

Climate Action 2020 and beyond

Appendices

Climate Action 2020 and Beyond

Public Review Draft

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More information: rcpa.ca.gov/climate-action-2020

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Appendix A

Climate Action 2020 Community Climate Action Plan Draft Compliance Checklist Template

This appendix provides a compliance checklist template to be adapted and modified for use by local agency planning staff to assist in determining a discretionary project’s consistency with the Climate Action 2020 (CA2020) Community Climate Action Plan (CAP) for the purposes of California Environmental Quality Act (CEQA) tiering.

Discretionary projects that utilize the checklist and can demonstrate consistency with all applicable mandatory local or regional measures in the CAP can conclude that their impacts related to greenhouse gas (GHG) emissions would be less than significant under CEQA because the project would be consistent with a qualified GHG reduction plan under State CEQA Guidelines Section 15183.5:

(b) Pursuant to sections 15064(h)(3) and 15130(d), a lead agency may determine that a project’s incremental contribution to a cumulative effect is not cumulatively considerable if the project complies with the requirements in a previously adopted plan or mitigation program under specified circumstances.

...

(b) (2) A plan for the reduction of greenhouse gas emissions, once adopted following certification of an EIR or adoption of an environmental document, may be used in the cumulative impacts analysis of later projects. An environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project.

The significance threshold for projects using the checklist is “consistency with an applicable plan for the reduction of greenhouse gas emissions meeting the requirements of CEQA guidelines Section 15183.5.”

A.1 Non-Discretionary Projects and Other Projects Exempt from CEQA

This checklist applies only to discretionary projects that are subject to CEQA. Similarly, if a project is otherwise statutorily or categorically exempt from CEQA, there is no requirement for CEQA review of environmental impacts and this checklist.

Mandatory requirements due to local ordinances or other local and state regulations that reduce GHG emissions (such as Title 24 energy efficiency requirements, a local idling ordinance or other regulations) would still apply to non-discretionary projects as well as other projects exempt from CEQA. Some non-discretionary and other CEQA exempt projects may also choose to implement voluntary GHG reduction measures (such as solar incentive programs) or may choose to opt in to programs such as Sonoma Clean Power (SCP).

A.2 Applicability to Discretionary Projects

This checklist is primarily aimed at and is most suitable for discretionary residential, non-residential, and mixed use projects.

This checklist is not appropriate for projects involving larger stationary source GHG emissions or process GHG emissions that involve combustion of fossil fuels except natural gas. These sources of GHG emissions are not included in CA2020 to avoid duplication of state and federal regulations of these sources, including the California Cap and Trade regulation. If such projects are subject to CEQA, they can be reviewed for applicable measures under the adopted CA2020, but they would not qualify for CEQA tiering from CA2020.

This checklist is also not suitable for other discretionary agricultural or forestry projects because the character of emissions associated with such projects, including emissions and sinks related to carbon sequestration, are not part of the formal CA2020 inventory and forecasts, and thus such projects would require separate project-specific analysis and could not tier from CA2020.

A.3 Alternatives to Use of the Checklist

A discretionary project, subject to CEQA, does not have to use the checklist in order to complete CEQA review of GHG emissions. Local communities may choose to use the checklist as part of CEQA review or to do a project-specific CEQA analysis of GHG emissions.

If the project CEQA document will not tier from CA2020, then it will need to use an alternative framework for significance thresholds and determination. One option would be to use recommended thresholds from the Bay Area Air Quality Management District or Northern Sonoma County Air Quality Management District, as they exist at the time of CEQA review for the project. There are other GHG threshold concepts that have been used by CEQA lead agencies across California. Project-specific analysis of GHG emissions outside of the framework of CAP consistency should heed all current CEQA requirements for the analysis of GHG emissions, including the 2015 California Supreme Court ruling in the *California Building Industry Association vs. San Francisco Bay Area Air Quality Management District* case. In addition, all mandatory measures under CA2020 (i.e., those adopted in state statute or local ordinances) would still apply to projects whether or not they tier from CA2020 for CEQA purposes.

For projects that use an alternative framework for analyzing climate change impacts under CEQA, a local jurisdiction may nevertheless decide to use the checklist in a non-CEQA manner in order to track project consistency with CA2020 as part of monitoring of CAP implementation and the project over time.

A.4 Overview of Checklist Requirements

A project is only required to implement mandatory measures. For voluntary measures, a project is not required to implement the measure, and is only required to identify if it intends to implement the measure for informational purposes only. A project is considered consistent with CA2020 as long as it implements all mandatory measures that are applicable to the project. Applicants are encouraged to implement as many voluntary measures as possible that are relevant to their specific project.

This checklist includes regional and local GHG reduction measures relevant to new projects only. This checklist will need to be modified for each jurisdiction based on the final GHG reduction measures actually adopted and to provide the specific requirements for each measure for that jurisdiction.

CAP measures that are not relevant to new development or that require no action by new development projects are not included in this checklist.

In addition to the CAP measures, each jurisdiction may also want to add other ordinances or jurisdictional requirements that are related to GHG reductions to this checklist to further support the jurisdiction's determinations concerning GHG reductions.

Community Climate Action Plan Compliance Checklist Table for Greenhouse Gas Analysis

Table 1. Private Development Projects

A. General Project Information:

Date: _____

Project name: _____ Case No: _____

Project address: _____

Compliance Checklist Prepared By: _____ Date: _____

Brief Project Description: _____

B. Compliance Checklist Table:

Instructions: Complete the following table by determining if the project will implement actions consistent with the identified GHG reduction measures and providing project-level details in the “Remarks” column. Projects that do not comply with a mandatory measure may be determined to be inconsistent with CA2020.

For voluntary measures, a project is not required to implement the measure, and is only required to identify if it intends to implement the measure for informational purposes only. A project is considered consistent with CA2020 as long as it implements all mandatory measures that are applicable to the project. Applicants are encouraged to implement as many voluntary measures as possible that are relevant to their specific project.

Table 2. Mandatory Requirements and Voluntary Measures Applicable to New Development Projects

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 1: Increase Building Energy Efficiency			
1-S1. Title 24 Standards for Commercial and Residential Buildings <i>[All jurisdictions]</i>	The California Building Standards Commission is responsible for adopting and updating Title 24 standards, which then become the default standards for jurisdictions throughout the state. Building departments in each Sonoma County jurisdiction implement this measure through local building code adoption. MANDATORY: <i>Confirm compliance with local building code.</i>	Applies to all projects	All projects comply through compliance with local building codes.
1-S2. Lighting Efficiency and Toxics Reduction Act (AB 1109) <i>[All jurisdictions]</i>	The California Energy Commission is responsible for implementing this measure through the prescription of minimum efficiency lighting standards. Minimum lighting standards are implemented through local building code. MANDATORY: <i>Confirm compliance with local building code.</i>	Applies to all projects	All projects comply through compliance with local building codes.
1-L1. Expand the Green Building Ordinance Energy Code <i>[Windsor Only]</i>	The City of Windsor has identified that it will require compliance with community energy efficiency standards which exceed Title 24 standards 1 by 10%. MANDATORY: <i>Confirm compliance with local building code.</i>	Applies to all projects	All projects comply through compliance with local building codes.
1-L2. Outdoor Lighting <i>[All jurisdictions except Cloverdale]</i>	Participating jurisdictions have identified that they will require new development to use light-emitting diode (LED) bulbs for outdoor lighting. MANDATORY: <i>Confirm compliance with local LED lighting requirements.</i>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
1-L3. Shade Tree Planting [All jurisdictions]	<p>MANDATORY: <i>If the participating jurisdiction has specific shade tree planting requirements for new development, evaluate consistency with those requirements.</i></p> <p>VOLUNTARY: <i>If there are no mandatory shade tree planting requirements applicable to the project, projects are still encouraged to plant shade trees where appropriate. If the project will voluntarily install shade trees, please check “not applicable” and describe.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	
1-L4. Co-Generation Facilities [Petaluma, unincorporated county only]	<p>This measure supports the use of locally-generated energy by encouraging, where feasible, co-generation facilities in new commercial and industrial facilities greater than 100,000 square feet. The jurisdictions will encourage co-generation facilities through a number of actions, such as amending ordinances, removing regulatory barriers, providing financial incentives, and providing outreach.</p> <p>VOLUNTARY: <i>For large commercial or industrial projects (>100,000 square feet), co-generation facilities are voluntary but are encouraged for suitable large developments. If the project will voluntarily include cogeneration, please check “not applicable” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 2: Increase Renewable Energy			
2-S2. Solar Water Heaters <i>[All jurisdictions]</i>	<p>The Residential Solar Water Heater Program (AB 1470) creates a \$25 million per year, 10-year incentive program to encourage the installation of solar water heating systems that offset natural gas and electricity use in homes and businesses throughout the state. The Public Utilities Commission will design and implement a program of incentives for the installation of solar water heaters.</p> <p>VOLUNTARY: <i>Installation of solar water heaters is voluntary (unless required by other statute) but is encouraged for all applicable projects. Please check “not applicable” and identify if the project will include solar water heaters.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
2-C1. Community Choice Aggregation <i>[All jurisdictions other than Healdsburg]</i>	<p>Sonoma Clean Power (SCP) is a community choice aggregation (CCA) program and electricity provider that works with Pacific Gas & Electric Company (PG&E) to provide their customers with electricity that has a higher renewable energy content. SCP offers two participation options for the CCA: the CleanStart option provides 33% renewable power in 2014, and the EverGreen option, which provides 100% renewable power. This measure includes the potential to increase participation in the CleanStart and EverGreen options by 2020.</p> <p>VOLUNTARY: <i>Participation in SCP is voluntary but is encouraged for all projects. Please identify if the project will participate in SCP and, if so, whether it will participate in CleanStart or EverGreen.</i></p>	<input type="checkbox"/> Project Participates in SCP <input type="checkbox"/> Project Does Not Participate in SCP <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
2-L1. Solar in New Residential Development <i>[Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, and Windsor only]</i>	Each participating jurisdiction will define which new development must provide rooftop solar photovoltaic (PV) by defining qualifying criteria (such as “all projects with more than 5 units”) and the amount of solar required (such as “20% of electricity demand from on-site solar”) depending on the structure of the local measure and target penetration rate. MANDATORY: <i>Confirm compliance with rooftop solar PV requirements established in local ordinance.</i>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	
2-L2. Solar in Existing Residential Buildings <i>[All jurisdictions]</i>	Applies if participating jurisdiction decides that remodels/renovations are required to meet community-defined target for solar installations. Each participating jurisdiction to define qualifying criteria for remodels and renovations (such as the minimum square footage) and amount of solar (such as 10% of remodel square footage) depending on the structure of the local measure and target penetration rate. MANDATORY: <i>Confirm that alterations, including substantial remodels and renovations, to residential buildings comply with local requirements for installation of rooftop solar PV as determined by local ordinance.</i>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
2-L3. Solar in New Non-Residential Developments <i>[Cotati, Healdsburg, Petaluma, Rohnert Park, Sebastopol, and Windsor only]</i>	Each participating jurisdiction must define which new development must provide rooftop solar PV by defining qualifying criteria (such as “all projects over 50,000 square feet”) and amount of solar required (such as “20% of electricity demand from on-site solar”) depending on the structure of the local measure and target penetration rate. MANDATORY: <i>Confirm compliance with non-residential building requirements for rooftop solar PV as required by local ordinance.</i>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
2-L4. Solar in Existing Non-Residential Buildings <i>[All jurisdictions except City of Sonoma]</i>	<p>Applies if participating jurisdictions decide that removal/renovations are required to meet community-defined targets for solar installations. Each participating jurisdiction must define which remodels/renovations must provide rooftop solar PV by defining qualifying criteria (such as “all projects over 20,000 square feet”) and how much solar is required (such as “provide 10% of electricity demand from remodeled space”) depending on the structure of the local measure and target penetration rate.</p> <p>MANDATORY: <i>Confirm that all alterations, including substantial remodels and renovations, comply with local requirements for non-residential building installation of rooftop solar PV as determined by local ordinance.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

