individual business or household
- Neighborhood
- City wide operations
- Community wide including transportation, energy and waste.

This capability to provide results at all levels greatly enhances the ability to communicate opportunities to individuals in the business and residential community, and demonstrates large scale impacts in multiple sectors. The available reporting includes projected cash flows, investment metrics, and debt/payment information. Using the Roseville example, the city selected an emissions reduction plan consisting of 19 specific measures.² The estimated impact of these measures is presented below.

Unfortunately, the very large numbers representing the costs and benefits of the municipal action plan do not translate easily to the individual home or business owner. However, the same analysis framework is available to produce the results in the adjacent table for a single business owner of a small commercial office effectively communicating the local and community wide opportunities for effective action.

City of Roseville MCAP Plan Adopted November 4, 2009	
GHG Emissions Avoided (metric tons)	5,237
Percentage Reduction (below 2000 levels)	22.8%
Investment Net Capital Cost	\$28,967,863
Investment Internal Rate of Return	80.10%
Investment Net Present Value	\$35,167,890
Avoided Utility Payments	\$23,207,152

Small Office Building Owner Energy Efficiency Upgrades and Photovoltaics	
GHG Emissions Avoided (metric tons)	5.1
Percentage Reduction (below 2000 levels)	20.1%
Investment Net Capital Cost	\$11,426
Investment Internal Rate of Return	19.5%
Investment Net Present Value	\$10,441
Avoided Utility Payments	\$15,162

The all important bottom line, the net annual cash flow is provided at the measure level, the facility level, neighborhood or community level when needed to build personal relevancy and meaningful impact. The financial tables provide capital costs, incentives, energy savings, operations and maintenance cost and the resulting net cash flow by year

² City of Roseville Greenhouse Gas Emissions Reduction Action Plan Analysis, Sam Pierce, PE, 11.4.2009



Draft Proposal of Professional Services

The Energy Alliance Association (TEAA) will provide professional services in the Implementation of the Sonoma County Municipal Climate Action Plans and the Community Climate Action Plan.

Project Scope

TEAA will work with the PG&E, municipal staff, SCTA and other interested parties to facilitate the implementation of the Sonoma County Action Plans and will support staff in the tracking and reporting of progress on each measure and the plans as a whole. This work will be directed by the responsible staff on an "as needed" basis and will rely on the analysis contained in the adopted Climate Action Plans. TEAA will also support the responsible staff in the implementation of the Sonoma County Community Climate Action Plan within each community as directed by responsible staff.

The principal areas of focus will be the following:

- Reporting of program impacts supporting climate action plan implementation
- Integration of new measures into existing climate action plans
- Replacement of existing measures with new measures
- Modification of existing measures with new information
- Semi-annual status reporting with alternative plans looking forward
- Plan integration of the impacts (positive) of the CA Renewable Portfolio Standard
- Plan integration of the impacts (positive) of the CA Low Carbon Fuel Standard
- Provision of detailed GHG status reporting by community (Windsor, Rohnert Park...)
- Presentation of financial results by sector (residents, businesses, government)
- Integrating all analyses to provide a detailed county wide analytical framework

Basic Implementation Deliverables

Periodic project meetings will be held to identify the needs and objectives to be address in the execution of this agreement. The implementation support delivered by the TEAA team will be summarized monthly and provided with the project monthly invoices.

Project Schedule and Budget

TEAA will provide GHG implementation support on a time and materials basis, not to exceed \$24,000 for the period from February 1, 2010 to December 31, 2010.

The billing rates for key staff are provided below:

Sam Pierce, PE	Principal	\$95/hr
Eros Blankenbecler	Analyst I	\$65/hr
Staff	Clerical Support	\$55/hr

This project will be managed by Sam Pierce, PE. Mr. Pierce will be the principal resource for this work. The identification and schedule of deliverables will be developed in the project initiation meeting to be scheduled for the first week of February, 2010.