Goal 3: Switch Equipment from Fossil Fuel to Electricity

3-C1. Stationary Fuel Switching Incentives <i>[All jurisdictions]</i>	<p>New buildings are encouraged to use on-site PV electric generation instead of propane for heating and other applicable uses. The Regional Climate Protection Authority (RCPA), SCP, County of Sonoma Energy and Sustainability Division, and Northern Sonoma County Air Pollution Control District (NSCAPCD) will be creating the incentives to support this measure. These agencies will coordinate with the local jurisdictions to develop outreach efforts to achieve widespread implementation each jurisdiction.</p> <p>VOLUNTARY: <i>Installation of alternatives to propane, fuel oil, and other fossil fuels for heating (unless required by other statute) is not required but is encouraged for all applicable projects. If the project will include installation of alternatives to propane, fuel oil, and other fossil fuels for heating, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
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GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
3-L2 Convert to Electric Water Heating [Healdsburg, Petaluma, Rohnert Park, Sebastopol and Windsor only]	<p>MANDATORY: Only mandatory if participating jurisdiction decides that there will be mandatory requirements for new development and specifies the requirements for new development. Confirm compliance with new residential development requirements for electric water heating equipment instead of natural gas and propane water heating equipment as mandated by local ordinance.</p> <p>VOLUNTARY: <i>If there are no mandatory requirements and the project will voluntarily use electric water heating, then please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
Goal 4: Reduce Travel Demand Through Focused Growth			
4-L1. Mixed-Use Development in City Centers and Along Transit Corridors [All jurisdictions]	<p>The jurisdictions will identify and support mixed use development in city-centers and transit-oriented development locations through their General Plans, Area Plans, and Specific Plans and zoning codes.</p> <p>MANDATORY: <i>Evaluate the project’s consistency with existing general plans, area plans, specific plans, and zoning as it relates to the proposed project site.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	
4-L2. Increase Transit Accessibility [All jurisdictions, except unincorporated county]	<p>Each jurisdiction will identify potential areas for transit-oriented development and include policies and incentives to encourage development near high-quality transit service. General Plans, Specific Plans, zoning codes, and ordinances will define requirements for transit accessibility to encourage transit-oriented development. Each jurisdiction will also identify potential incentives that may include reduced parking requirements, reductions in building and permit fees, density increases, and other related items.</p> <p>MANDATORY: <i>Evaluate the project’s consistency with existing general plans, area plans, specific plans, and zoning code requirements as it relates to the proposed project site and transit accessibility.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
4-L3. Supporting Land Use Measures <i>[All jurisdictions]</i>	<p>Participating jurisdictions will encourage new development to provide amenities to support transit and other modes of transportation, including transit stops, bicycle facilities, good pedestrian networks, car-sharing locations, and electric vehicle (EV) charging stations and to encourage residential developments at a variety of price points to increase options for workers (especially public serving employees) of Sonoma to live within the county.</p> <p>VOLUNTARY: <i>Installation of transit and other amenities as described above is voluntary (unless required by other regulations) but is encouraged. If the project will include any of the above features, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
4-L4. Affordable Housing Linked to Transit <i>[All jurisdictions, except unincorporated county]</i>	<p>Each jurisdiction would develop policies and incentives to encourage affordable housing development for cities and unincorporated county. The jurisdictions would draft new ordinances or offer incentives encouraging the affordable housing development near transit hubs and city centers. Potential incentives could include reduced parking requirements, reductions in building and permit fees, increased density, and other related items.</p> <p>MANDATORY: Only mandatory if participating jurisdiction decides that there will be mandatory affordable housing requirements for new development. <i>Describe the project’s compliance with the jurisdiction’s mandatory affordable housing requirements, if applicable.</i></p> <p>VOLUNTARY: <i>If there are no mandatory requirements and the project will voluntarily provide support for affordable housing near transit, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options			
5-C3. Sonoma Marin Area Rail Transit [Cloverdale, Healdsburg, Windsor, Rohnert Park, Cotati, Petaluma and unincorporated county]	<p>SMART and jurisdictions along the SMART Corridor are establishing policies to support SMART, such as transit-oriented development at planned SMART stations, future local transit planning for SMART, and pedestrian and bicycle facilities to connect to SMART stations.</p> <p>MANDATORY: <i>If project is in proximity to SMART stations or connecting pedestrian and bicycle facilities, it must be consistent with any jurisdictionally identified requirements supportive of SMART as found in General Plans, Area Plans, Specific Plans, Station Plans, zoning codes, or infrastructure plans.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
5-C4. Trip Reduction Ordinance [All jurisdictions]	<p>Sonoma County Transportation Authority (SCTA) will develop and local jurisdictions will adopt and both will implement a Trip Reduction Ordinance (TRO) requiring employers with 50+ employees to offer one of the following: pre-tax transit expenses, transit or vanpool subsidy, free or low-cost shuttle, or an alternate benefit. The TRO may also consider more ambitious recommendations such as specific transportation demand management (TDM) programs offered to all employees, annual monitoring and reporting requirements, or specific trip reduction or mode share target rates. The TRO will also provide a non-trip reduction alternative in the form of purchase of an equivalent amount of GHG offsets for employer.</p> <p>MANDATORY: <i>Evaluate the project's consistency with the adopted TRO, if applicable.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-C5. Supporting Measures for the Transportation Management Program [All jurisdictions]	<p>SCTA will develop a TDM program that incorporates the following.</p> <p>Support for employer-based TDM program efficiency: Look for opportunities for small businesses to share resources and/or create transportation management associations.</p> <p>Consider district-wide TDM programs in specified business districts.</p> <p>Support development of municipal-specific TDM programs.</p> <p>Consider recommendations to local agencies for TDM program requirements for new developments such as transit subsidies or parking cash-out.</p> <p>The city/County will develop a TDM program for employers which may include the strategies mentioned above.</p> <p>City/County staff would promote the TDM program and assist interested employers in implementing strategies and may offer financial incentives for employers because they will bear the costs of running the program.</p> <p>VOLUNTARY: <i>Inclusion of TDM measures is voluntary but is encouraged for all suitable projects. If the project will include voluntary TDM measures, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-C6. Reduced Cost Transit Passes [All jurisdictions]	<p>SCTA would work to identify funding for and/or assist in subsidizing reduced transit passes. Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit would be responsible for rolling out and publicizing reduced transit passes. Agencies would encourage employers and new developments to provide reduced-cost monthly transit passes. Each jurisdiction would partner with transit agencies to negotiate cost-sharing and facilitate transit pass distribution. Requirements could be implemented for new or expanded employers with 50 employees or more (to be consistent with Senate Bill 1339) and new residential projects of 25 units or more. If a local jurisdiction decides to make requirements mandatory, then a non-trip reduction alternative, in the form of required purchase of an equivalent amount of GHG offsets, shall be provided for employers choosing not to implement trip reductions.</p> <p>MANDATORY: <i>If a local jurisdiction decides to apply requirements for new or expanded employers with 50 employees or more or new residential projects of 25 units or more, then describe project’s compliance with those requirements.</i></p> <p>VOLUNTARY: <i>Where subsidized transit pass provision is not a mandatory requirement, it is nonetheless encouraged. If the project will include the voluntary provision of subsidized transit passes, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-C7. Alternative Travel Marketing & Optimize Online Service [All jurisdictions]	<p>SCTA would be the lead agency to implement this measure and would find funding for or subsidize communication channels to provide information on alternate travel means. Local jurisdictions would work with SCTA to ensure that consistency in service and information is maintained throughout the county. SMART will also be doing travel marketing for its services.</p> <p>The jurisdictions would provide targeted marketing in various formats to employees, employers, residents, and developers. Agencies would update existing online resources with current TDM strategy information and promote the use of these online resources when implementing other TDM strategies. Marketing materials should provide accurate and timely information regarding commute reduction strategies. Information could be rolled into human resources policies for new employee orientation. Real-time transit data could be made available online with trip planning tools, with mobile phone apps as a future development. These marketing efforts could be made mandatory for new residential projects consisting of 25 units or more, and new or expanded projects with 50 employees or more (consistent with Senate Bill 1339).</p> <p>MANDATORY: <i>If a local jurisdiction decides to apply these requirements for new or expanded employers with 50 employees or more or new residential projects of 25 units or more, then describe project's compliance with those requirements.</i></p> <p>VOLUNTARY: <i>If these requirements are not mandatory, then they are nonetheless encouraged where applicable. If the project will include the provision of these marketing efforts, please check "implements" and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-C8. Safe Routes to School <i>[All jurisdictions]</i>	<p>SCTA, working with local school districts, would be the lead agency to implement this measure and find funding for or subsidize safe routes to school programs. Local jurisdictions and school districts would need to coordinate on bus routes that cross jurisdictions. SCTA would partner with local schools to tailor the program to fit each school’s needs and help look for funding to support the program.</p> <p>MANDATORY: <i>If a local jurisdiction designates pedestrian or bicycle facilities to be built as part of safe routes to school planning and a project occurs within areas planned for those facilities, evaluate the consistency of the project with those plans.</i></p> <p>VOLUNTARY: <i>If these requirements are not mandatory, then they are nonetheless encouraged where applicable. If the project will provide any voluntary support for safe routes to school, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
5-C9. Car Sharing Program <i>[All jurisdictions]</i>	<p>RCPA/SCTA would be the lead agency to implement this measure, and would work with the Sonoma County Air Resources Team and find funding for or subsidize mobile device infrastructure needed to implement a car sharing program. RCPA/SCTA could consider partnering with commercial car sharing service providers to identify locations or markets to roll out the service.</p> <p>VOLUNTARY: <i>New projects are encouraged to provide car share parking spaces, if applicable. Please describe if the project will provide such spaces.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L1. Local Transportation Demand Management Program <i>[Cloverdale, Cotati, Healdsburg, Rohnert Park, Sebastopol, unincorporated county]</i>	<p>This measure supports TDM measures for employers with fewer than 50 employees, additional voluntary TDM measures (beyond the minimum TRO requirements) for larger employers, and requirements for TDM measures in new large residential projects.</p> <p>TDM programs may include: participation in vanpool programs, EV charging stations, reduced parking requirements for affordable or senior housing projects, reduced cost transit passes, unbundled parking costs, priced parking, bicycle amenities, car-share pods, telecommuting and alternative work schedules, ride-matching services, and emergency ride home.</p> <p>Each jurisdiction will define the threshold for application of the ordinance, the specific TDM measures to be implemented, and methods to methods for monitoring employer compliance. Incentives for voluntary TDM by employers with fewer than 50 employees may also be used, such as reduced parking requirements, reductions in fees, and other related items.</p> <p>MANDATORY: <i>The jurisdictions may require certain TDM strategies (beyond the minimum TRO requirements in Measure 5-C4) through the permitting process for businesses with 50 or more employees. If so, please evaluate consistency with the mandatory TDM strategies.</i></p> <p>VOLUNTARY: <i>If the project is not required to implement TDM, then TDM measures are still encouraged where appropriate. If any voluntary TDM measures will be implemented by the project, please check “implement” and describe.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L2. Carpool-Incentives & Ride-Sharing Program <i>[Cloverdale, Cotati, Healdsburg, Rohnert Park, Sebastopol, unincorporated county]</i>	Each participating jurisdiction will create or promote a regional ride-sharing program and encourage participation by local employers through their TDM programs with a focus on large employers to create programs. VOLUNTARY: <i>Projects are encouraged to incorporate carpool and ridesharing efforts if applicable. If the project will include voluntary carpool or rideshare elements or support, please check “implement” and describe.</i>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	
5-L3. Guaranteed Ride Home <i>[Cloverdale, Cotati, Sebastopol, unincorporated county]</i>	Participating jurisdictions would implement a guaranteed ride home program that provides a free car share, shuttle, or taxi ride home to employees in case of an emergency (illness, family crisis, unscheduled overtime) for employees who uses an alternative to driving alone to work (public transit, carpooling, vanpooling, biking, or walking) on the day of the emergency. MANDATORY: <i>If the local jurisdiction mandates this measure for employers with a certain level of employees and the project fits the qualifying criteria, then describe the project’s compliance with the local requirements.</i> VOLUNTARY: <i>If there are no mandatory guaranteed ride home requirements applicable to the project, and the project will voluntarily implement guaranteed ride home programs, please check “implement” and describe.</i>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L4. Supporting Bicycle/Pedestrian Measures [All jurisdictions]	<p>SCTA will work with the cities and county transit agencies to coordinate the identification and implementation of cross-jurisdictional bicycle and pedestrian corridor projects. Each jurisdiction will update municipal codes and prepare or update their bike/pedestrian master plan, as needed. The bike and pedestrian master plans will outline needed improvements and the areas identified for expansion. Communities will also coordinate with transit agencies to improve the bike-transit facilities. Facilities may include projects to close bicycle/pedestrian route gaps, increased bike storage on buses, at bus stops, and at transit hubs, bicycle facilities at all park-and-ride lots and transit stations, and bike sharing programs.</p> <p>MANDATORY: <i>Evaluate consistency of the project with the bike and pedestrian master plan if facilities are identified in the project area and with any relevant municipal code requirements.</i></p> <p>VOLUNTARY: <i>If there are no facilities in the bike and pedestrian master plan in the project area and no relevant municipal code requirement, but the project will voluntarily include bicycle and pedestrian facilities, please check “implement” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L5. Traffic Calming [All jurisdictions]	<p>Each jurisdiction will develop a strategy to implement traffic-calming measures in downtown cores, accident hotspot locations, near schools and libraries, and other areas appropriate to their community setting. Traffic-calming measures can be made a condition of new development approvals where appropriate and can be incorporated in General Plans, Area Plans, and Specific Plans. Specific measures may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.</p> <p>MANDATORY: <i>Projects within areas identified by each jurisdiction for traffic-calming measures shall be consistent with all specified requirements in general plans, area plans, specific plans, or infrastructure master plans or other plans wherein the jurisdiction memorialized required traffic calming measures. Evaluate the project consistency, as applicable with required traffic-calming measures.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L6. Parking Policies <i>[Cloverdale, Healdsburg, and unincorporated county only]</i>	<p>This measure would implement additional parking policies to promote reduction in single-occupancy vehicle travel. Requirements may include on-street market pricing in downtown areas, reduced parking requirements, shared parking, and in-lieu fees, in combination with providing transit and bicycle facilities, in appropriate areas.</p> <p>Each participating jurisdiction would be responsible for implementing this measure. Staff would develop a process for implementation and management, which may include updating municipal codes. The jurisdictions would draft new ordinances and/or general plan policies, or offer incentives encouraging reduced parking requirements and increased transit or bicycle facilities.</p> <p>MANDATORY: <i>Evaluate the project’s consistency with any mandatory parking requirements.</i></p> <p>VOLUNTARY: <i>If there are no mandatory parking requirements applicable to the project, but the project will voluntarily implement any measures such as shared parking, reduced parking, providing transit or bicycle facilities, etc., please check “implement” and describe</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
5-L7. Supporting Parking Policy Measures <i>[All jurisdictions, except Rohnert Park]</i>	<p>This measure includes the promotion of prioritized parking for hybrid/EV cars, carpools, vanpools at city-centered corridors, new developments, public parking areas, and municipal facilities. Participating jurisdictions may consider amending zoning code to require new parking lots to provide prioritized parking for carpools, vanpools, hybrids, and EVs, and provide charging facilities and/or incentives.</p> <p>MANDATORY: <i>Evaluate the project consistency with any mandatory prioritized parking for hybrid/EV cars, carpools, and vanpools.</i></p> <p>VOLUNTARY: <i>If there are no mandatory prioritized parking requirements, but the project will voluntarily implement any prioritized parking, please check “implement” and describe.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

Goal 6: Increase Vehicle and Equipment Fuel Efficiency

All measures supporting this goal (Measure 6-S1. Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard [LCFS], Measure 6-S2. Advanced Clean Cars, and Measure 6-S3. Assembly Bill 32 Vehicle Efficiency Measures) are state measures that will benefit new projects using passenger vehicles and trucks, but will require no project-level actions.

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicle and Equipment			
7-C1. Shift Sonoma County (Electric Vehicles)	<p>With RCPA/SCTA as the lead, and in partnership with SCP, this measure would implement a countywide EV promotion program. The measure may include incentives for EV home, commercial, or institutional chargers, promotion of EV purchase, preferential public parking, working with employers to provide preferential parking and charging stations, working with the hospitality and wineries to promote an “EV/wine trail,” demonstration projects, education, and outreach.</p> <p>VOLUNTARY: Residential and commercial projects are encouraged to incorporate EV charging stations and/or EV-ready infrastructure. If the project voluntarily includes such features, please check “implements” and indicate the number and type of charging stations constructed or whether EV-ready infrastructure will be installed as part of the project.</p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
7-C2. Alternative Fuels for Transit Vehicles	<p>SCTA will work with transit agencies to replace diesel and gasoline buses with hybrid buses or compressed natural gas buses and to establish a goal to replace at least 50% of the bus fleet with alternatively fueled buses. This measure may also include the replacement of diesel and gasoline buses with electric buses as feasible.</p> <p>VOLUNTARY: If the project will include bus fleets or other transit vehicles, use of alternatively fueled vehicles is encouraged. If the project will include the use of alternatively fueled vehicles, please check “implement” and describe.</p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
7-L1. Electric Vehicle Charging Station Program [All jurisdictions]	<p>The participating jurisdictions would work with PG&E and SCP to identify grants and other funding sources to help finance the installation of charging stations throughout the county. In addition, SCP, County of Sonoma Energy and Sustainability Division (through available PACE financing options), and NSCAPCD would create a package to install and finance charging stations.</p> <p>VOLUNTARY: <i>As with Measure 7-C1, residential and commercial projects are encouraged to incorporate EV charging stations and/or EV-ready infrastructure. If the project voluntarily includes these features, please check “implements” and indicate the number and type of charging stations constructed or whether EV-ready infrastructure will be installed as part of the project.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
7-L2 Electrify Landscaping Equipment [Cotati, Healdsburg, Petaluma, Sebastopol, and Windsor]	<p>Participating jurisdictions would adopt an ordinance that reduces gasoline-powered landscaping equipment use and/or reduces the number and operating time of such equipment. New development would be required to provide adequate amount and location of electrical outlets to allow use of electrical landscaping equipment. New development would also be also required to prepare landscaping plans that commit to any jurisdictional targets for use of alternatively fueled or electric landscape equipment goals.</p> <p>MANDATORY: <i>Evaluate consistency with the jurisdiction’s electrical landscaping equipment requirements.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	
7-L3. Electrify Construction Equipment [Cotati, Healdsburg, Petaluma, Sebastopol, and Windsor]	<p>Each participating jurisdiction has identified a goal for construction equipment use of alternative fuels or electricity in place of diesel and gasoline.</p> <p>MANDATORY: <i>Provide a construction equipment management plan that meets the local jurisdiction requirements for use of alternatively fueled equipment (including electrical equipment) during project construction.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
7-L4. Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching <i>[Only applies to agricultural projects]</i>	<p>This voluntary measure would include supporting farmers to reduce fuel use in agricultural equipment by converting equipment currently using gasoline, diesel, or liquid propane gas to alternative fuels with lower GHG intensity (such as natural gas, biofuels, or solar electricity) as feasible, keep equipment maintained and in good working order, replace old equipment with newer and more efficient equipment, and use global positioning systems (GPS) to optimize equipment operation. A particular focus may be expanding renewable energy use for water pumps and wind machines.</p> <p>VOLUNTARY: <i>Use of alternatively fueled and/or efficient agricultural equipment and vehicles is encouraged. If the project includes agricultural equipment and will employ alternatively fueled and/or high-efficiency equipment, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
Goal 8: Reduce Idling			
8-L1. Idling Ordinance <i>[Petaluma, Rohnert Park, Sebastopol, and unincorporated county only]</i>	<p>Participating jurisdictions will adopt new ordinances that limit idling for commercial vehicles to no more than 3 minutes.</p> <p>MANDATORY: <i>Evaluate the project’s consistency with the jurisdictional idling ordinance.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	
8-L2. Idling Ordinance for Construction Equipment <i>[Petaluma, Rohnert Park, Sebastopol, and unincorporated county only]</i>	<p>Participating jurisdictions will adopt new ordinances that limit idling for construction vehicles and equipment to no more than 3 minutes.</p> <p>MANDATORY: <i>Evaluate the project’s consistency with the jurisdictional idling ordinance.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 9: Increase Solid Waste Diversion			
9-C1. Waste Diversion Goal <i>[All jurisdictions]</i>	<p>The Sonoma County Waste Management Agency (SCWMA) would be the lead agency for implementing this measure. SCWMA could create a fund for new and expanded waste collection programs that the jurisdictions could contribute money to, and facilitate countywide or individual jurisdiction waste ordinances. Local jurisdictions would work with waste providers to identify baseline diversion rates, opportunities for additional waste diversion, and achievable diversion goals before a certain time period, all of which can be incorporated into the waste provider’s contract with a jurisdiction.</p> <p>MANDATORY: <i>Evaluate the project’s consistency with applicable countywide and/or jurisdictional ordinances concerning mandatory waste minimization and diversion requirements.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	
9-L1. Construction and Demolition Reuse and Recycling Ordinance <i>[All jurisdictions]</i>	<p>Each jurisdiction has or will adopt minimum diversion rates for Construction and Demolition (C&D) waste. <i>[NOTE: Community to identify specific diversion rate.]</i></p> <p>MANDATORY: <i>Each development project is required to develop a Construction Phase Recycling Plan that would address the reuse and recycling of major waste materials and that would meet the minimum diversion rate for C&D waste as determined by the applicable jurisdiction.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	
Goal 10: Increase Capture and Use of Methane from Landfills			
<p>The measure supporting this goal (Measure 10-C1. Waste-to-Energy Facilities) would only apply to landfills and would support installation of methane capture technology and associated monitoring systems on all landfills without methane capture and that are not otherwise required to install or upgrade equipment under the state rule, with a goal of reaching the highest feasible methane capture rate (i.e., approaching 100%). This measure would also increase methane capture at landfills that already capture methane by expanding existing collection wells and would support increased electricity generation capacity at the Central Disposal Site by an additional 1.8 gigawatt-hour (GWh) by 2020. While this measure will help to reduce the GHG emissions associated with landfilled waste from new development, it requires no project-level action by development projects.</p>			

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 11: Reduce Water Consumption			
11-C1. Countywide Water Conservation Support and Incentives [All jurisdictions]	<p>Sonoma County Water Agency (SCWA) is responsible for implementing this measure in cooperation with the local jurisdictions. SCWA would identify areas where additional conservation would be most effective and develop conservation goals. The local jurisdictions would work with SCWA to identify conservation opportunities, and to develop new ordinances or general plan policies pertaining to water conservation.</p> <p>MANDATORY: Evaluate consistency of the project with all local or regionally required water conservation measures.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	
11-L1. Senate Bill X7-7 – Water Conservation Act of 2009 [All jurisdictions]	<p>This statute requires urban water agencies throughout California to increase conservation to achieve a statewide goal of a 20% reduction in urban per-capita use (compared to nominal 2005 levels) by December 31, 2020 (referred to as the “20X2020 goal”). Each urban water retailer in the county subject to the law has established a 2020 per-capita urban water use target (in terms of gallons per capita per day) to meet this goal. Specific per-capita water use reduction goals vary by water agency.</p> <p>MANDATORY: Evaluate consistency of the project with all local or regionally required water conservation measures.</p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
11-L2. Water Conservation for New Construction <i>[Petaluma, Rohnert Park, Sebastopol, and Windsor only]</i>	<p>Under this measure, participating jurisdictions will update building standards and codes for new buildings to require adoption of voluntary CALGreen Tier 1 water efficiency measures, including use of low-water irrigation systems, installation of rainwater systems, installation of water-efficient appliances and plumbing fixtures, a 30% to 40% reduction over baseline indoor water use, and a 55% to 60% reduction in outdoor potable water use (CALGreen Tier 1 or 2).</p> <p>MANDATORY: <i>Evaluate consistency of the project with all local building standards and codes for new buildings relative to water efficiency.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	
11-L3. Water Conservation for Existing Buildings <i>[Petaluma, Rohnert Park, Sebastopol, and Windsor only]</i>	<p>Under this measure, the participating jurisdictions would adopt a water reduction target for existing development that exceeds the Senate Bill X7-7 20% reduction target and implement a program to renovate existing buildings to achieve higher levels of water efficiency. The participating jurisdictions could require water conservation upgrades for all existing buildings that undergo substantial remodels or renovations (such as compliance with Title 24 Part 6 (2013) CALGreen Tier 1 voluntary water efficiency standards) and/or incentivize water efficiency upgrades outside the permitting process.</p> <p>MANDATORY: <i>If a participating jurisdiction determines that substantial remodels and renovations must implement water conservation upgrades, and the project fits the qualifying criteria, then evaluate the consistency of the project with those mandated upgrade requirements.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 12: Increased Recycled Water and Greywater Use			
12-C1. Recycled Water [All jurisdictions]	<p>Under this measure, the wastewater treatment providers in the county and the jurisdictions would coordinate on the following strategies for implementation of this measure.</p> <p>Inventory potential non-potable uses of water for substitution by recycled water.</p> <p>Encourage the retrofit of irrigation systems to promote the use of recycled water at golf courses, parks, and open spaces owned and operated by other entities, and take the lead in implementing these modifications at municipal government operated facilities.</p> <p>Encourage the retrofit of single-family and multi-family homes to promote the use of recycled water for landscaping and irrigation.</p> <p>Consider programs to collect stormwater for on-site reuse for landscape irrigation.</p> <p>VOLUNTARY: <i>Where recycled water is available and the project includes landscaping and other irrigated areas, the project is encouraged to employ recycled water. If the project will use recycled water, please check “implement” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
12-C2. Greywater Use [All jurisdictions except Cloverdale and Sonoma]	<p>Each participating jurisdiction has established a goal to replace a certain percentage of potable water that was previously being used for residential non-potable uses (landscaping, toilet water, etc.) with greywater.</p> <p>MANDATORY: <i>If the local jurisdiction mandates the use of greywater for non-potable uses, then evaluate the project’s consistency with those requirements.</i></p> <p>VOLUNTARY: <i>If no local mandate exists, and the project will use greywater for non-potable uses, please check “not applicable” and describe.</i></p>	<input type="checkbox"/> Project Complies <input type="checkbox"/> Not Applicable <input type="checkbox"/> Project Does Not Comply	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 13: Increase Water and Wastewater Infrastructure Efficiency			
The measures supporting this goal (Measure 13-C1. Infrastructure and Water Supply Improvement and Measure 13-C2. Wastewater Treatment Equipment Efficiency) apply to water and wastewater infrastructure only and not to individual development projects, but will benefit new development by reducing the indirect GHG emissions of providing water and wastewater services by promoting increased efficiency. No project action is required.			
Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems Including Methane			
The measures supporting this goal (Measure 14-C1. Sonoma County Agency Carbon Free Water by 2015 and Measure 14-L1. Green Energy for Water Production and Wastewater Processing in Healdsburg and Cloverdale) apply to water infrastructure only and not to individual development projects, but will benefit new development by reducing the indirect GHG emissions of providing water and wastewater services by promoting use of renewable energy. No project action is required.			
Goal 15: Reduce Emissions from Livestock Operations			
15-L1. Methane Capture and Combustion at Dairies <i>[Dairy projects only]</i>	<p>This measure would encourage installation of methane digesters to capture emissions from the decomposition of manure at dairies. The methane could be used on site as an alternative to natural gas in combustion or power production, or as a transportation fuel. Individual project proponents could also sell GHG credits associated with these installations on the voluntary carbon market.</p> <p>VOLUNTARY: <i>Installation of methane digesters at dairies is voluntary but is encouraged where feasible. If the project includes a methane digester, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
15-L2 Reduce Emissions from Enteric Fermentation <i>[Dairy and livestock projects only]</i>	<p>This voluntary measure would encourage dairies and livestock operations to explore ways to reduce GHG emissions from enteric fermentation (both methane and nitrous oxide). Potential methods for reducing these emissions include manipulating animal diet to inhibit a rumen environment favorable to methanogens. A range of potential emission options include dietary oils (such as whole cottonseed oil, sunflower oil, coconut oil, and palm oil), the use of corn or legume silage in place of grass silage, use of concentrate feeds, nitrates, ionophores, and tannins, and improving forage quality and the overall efficiency of dietary nutrient use. Potential use of pomace from wine-making should also be explored.</p> <p>VOLUNTARY: <i>Exploration of methods to reduce enteric fermentation is encouraged where feasible. If the project includes enteric fermentation reduction methods, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
Goal 16: Reduce Emissions From Fertilizer Use			
16-L1. Optimize Fertilizer Use <i>[Agricultural projects only]</i>	<p>Under this measure, the County would implement a policy to encourage voluntary agricultural practices that reduce or eliminate the need for fertilizer (especially synthetic fertilizer). The County and any other interested jurisdictions would work with growers to provide incentives for organic fertilizers as an alternative. The County would create an outreach program to help growers optimize nitrogen application rates, decrease overall fertilizer inputs and cost, maintain current crop yields, and reduce emissions of nitrous oxide.</p> <p>VOLUNTARY: <i>Exploration of methods to optimize fertilizer is encouraged, where feasible, especially when it results in reduction of nitrogen fertilizer usage. If the project will employ methods to optimize fertilizer use, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
Goal 17: Protect and Enhance the Value of Open and Working Lands			
18-L1. Certification Programs <i>[Agricultural projects and wineries only]</i>	<p>The County would support sustainable agricultural certification programs that promote practices that will reduce GHG emissions and/or enhance carbon stocks and sequestration. This measure supports development and implementation of rigorous standards in documenting, tracking, and disclosing sustainability practices that reduce GHG emissions. Some of the certification programs include Certified Organic, Certified Biodynamic, and Certified California Sustainable Winegrowing, among others. Sonoma County Winegrowers is leading a 100% sustainable wine partnership with county wineries and vineyard owners and operators.</p> <p>VOLUNTARY: <i>Projects are encouraged to participate in sustainable agricultural certification programs that promote practices that will reduce GHG emissions and/or enhance carbon stocks and sequestration. If the project will seek certification under relevant certification protocols and provide documentation of that certification when achieved, please check “implement” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
18-L2. Promote the Sale of Local, Sustainable, and Organic Grown Foods and/or Products <i>[All jurisdictions]</i>	<p>The County and local jurisdictions would support local farmers’ markets to provide community residents with local, sustainable, and organic (or equivalent) sources of food that can displace carbon-intensive food production practices.</p> <p>VOLUNTARY: <i>If the project will include any support for local, sustainable, and organic (or equivalent) foods, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

GHG Reduction Measure [Communities]	Measure Descriptions and Requirements	Project Compliance	Remarks
18-L3. Urban Agriculture <i>[All jurisdictions]</i>	<p>Under this measure, participating jurisdictions would amend zoning code to allow for small-scale urban farming areas and gardens in the cities in appropriate areas (excluding areas that are more suitable for infill and transit-oriented mixed land uses).</p> <p>VOLUNTARY: <i>If the project will include any opportunities for small-scale urban farming areas and/or gardens, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	
Goal 19: Increase Carbon Sequestration			
19-L1. Rangeland Carbon Farming <i>[Only applies to rangeland projects]</i>	<p>Under this measure, the County would support increases in carbon sequestration in Sonoma’s working rangelands. Carbon sequestration can be increased by a variety of actions including, but not limited to, adding compost from local community waste or manure from dairy operations to the soil, planting hedgerows and riparian corridors, residue management, prescribed grazing, range and critical area planting, filter strips, and other measures.</p> <p>VOLUNTARY: <i>If the project includes rangeland management and carbon farming activities, please check “implements” and describe.</i></p>	<input type="checkbox"/> Project Implements Measure <input type="checkbox"/> Project Does Not Implement Measure <input type="checkbox"/> Not Applicable	

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Appendix B

Inventory and Forecast Details

B.1 Introduction

This appendix summarizes the data sources and general methods that were used to develop Sonoma County’s greenhouse gas (GHG) inventory for 2010, the backcast of emissions to 1990, and the “business-as-usual” (BAU) forecasts for 2015, 2020, 2040, and 2050 for the Climate Action 2020 (CA2020) Community Climate Action Plan (CAP). These will be referred to as the “inventory,” “backcast,” and “forecast” in this appendix. Methods are described for each emissions sector below.

B.2 GHG Inventory Structure and Definitions

GHG Inventory. The GHG Inventory includes GHG emissions associated with community activities occurring within the geographic or jurisdictional boundaries of the county and generally consists of sources of emissions that the County and its communities can influence or control. It is an activity-based inventory (as opposed to a consumption-based inventory). The inventory includes emissions that occur both inside and outside the jurisdictional boundaries, but only to the extent that such emissions are due to land uses and activities within the county.

Direct/Indirect Emissions. GHG emissions can be classified as either *direct* (emissions that occur at the end use location, such as natural gas combustion for building heating) or *indirect* (emissions that result from consumption at the end use location but occur at another location, such as the consumption of electricity in a residence which results in emissions that occur at the power plant). For direct emissions (such as natural gas combustion in buildings), if the County and communities can have a substantial effect on those emissions by influencing energy use (such as through green building codes), then the direct emissions are included in the inventory. For indirect emissions (such as solid waste disposed outside of the county), if the County or communities (or other agency in the county) can have a substantial effect on those indirect emissions by influencing demand (such as waste minimization and diversion programs), then they are included in the inventory. By including emissions that are controlled by or subject to the influence of the County and communities, the inventory can form the basis for local climate action planning. The term *emissions* refers to GHG emissions and not to emissions of air quality pollutants.

GHG Emission Sectors. GHG emissions are divided into the following seven sectors: building energy, on-road transportation, off-road transportation and equipment, solid waste generation,

wastewater treatment, water conveyance, and agriculture. Stationary source emissions were estimated for informational purposes but were not included in the GHG inventory¹.

Business-as-Usual (BAU) Forecasts. BAU represents a future scenario that does not consider the possible reduction of GHG emissions that may result from any legislation or regulation that would go into effect after the inventory year. The BAU projections are estimates of future emissions based on energy and carbon intensity in the existing economy with the expected increases in population and economic growth in the future. BAU forecasts are presented in CA2020 for 2015, 2020, 2040, and 2050 for community emissions.

Unit of Measure. The unit of measure used throughout CA2020 is metric tons of carbon dioxide equivalent (MTCO_{2e}). Presenting inventories in carbon dioxide equivalence allows characterization of the complex mixture of GHG as a single unit taking into account that each gas has a different global warming potential (GWP)². One million MTCO_{2e} is abbreviated MMTCO_{2e}.

Carbon Stock Sectors. Estimates of carbon stored in soil and vegetation (not emissions) in agricultural rural lands, urban forested lands, and natural rural lands were also provided for informational purposes but were not included in the GHG inventory. Storage of carbon in these lands represent an emissions “sink”³ because soil and vegetation remove carbon dioxide from the atmosphere. However, since carbon cycling in existing soil and vegetation is part of global atmospheric carbon cycling, *the U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions* (ICLEI–Local Governments for Sustainability 2012) (referred to as the *2012 ICLEI Community Protocol*) recommends that emissions sinks be disclosed but not combined with other emissions created by human activity in an emissions inventory.

B.3 Previous Inventories

The Climate Protection Campaign (CPC) assessed community and municipal GHG emissions for a number of years as part of the 2008 Community CAP. Emissions were estimated for the years 1990 and 2010 as part of the 2008 CAP. CPC also prepared emissions estimates for every year between 2000 and 2011.

Community emissions included emissions for the entire county, including both the cities and the unincorporated areas. These inventories used slightly different methods and data sources from those used in the inventory for CA2020, as data sources have expanded and improved, and methods for calculating emissions have grown more robust. This appendix identifies important

¹ Stationary source emissions were not included because the County and communities have limited jurisdictional control over stationary sources, and large stationary point source emissions are regulated by the State of California (under Assembly Bill 32 through cap-and-trade) and through the U.S. Environmental Protection Agency (under the Clean Air Act) for GHG emissions. Thus, for the larger stationary point sources, local regulation of such sources (as part of CA2020) can be duplicative of state and federal authority.

² The GWP values used in the backcast, inventory, and forecast are 1 for CO₂, 28 for CH₄, and 265 for N₂O (Intergovernmental Panel on Climate Change 2013).

³ An *emissions sink* is a natural or artificial reservoir that accumulates and stores GHG or carbon-containing compounds for an indefinite period.

differences in activity data, emission factors, and methods that explain the different estimate of GHG emissions for 1990 and 2010 between those prepared previously by CPC and those prepared for CA2020.

The previous community inventories included emissions for building energy, on-road transportation, solid waste, and agriculture. The new inventory, backcast, and forecast contained in CA2020 include additional emissions sectors to encompass more sources of emissions and provide a more comprehensive picture of emissions associated with the county.

B.4 Inventory Year

The inventory year is 2010. The year 2010 was chosen because complete or nearly complete activity data are available for 2010 for all sectors to support inventory preparation. Socioeconomic data for 2010, including population, employment, and housing figures, have been developed for the county by the Sonoma County Transportation Authority (SCTA) and the Association of Bay Area Governments (ABAG) and are largely based on the 2010 U.S. Census. For sectors where 2010 data are not available, appropriate scaling methodologies were developed to project activity data to 2010. Any actions initiated by communities to reduce GHG emissions implemented prior to 2010 are accounted for in the inventory and forecasts.

B.5 1990 Backcast

A backcast to 1990 levels was developed primarily using socioeconomic information (i.e., population, households, and employment) for each emissions sector to “backcast” from the 2010 inventory. 1990 activity data and 1990 emission factors were used where available for relevant emissions sectors. The development of a 1990 emissions backcast for the communities allows for the comparison of the GHG inventory, forecasts, and effect of GHG reduction measures to 1990 levels per the countywide GHG reduction target.

B.6 2015, 2020, 2040, and 2050 Business as Usual Forecasts

The BAU forecasts for 2015, 2020, 2040, and 2050 primarily use socioeconomic metrics to scale the inventory year (2010) data. A unified set of socioeconomic data (population, jobs (potentially jobs by type), and households) has been developed by SCTA.

Additional methods of forecasting 2010 activity and emissions data to each forecast year have been used depending on the sector and availability of data. For example, water consumption and wastewater generation projections are available in Urban Water Management Plans (UWMPs). SCTA’s Sonoma County Travel Demand (SCTM) model was used to develop the transportation forecasts. The methods used for forecasting for each sector are discussed below.

B.7 Inventory Boundaries and Socioeconomic Data

As noted above, the BAU forecasts for 2015, 2020, 2040, and 2050 use socioeconomic metrics to scale the inventory year data. However, the jurisdictional boundaries change over time due to annexations from the unincorporated county, so socioeconomic projections were adjusted to eliminate artificial decreases in GHG emissions for the unincorporated county for CA2020 planning purposes. A description of this adjustment is discussed below.

Rohnert Park has indicated that they will reach full-buildout of their current General Plan by 2020. Assuming that city limit population, employment, and housing provided by SCTA for the entire county (and all other cities) remains constant, then the unincorporated county numbers would need to be adjusted downward to include the Rohnert Park buildout projections while not increasing the countywide totals.

Because these socioeconomic data (which represent the city-limits of each city and the area outside of the city-limits for the unincorporated county) were used to forecast emissions in most sectors, unincorporated county emissions would decline from 2015 to 2020 based on the downward adjustment performed to incorporate Rohnert Park's full buildout projections. This is not a real decline in emissions; it is merely a shift in the assignment of emissions from the unincorporated county to Rohnert Park.

To avoid this artificial decline in emissions for the unincorporated county, emissions for the unincorporated county are only associated with the *area outside the sphere of influence*⁴ of each city for each future year (as opposed to the *area outside city limits*⁵).

In this framework, annexations from Rohnert Park (or any other city) will not affect unincorporated county emissions. Since the cities only annex into their spheres of influence, this annexation will not change the unincorporated county socioeconomic data. Under this scenario, county population, employment, and housing numbers increase each year and emissions do not show an artificial decline due to Rohnert Park's annexations.

This is a more accurate framework with regard to what the unincorporated county will have control over in the future, and is therefore more appropriate for CA2020.

However, this approach was not used for 1990 emissions. Data regarding the spheres of influence for each city for the year 1990 were not available; only city limit data were available. Consequently, 1990 unincorporated county emissions do not represent activities outside the sphere of influence of each city (as is the case for all other years); they represent activities outside the city limits of each city for 1990. This means that the 1990 emissions boundaries for the unincorporated county (on which the GHG emission reduction target is based) are not consistent with the emission boundaries for all other years (i.e., the 1990 boundaries are for city-limits not for spheres of influence).

⁴ "Sphere of influence" refers to the spatial region over which each city has a level of cultural, economic, or political exclusivity.

⁵ "City limits" refers to the defined boundary or border of a city.

Despite the changes in city and unincorporated county boundaries over time, the overall county boundary (in relation to other neighboring counties) has not changed. Thus, there is a higher accuracy in the comparison of the countywide inventory between past years (e.g., 1990), the inventory year (2010), and the forecast years. This is one of the reasons why the GHG emission reduction target⁶ for CA2020 is based on countywide emissions compared to 1990 countywide emission levels overall, and not based on individual community emissions compared to 1990 individual jurisdictional emissions.

B.8 Inventory Protocol

The ICLEI - Local Governments for Sustainability (ICLEI) *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* (October 2012) was used to quantify emissions for 2010 wherever applicable and appropriate. For some sectors, like carbon stock estimates for natural and urban lands, the ICLEI 2012 Community Protocol provides no guidance and alternative protocols were consulted including the Association of Environmental Professionals (AEP) white paper on baseline community inventories (Association of Environmental Professionals 2011) and Intergovernmental Panel on Climate Change (IPCC) (Intergovernmental Panel on Climate Change 2000) methodologies.

B.9 Emission Sectors

The following section includes detailed methods and supporting information for each emission sector included in the 2010 inventory, 1990 backcast, and 2015, 2020, 2040, and 2050 BAU forecasts. For each sector, the following information is provided:

- Overview: a brief description of the emission calculation(s).
- Changes from CPC's Previous Inventory: a brief discussion of the reasons for different emissions estimates in CPC's previous GHG inventories for 1990 and 2010 (Climate Protection Campaign 2008).
- Data and Models: a list of data and models used to calculate emissions.
- Inventory Methods: the detailed methodology for calculating emissions.
- Forecast and Backcast Methods: the detailed methodology for forecasting and backcasting emissions.

B.9.1 Building Energy

Overview

GHG emissions from electricity and natural gas consumption for the residential, commercial, industrial, and institutional sectors for each community.

⁶ The 2008 CAP reduction target is 25% below 1990 levels by 2020 for the entire county.

Changes from CPC's Previous Inventory

1990 Emissions. The primary reason for the change in the emissions estimate compared to the prior CPC 1990 estimate is due to a different emission factor. CPC's average emission factors were 0.645 lbs CO₂e/kWh for electricity and 13.6 lbs CO₂e/therm for natural gas. The average emission factors used for CA2020 are 0.583 lbs CO₂e/kWh for electricity and 11.7 lbs CO₂e/therm for natural gas⁷. CA2020 includes electricity for agriculture and water pumping in the water conveyance sector, while CPC included these emissions in the building energy sector, which is another reason why CA2020 emissions are lower than CPC emissions. CA2020 also includes emissions from Transmission and Distribution (T&D) loss whereas the CPC estimate did not.

2010 Emissions. The primary reason for the change in the emissions inventory is due to a different emission factor. CPC reported an average emission factor of 0.445 lbs CO₂e/kWh for electricity but did not report an emission factor for natural gas. The average emission factors used in CA2020 were 0.446 lbs CO₂e/kWh for electricity and 11.7 lbs CO₂e/therm for natural gas⁸. CA2020 electricity emission factor is slightly different because the 2010 inventory incorporates the emission factor for electricity supplied by Healdsburg Electric (0.386 lbs CO₂e/kWh), in addition to the emission factor for electricity supplied by PG&E (0.445 lbs CO₂/kWh), and also emission factors for CH₄ and N₂O from eGRID (28.49 lbs CH₄/GWh and 6.02 lbs N₂O/GWh, respectively). Electricity for agriculture and water pumping are included in the water conveyance sector, while CPC included these emissions in the building energy sector; this is another reason why CA2020 emissions are lower than CPC emissions. CA2020 also includes emissions from T&D loss in this sector whereas the CPC estimate did not.

Data and Models

- Electricity consumption (kWh) provided by Pacific Gas & Electric Company (PG&E).
- Natural Gas consumption (therms) provided by PG&E.
- Electricity consumption (kWh) provided by the City of Healdsburg (Crowley pers. comm.).
- Utility specific electricity GHG emission factors for PG&E from Climate Registry's Electric Power Sector Protocol (Pacific Gas and Electric 2013).
- State-specific GHG emission factors for electricity (U.S. Environmental Protection Agency 2014).
- State-specific GHG emission factors for natural gas (Climate Registry 2014).

⁷ The electricity emission factor represents emissions from a combination of Pacific Gas & Electric Company (PG&E) electricity and Healdsburg Electric electricity. The PG&E emission factor, 0.572 lbs CO₂e/kWh, and the natural gas emission factor are both from the whitepaper *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, April 2013). The Healdsburg Electric emission factor, 0.002 lbs CO₂e/kWh, was provided by the City of Healdsburg.

⁸ The electricity emission factor represents emissions from a combination of PG&E electricity and Healdsburg Electric electricity. The PG&E emission factor, 0.445 lbs CO₂e/kWh, and the natural gas emission factor are both from the whitepaper *Greenhouse Gas Emission Factors: Guidance for PG&E Customers* (PG&E, April 2013). The Healdsburg Electric emission factor, 0.386 lbs CO₂e/kWh, was provided by the City of Healdsburg.

- Socioeconomic data from SCTA, including population, square footage of commercial and industrial establishments, employment by sector, and number of households.

Inventory Methods

CO₂ emissions from electricity provided by PG&E were estimated by multiplying electricity use by the utility-specific CO₂ emission factor for PG&E from the Climate Registry's Electric Power Sector Protocol report for 2010. This factor (444.64 lbs CO₂e/MWh) represents all emissions related to electricity deliveries in 2010, including owned and purchased power.⁹ An emission factor for the City of Healdsburg municipal electricity utility was provided by the City: 386 lbs CO₂e/MWh (Crowley pers. comm.). Methane (CH₄) and nitrous oxide (N₂O) emissions for both utilities were calculated using U.S. Environmental Protection Agency (U.S. EPA) Emissions & Generation Resource Integrated Database (eGRID) emission factors for the CAMX/WECC region (U.S. Environmental Protection Agency 2014).

GHG emissions from natural gas consumption were calculated by multiplying the natural gas consumption values by state-specific emission factors for the year 2010 from the Climate Registry protocol (Climate Registry 2014).

Electric Power T&D losses were calculated for electricity supplied by both utilities (U.S. Environmental Protection Agency 2014). Upstream emissions from electricity use and refrigerant leakage are not included due to limited jurisdictional control and limited data resources.

Forecast and Backcast Method

2015, 2020, 2040, and 2050 BAU building energy emissions were estimated by projecting 2010 data using the socioeconomic forecasts. Residential energy use was projected using housing data in each of the forecast years. Non-residential use was projected using employment data in each of the forecast years. A future PG&E emission factor was calculated by taking an average of emission factors for a five year period that encompasses the inventory year (2008–2012) to partially neutralize the large annual variability in utility emission factors. PG&E has published future emissions factors out to 2020 but those take into account RPS advancement, whereas the BAU forecast does not take into account future GHG reduction activities.¹⁰

1990 emissions were estimated using CPC's 1990 energy use data (actual activity data). These countywide data were then apportioned to the cities using socioeconomic data (population and employment) for 1990. Electricity use in the agricultural and water pumping category was included in the water conveyance sector. Natural gas in the agricultural and water pumping category was included in the building energy sector.

⁹ The emission factor varies from year to year because of a variety of factors that influence a utility's ratio of owned to purchased power and the source of generation (natural gas, hydroelectric, coal, etc.). The emission factor is higher in years when a utility purchases more power to meet California electricity demand. Thus, the emission factor for any given year can vary and also varies widely by utility company.

¹⁰ BAU Forecasts do not include Sonoma Clean Power. This is included in the GHG emission reduction analysis described in Appendix C.

B.9.2 On-Road Transportation

Overview

GHG emissions from fuel consumption in on-road vehicles.

Changes from CPC's Previous Inventory

1990 Emissions. The primary reason for the change in the emissions estimate is mostly due to a different emission factor: CPC's average emission factor is 778.2 g CO₂e/mile, while the CA2020 average emission factor is 599.0 g CO₂e/mile. CPC used the CACP model to determine fuel consumption using average fleet fuel efficiency values. The EMFAC model emission factors and fleet mix for Sonoma County for 1990 were used in CA2020, which is the current state of the practice for emissions inventories. The difference in emissions is also partly to a different conversion factor from daily vehicle miles traveled (VMT) to annual VMT: CPC's factor is 365, while the CA2020 factor is 347, as recommended by SCTA. This conversion factor leads to different estimate of annual VMT for 1990: 3,008 million annual VMT for CPC versus 2,860 million annual VMT for CA2020.

2010 Emissions. The primary reason for the change in the emissions inventory is likely because of different annual VMT and different emission factors. CA2020 uses SCTA's daily VMT using an Origin-Destination method for the county, along with the conversion factor from daily VMT to annual VMT of 347. CPC did not report 2010 VMT for the county, but they likely used MTC VMT along with a conversion factor of 365 days per year. Because CPC did not report VMT, it is uncertain what their average emission factor is. CPC used the CACP model to determine fuel consumption using average fleet fuel efficiency values. CA2020 used the EMFAC model emission factors and fleet mix for Sonoma County for 2010, which is the current state of the practice for emissions inventories. The average emission factor used in CA2020 is 508.6 g CO₂e/mile for 2010.

Data and Models

- VMT provided by the SCTA's SCTM model.
- Annualized VMT and trips provided by SCTA, aggregated by community and for speed increments ("speed bins") of 5 miles per hour (mph) from 0 to 65 mph
- California Air Resources Board's (ARB) EMFAC2011 model¹¹.
- Fuel emission factors from the Climate Registry (Climate Registry 2014).

Inventory Methods

Quantification of on-road transportation emissions followed the 2012 ICLEI Community Protocol. VMT was provided by SCTA for 2010. The VMT was not separated by vehicle type but contained all

¹¹ The Emissions Factor (EMFAC) model is a transportation model issued by the California Air Resources Board. It includes a set of emission factors that represent the vehicle fleet, speeds, and environmental conditions that can be useful in performing project-level air quality modeling.

on-road vehicles in the county, including passenger vehicles, heavy-duty trucks, transit buses, etc. To convert daily VMT to annual VMT, a factor of 347 days per year, obtained in consultation with SCTA staff, was used. To determine VMT by community, SCTA apportioned one-half of the trip distance for any trip with an origin or destination within a community. This eliminates apportioning through-trips on freeways or major arterials to the communities containing them, while adding regional traffic burden to land uses generating trips on a 50/50 split. This is the current recommended approach of the State's Regional Targets Advisory Committee and provides a better accounting of VMT associated with land use community than approaches that apportion VMT on a pro-rata share or on the basis of VMT that occurs within the boundaries of a community. This approach can also help to reveal potential differences in VMT generation that can be useful during future land use and GHG reduction planning. The VMT by speed bin, and the corresponding speeds and outputs from the EMFAC2011 model, were used to determine emission factors that were used to quantify the GHG emissions for on-road vehicles.

Forecast and Backcast Methods

VMT for model validated years (2010 and 2040) were used to interpolate VMT for 1990, 2015, 2020, 2040, and 2050. EMFAC2011 CO₂ emission factors are available through 2030 and were used to estimate emissions for all years except 2040 and 2050. Emission factors for 2040 and 2050 were estimated by linearly extrapolating emission factors from 1990–2030. CH₄ and N₂O emission factors were assumed to remain constant beyond 2030.

VMT from the SCTA model was not available for 1990. Based on guidance from SCTA, 1990 VMT for the entire county was obtained from the Highway Performance Monitoring System (HPMS). Speed and community distributions from 2010 were used to apportion the countywide HPMS VMT.

B.9.3 Off-Road Transportation and Equipment

Overview

GHG emissions from off-road vehicles and equipment (e.g., recreational, harbor craft, rail yard, private airport, lawn and garden, agricultural, commercial, and industrial equipment).

Changes from CPC's Previous Inventory

This sector was not included in CPC's 1990 backcast or 2010 inventory.

Data and Models

- Data from ARB's OFFROAD2007 and OFFROAD2011 model.
- ARB's Diesel Off-road On-line Reporting System.

Inventory Methods

For quantification of off-road emissions, the 2012 ICLEI Community Protocol was generally followed. The 2012 ICLEI Community Protocol recommends using U.S. EPA's NONROAD model,

but this analysis used ARB's OFFROAD model, because it is more specific to California communities than the NONROAD model.

Off-road vehicle and equipment emissions are difficult to quantify for individual communities, as there is no specific tracking of off-road equipment on a sub-county level basis. ARB's OFFROAD model provides estimates for emissions at the county level for a variety of off-road equipment types, including construction equipment, lawn and garden equipment, airport ground support equipment, and recreational equipment. County-level data from the OFFROAD2007 model were used as the foundation of the analysis. Additional data were obtained from the ARB from their 2011 Diesel Off-road On-line Reporting System (DOORS) model that revises some of the diesel fuel consumption values to reflect statewide diesel regulation that wasn't included in the 2007 model. The resulting emissions were allocated to each of the communities of the county based on housing, population, or employment (depending on the equipment type). While the 2012 ICLEI Community Protocol doesn't include employment as a metric to allocate emissions, employment was used to allocate emissions for certain equipment types (e.g., construction) for this analysis. Employment data are typically more accessible than the ICLEI-recommended metric of building permits. This analysis is based on the model's default assumption of annual hours of operation for all equipment in the county.

The output from the OFFROAD model includes emissions from airport ground support equipment (GSE) at small public and private airports located throughout the county (such as the Petaluma Municipal Airport and the Sonoma County Airport). Airport GSE are used to transport passengers as well as baggage and freight, to support maintenance and repair functions, and to provide power to various service functions. They include tugs for airplane pushback and hook-up, carts for moving people and materials, vehicles, forklifts and lifts, belt and container loaders, and other equipment. They also include vehicles such as light duty trucks that are used for airplane maintenance and fueling on the air-side of airport operations. Airport GSE does not include aircraft engines. Airport GSE emissions were allocated to each city using airport operations instead of socioeconomic data.

Emissions from on-site off-road agricultural equipment are included under this sector. Agricultural equipment emissions are proportionally biased to the unincorporated county inventory because nearly all agricultural activity occurs in the unincorporated county. Total agricultural equipment emissions were allocated to each community using crop acreage data for the total county and each community.

Emissions from freight rail equipment are not included due to lack of jurisdictional control of this source of emissions and limited activity in the county.

Forecast and Backcast Methods

2015, 2020, 2040, and 2050 BAU off-road emissions were estimated using the OFFROAD model, which was run for each forecast year through 2040, the furthest future year available in the model. Off-road emissions in the year 2050 were scaled using the growth in the socioeconomic data between 2040 and 2050. Depending on the equipment type, growth in population, households, or

employment was used to project emissions from 2040 to 2050. Emissions from agriculture and airport GSE equipment were projected using linear extrapolations of crop data and airport operations data.

Emissions in 1990 were backcast using output from the model and allocated to the communities using socioeconomic data, crop data, and airport operations data.

B.9.4 Solid Waste Generation

Overview

GHG emissions associated with the decomposition of waste generated by each community.

Changes from CPC's Previous Inventory

1990 Emissions. The primary change in the emissions estimate is due to a different emission factor for waste. Both inventories include the same waste tonnage for 1990 (521,779 tons), but the emission factors likely differ. The CPC emission factor is not available. The average emission factor used in CA2020 is 0.735 MTCO₂e/ton from the 2012 ICLEI Community Protocol. The CA2020 emission factor represents emissions from the average ton of mixed municipal solid waste because waste profile data was not available for the year 1990.

2010 Emissions. The primary reason for the change in the emissions inventory is likely due to a different emission factor for waste. CA2020 uses 355,477 total tons of waste to estimate emissions for the county for 2010. CPC did not report their 2010 waste tonnage for the county, so it is not possible to compare the tonnage numbers or the emission factors. The average emission factor used in CA2020 is 0.390 MTCO₂e/ton, which represents a number of emission factors for different waste types as reported in the 2012 ICLEI Community Protocol. This factor is higher than the 1990 factor because the waste profile for 2010 differs from 1990.

Data and Models

- Tons of waste (residential and commercial) sent to landfills in the inventory year provided by the Sonoma County Waste Management Agency (SCWMA).
- 2003 Sonoma County Solid Waste Generation Study (R3 Consulting Group 2003).
- Emission factors from the 2012 ICLEI Community Protocol.

Inventory Methods

Per the 2012 ICLEI Community Protocol for indirect future emissions from community-generated waste during the inventory year, total tons of waste (residential and commercial) sent to landfills in the inventory year and waste profile data were used in conjunction with equations from ICLEI. The total tons of waste by community and landfill in 2010 were provided by SCWMA. Waste profile

data were obtained from CalRecycle¹². Waste profile data include the percentage of waste types disposed within the county (e.g., 17% food waste, 3% textiles). Emission factors for each waste type (food waste, textiles, etc.) were obtained from the 2012 ICLEI Community Protocol, which are based on the U.S. EPA's Waste Reduction Model (WARM), and were multiplied by the corresponding waste amounts generated in each community to calculate future indirect emissions. Emissions from the Redwood Landfill were calculated separately using the ICLEI equations, as that landfill has a known methane collection rate of 90%. The other landfills that the county's waste is sent to were assumed to have a 75% methane collection rate, consistent with the default rate specified by ICLEI.

Emissions from composting and combustion of solid waste were not included in the inventory due to data availability issues, as CalRecycle does not provide this data. These sources are likely minor emissions sources.

Forecast and Backcast Methods

2015, 2020, 2040, and 2050 solid waste emissions were estimated by scaling 2010 year waste generation data and waste emissions using socioeconomic data from SCTA. Residential waste and waste emissions were scaled using population data, while commercial waste and waste emissions were scaled using employment data.

1990 emissions were estimated using 1990 waste generation tonnage from the *2003 Sonoma County Solid Waste Generation Study* to determine per-capita waste generation (R3 Consulting Group 2003). This per-capita number was multiplied by the 1990 population of each community to get tons of waste by community. The 2010 breakdown of residential and commercial waste was applied to 1990 waste. The 2012 ICLEI Community Protocol emission factor for mixed municipal solid waste was used for 1990 emissions (waste profile data was not available for 1990).

B.9.5 Wastewater Treatment

Overview

Fugitive GHG emissions from the treatment of industrial, residential, commercial, and institutional wastewater produced within each community that is treated at municipal wastewater treatment plants (WWTPs).

Changes from CPC's Previous Inventory

This sector was not included in CPC's 1990 backcast or 2010 inventory.

Data and Models

- 2012 ICLEI Community Protocol equations for emissions calculations.

¹² CalRecycle is California's leading authority on recycling, waste reduction, and product reuse. Officially known as the Department of Resources Recycling and Recovery, CalRecycle plays an important role in the stewardship of California's vast resources and promotes innovation in technology to encourage economic and environmental sustainability.

- Wastewater treatment data from the Sonoma County Water Agency (SCWA) (the Sanitation Districts) and the individual communities who operate WWTPs.

Inventory Methods

Energy consumed to operate any WWTP that is located within a community's borders is included in the building energy sector and not in the wastewater treatment sector.

Fugitive emissions from wastewater treatment were calculated following the 2012 ICLEI Community Protocol equations for each component of wastewater treatment. Each municipal wastewater facility that serves Sonoma County was contacted to request data, including population served, cubic feet of digester gas produced and combusted per day (if applicable), fraction of methane in digester gas (if applicable), BOD5 load¹³, the fraction of BOD5 removed during treatment, gallons of wastewater treated per day, and information regarding any existing methane capture, combustion, or energy conversion programs. The data obtained from the WWTPs were used in conjunction with the ICLEI equations to determine fugitive wastewater emissions. GHG emissions from septic systems were estimated using the ICLEI equation for septic systems and default percentages of septic users in rural and urban areas, and population.

Forecast and Backcast Methods

1990, 2015, 2020, 2040, and 2050 BAU wastewater emissions were estimated for each community by scaling 2010 emissions using population data for those years.

B.9.6 Water Conveyance

Overview

Water consumption-related emissions originate from energy used to transport, treat, and pump of water to the county or each community. Emissions from water conveyance were estimated for the following sources: 1) the energy associated with water conveyance and treatment *within* each community (such as local pumps distributing water within that community's boundaries) and 2) energy associated with water conveyance from *outside* each community (such as regional pumps delivering water from the State Water Project to a community's borders).

Changes from CPC's Previous Inventory

This sector was not included in CPC's 1990 backcast or 2010 inventory.

Data and Models

- Water consumption (gallons) in the inventory year (2010) for each community from the UWMPs for the county's water retailers and from a few cities.
- Water supply sources for each community.

¹³ BOD5 = biochemical oxygen demand of wastewater during decomposition occurring over a 5-day period

- Energy intensity factors from the 2012 ICLEI Community Protocol, the City of Healdsburg, and SCWA.

Inventory Methods

Water consumption values in 2010 were obtained from individual UWMPs for each community, which provide a standard template of water sources and demand projections for current and future years. Additional water use data was supplied by Cloverdale, Sebastopol, and Healdsburg. For the unincorporated county, a per capita water value was averaged for the Valley of the Moon Water District and the Sweet Water Springs water district. This per capita value was applied to the entire unincorporated county population.

Water energy transmission factors (in units of kWh per million gallons of water conveyed) were obtained from SCWA for all of the cities served by SCWA. Water pumping energy use for Healdsburg was provided by the City, and water pumping energy intensities for other communities that use groundwater were estimated using the ICLEI factor of 4.45 kWh per million gallon of well foot depth. Well depth was estimated based on California Department of Water groundwater bulletins.

Total gallons of water were multiplied by the energy intensity factors described above, based on the source of the water (imported water, groundwater, surface water, etc.) to calculate electricity from water use. Energy used to distribute and treat SCWA water is provided by PG&E and the Power and Water Resources Pooling Authority (PWRPA). Energy used to pump and treat groundwater is provided by PG&E and PWRPA. Energy used to distribute and treat recycled water is provided by PG&E and PWRPA. For PWRPA, the 2009 PWRPA emission factor was used to estimate emissions. For PG&E, the emission factors as described in the building energy sector above were used to estimate emissions.

Water-related energy use was subtracted from the building energy sector to avoid double-counting. T&D losses associated with water-related electricity were also included in this sector (details provided in the building energy sector section above). Emissions calculations were based on electricity emission factors as described in the building energy sector.

It should be noted that agriculture predominantly uses well water directly pumped from agricultural lands. This water was not provided by water retailers and was therefore not contained in the UWMPs used as data sources for this sector. Consequently, agricultural well water and other sources of water that is not provided by water retailers was not included in the GHG inventory.

Forecast and Backcast Methods

Water-related emissions in 2015 and 2020 were estimated using the relevant water retailer UWMPs, which provide water projection estimates for future years, including 2015 and 2020. Water consumption in 2040 and 2050 was estimated by scaling 2020 water consumption using population data for 2040 and 2050. Future year water consumption for each community was

multiplied by the appropriate water intensity factors assumed for 2010. It was assumed that Cloverdale and Sebastopol will get 100% of its water from groundwater for all future years.

1990 emissions were estimated using CPC's 1990 electricity use data (actual activity data) for the agricultural and water pumping category. These countywide data were apportioned to the cities using 2010 water profile data along with socioeconomic data (population and employment). For 1990, the eGRID emission factors were used (see building energy sector for details). This leads to a much higher estimate of emissions in 1990 than for other years.

B.9.7 Agriculture

Overview

GHG emissions from manure management (fugitive emissions of methane and nitrous oxide), enteric fermentation (fugitive emissions of methane and nitrous oxide), and fertilizer use (fugitive emissions of nitrous oxide). Agriculture emissions are only reported at the countywide level and not for individual communities.

Changes from CPC's Previous Inventory

1990 Emissions. The primary reason for the change in the emissions estimate is likely due to a different emissions estimation methodology and different emission factors. The livestock counts are likely the same, because CA2020 uses the livestock numbers from the County's 1990 crop report. While CPC does not report the livestock numbers used in their 1990 inventory, they likely used the 1990 crop report. CA2020 followed the 2012 ICLEI Community Protocol methodology for enteric fermentation and manure management. It is unclear what method CPC used to calculate these emissions. CA2020 also includes fertilizer emissions, which CPC likely did not (although the available documentation does not indicate whether CPC included fertilizer emissions).

2010 Emissions. The reasons for the difference in the emissions inventory for 2010 are the same as noted above for the 1990 backcast.

Data and Models

- CropScape Geographic Information System (GIS) database from National Agricultural Statistics Service (NASS).
- The Sonoma County Agricultural Commissioner's 2010 Crop Report.
- Standard emissions factors from U.S. EPA and ARB.

Inventory Methods

Emissions from agricultural vehicles were included in the Off-Road Transportation and Equipment sector. It should be noted that the 2012 ICLEI Community Protocol does not include agricultural vehicle-related emissions with other agricultural emissions.

Manure management emissions were calculated using livestock population numbers from Sonoma County 2010 Crop Report (Sonoma County Agricultural Commissioner 2011). Standard emissions factors from the 2012 ICLEI Community Protocol, U.S. EPA, and ARB, and equations specific to manure management were used to estimate emissions resulting from manure use for the livestock population in the county (ICLEI – Local Governments for Sustainability 2012; U.S. EPA 2013; ARB 2011). Similarly, emissions resulting from enteric fermentation were calculated using livestock population numbers from the Agriculture Commissioner, standard emissions factors from the 2012 ICLEI Community Protocol, ARB and U.S. EPA, and equations specific to enteric fermentation from these sources.

Emissions resulting from fertilizer use were calculated using crop acres from the County 2010 crop report multiplied by emission factors from the U.S. EPA based on methods outlined in the 2012 ICLEI Community Protocol.

Forecast and Backcast Methods

2015, 2020, 2040, and 2050 BAU agricultural emissions were estimated by scaling 2010 agricultural emissions by changes in specific agricultural lands/crops as anticipated in the Sonoma County General Plan for 2020 (Sonoma County Permit and Resource Management Department 2008). For crops not forecasted by the general plan, historical trends of changes in county crop acreages from NASS CropScape for 2008–2012 were used to forecast future crop acreages (USDA 2013).

1990 manure management and enteric fermentation emissions were estimated using livestock numbers from the Sonoma County 1990 Crop Report along with methods outlined in the 2012 ICLEI Community Protocol (Sonoma County Agricultural Commissioner 1991; ICLEI – Local Governments for Sustainability 2012). 1990 livestock emission factors from the U.S. 2012 GHG Inventory (Annex 3) were used where available (U.S. Environmental Protection Agency 2013). 1990 emissions from fertilizer were estimated by scaling 2010 emissions using crop acreages from 1990 crop report.

B.9.8 Stationary Sources (Informational Only)

Industrial/Commercial

Overview

GHG emissions from stationary (typically industrial) combustion of fossil fuels of any type *except* natural gas (which is accounted for in the building energy use sector) and fugitive emissions from industrial processes for each community. These emissions are reported for informational purposes only and are not included in the backcast, inventory, and forecast because the County and communities have limited jurisdictional control over stationary sources, and large stationary point source emissions are regulated by the State of California (under AB 32 through cap-and-trade) and through the U.S. EPA (under the Clean Air Act) for GHG emissions. Thus, for the larger stationary point sources, local regulation of such sources (as part of CA2020) can be duplicative of state and federal authority.

Changes from CPC's Previous Inventory

This sector was not included in CPC's 1990 backcast or 2010 inventory.

Data and Models

- GHG emissions associated with fuel consumption from the Bay Area Air Quality Management District (BAAQMD) and the North Sonoma County Air Pollution Control District (NSCAPCD) by facility.

Inventory Methods

GHG emissions data for all facilities in Sonoma County under both air districts that have jurisdiction over the county were provided by BAAQMD and NSCAPCD.

Forecast and Backcast Methods

1990 backcast and 2015, 2020, 2040, and 2050 BAU industrial/commercial stationary source emissions were estimated by scaling total 2010 emissions by employment data for those years.

Residential

Overview

Calculation of GHG emissions from residential combustion of fossil fuels of any type *except* natural gas (accounted for in the building energy use sector). This may include fuel oil, kerosene, and wood.

Changes from CPC's Previous Inventory

This sector was not included in CPC's 1990 backcast or 2010 inventory.

Data and Models

- U.S. Census data from the American Community Survey (ACS).
- Energy Information Administration's (EIA) Residential Energy Consumption Survey (RECS) dataset.
- EIA State Energy Data System (SEDS).
- Emission factors from the 2012 ICLEI Community Protocol and Climate Registry protocols.

Inventory Methods

Quantification methods consistent with the 2012 ICLEI Community Protocol to quantify GHG emissions from residential fuel combustion were used. The number of households in the county that use each type of fuel (i.e., fuel oil, kerosene liquefied petroleum gas, wood) were obtained from ACS data. Fuel consumption per household was approximated using state-level fuel use from the EIA SEDS for each fuel type and the number of households statewide that use each fuel type from the RECS. Fuel use in Sonoma households was determined by multiplying the

approximated fuel use per household by the number of households obtained from the ACS. Emissions were then determined by multiplying the Sonoma County fuel use for each fuel type by the corresponding emission factors from the 2012 ICLEI Community Protocol, and Climate Registry protocols. Countywide emissions were allocated to each community using housing data.

Forecast and Backcast Methods

1990 backcast and 2015, 2020, 2040, and 2050 BAU residential fuel use emissions were estimated by scaling total 2010 emissions using household data for those years.

B.10 Carbon Stock Sectors

The following section includes detailed methods and supporting information for three carbon stock sectors provided for informational purposes. The sectors include agricultural carbon stock, non-agricultural rural lands carbon stock, and urban forest carbon stock. These sectors represents total carbon storage and not sequestration or emissions. Storage of carbon in these lands represents an emissions “sink” because soil and vegetation remove carbon dioxide from the atmosphere. However, since carbon cycling in existing soil and vegetation is part of global atmospheric carbon cycling, the 2012 ICLEI Community Protocol recommends that emissions sinks associated with global atmospheric carbon cycling be disclosed but not combined with other emissions created by human activity in an emissions inventory. Units presented are in metric tons of carbon (MTC), not MTCO₂e.

For each carbon stock sector, the following information is provided:

- Overview: a brief description of the carbon stock calculation(s)
- Data and Models: a list of data and models used to calculate carbon stock
- Inventory Methods: the detailed methodology for calculating carbon stock
- Forecast and Backcast Methods: the detailed methodology for forecasting and backcasting carbon stock

Carbon stock was not included in CPC’s 1990 backcast or 2010 inventory for the county.

Agricultural Carbon Stock

Overview

Carbon storage in agricultural rural land soil and vegetation, including rangelands/pasture, croplands, and vineyards estimated as total stock, nominally as of 2010.

Data and Models

- The Sonoma County Agricultural Commissioner’s 2010 Crop Report.
- Sonoma County Estimates of 2010 Carbon Stocks by Landcover Class and Carbon Pool (Dogwood Springs Forestry 2013).

- Baseline Greenhouse Gas Emissions for Forest, Range and Agricultural Lands in California (California Energy Commission 2004).
- Carbon Sequestration in California Agriculture, 1980 – 2000 (Kroodsma and Field 2006)

Inventory Methods

To determine agricultural carbon stock, crop data from the Sonoma County 2010 Crop Report (Sonoma County Agricultural Commissioner 2011) were used in conjunction with values for soil carbon stock per acre for rangeland, croplands, and vineyards from the report *Sonoma County Estimates of 2010 Carbon Stocks by Landcover Class and Carbon Pool* (Dogwood Springs Forestry 2013) and aboveground carbon stock estimates per acre for rangeland (grassland) and non-vineyard crops from the *Baseline Greenhouse Gas Emissions for Forest, Range and Agricultural Lands in California* (California Energy Commission 2004) and the aboveground carbon stock estimate per acre from the report *Carbon Sequestration in California Agriculture, 1980–2000* (Kroodsma and Field 2006). The amount of acres of each crop type was multiplied by the appropriate carbon stock per acre factor.

Forecast and Backcast Methods

A forecast and backcast of agricultural carbon stock was not conducted due to lack of future land use cover data. Although future land use data may be available from the County’s 2020 General Plan and 1990 forest land may be available from the California Department of Conservation’s Farmland Mapping and Monitoring Program (FMMP) historical maps, these data sources are not detailed enough to forecast and backcast base year agricultural carbon stock accurately.

Non-Agricultural Rural Lands Carbon Stock

Overview

Carbon stock in vegetation and soil in natural rural lands in the county such as oak woodlands, riparian woodlands, and shrublands estimated as total stock, nominally as of 2010.

Data and Models

- Sonoma County Estimates of 2010 Carbon Stocks by Landcover Class and Carbon Pool (Dogwood Springs Forestry 2013).
- U.S. Forest Service Forest Inventory and Analysis plots for the county.
- U.S. Department of Agriculture Forest Service and U.S. Department of Interior LANDFIRE program.
- Soil Survey Geographic (SSURGO) database for the county.
- Environmental Systems Research Institute ArcGIS extension “Soil Data Viewer”

Inventory Methods

Approximately 40% of Sonoma County's land cover is forested vegetation. The forested land cover contains higher levels of carbon than other vegetative land cover due to the volume in standing live and dead trees. Carbon in standing live and dead trees was calculated for any land cover class where data indicated the presence of trees in the Dogwood Springs Forestry report (2013). This included forest cover classes and urban cover classes. The approach to estimating carbon in standing live and dead trees includes the following steps (please refer to Dogwood Springs Forestry 2013 for additional detail):

1. Deriving county-level inventory estimates using US Forest Service Forest Inventory and Analysis (FIA) plots in Sonoma County. This created a statistically viable estimate of standing live and dead trees at the county level.
2. Using the individual FIA plots to estimate carbon in standing live and dead trees for specific strata, or combinations of LANDFIRE cover, size, and density classes. This allowed for allocation of the estimate from Step 1 to more resolute spatial areas.
3. Estimating the below-ground proportion of standing live and dead trees for each LANDFIRE stratum by applying a percentage to the above-ground estimate.

Soil carbon stock estimates were calculated through a GIS analysis by intersecting soil data polygons with geo-spatial data on LANDFIRE strata which include land cover, size and density attributes. Soil carbon per acre was determined by obtaining soil organic matter values and soil bulk density values at a depth of 0–30 cm available in the SSURGO database for the county. The Environmental Systems Research Institute (ESRI) ArcGIS extension "Soil Data Viewer" was used to aggregate the Organic Matter and Bulk Density estimates needed to generate the soil organic carbon estimates. Soil organic carbon was calculated in metric tons per acre. Overlaying these soil values with the LANDFIRE strata led to the generation of soil carbon values for each stratum, using a weighted average.

Estimates of carbon stock in shrubs, lying dead wood, and litter and duff were calculated for forested LANDFIRE cover classes using a tool called the Carbon Online Estimator (COLE) developed by the National Council for Air and Stream Improvement, Incorporated (NCASI - <http://www.ncasi2.org/>) and the U.S. Forest Service. COLE relies on FIA data to generate estimates. Since FIA data is limited to land cover types in forested vegetation, COLE cannot provide estimates of these pools for non-forested vegetation. COLE is an online tool that enables users to query the most recent U.S. Forest Service FIA data available. Queries can be conducted at a variety of spatial scales, including county scale data. In this analysis, a query was conducted for Sonoma County plots.

Shrubland land cover is approximately 30% of Sonoma County's overall land cover, based on LANDFIRE stratification. Besides carbon associated with soils, carbon associated with shrub, mainly chaparral, provides a substantial contribution to the overall carbon storage in this land cover type. Estimates of carbon storage associated with shrub vegetation were estimated for each LANDFIRE stratum dominated by shrubs by comparing LANDFIRE strata (species, size, and

density) with similar species compositions, vegetation height, and density found in biomass studies conducted by the Pacific Northwest Research Station of the US Forest Service (see: <http://depts.washington.edu/nwfire/dps/>). The website provides links to a photo series that displays the vegetation, identifies the species composition in the photo, and provides estimates of the biomass associated with the vegetation type.

Forecast and Backcast Methods

A forecast and backcast of carbon stock was not conducted due to lack of future land use cover data. Although future land use data may be available from the County’s 2020 General Plan and 1990 forest land may be available from FMMP historical maps, these data sources are not detailed enough to forecast and backcast base year carbon stock accurately.

Urban Forest Carbon Stock

Overview

Carbon storage from urban forested lands estimated as total stock, nominally as of 2010. The emissions sink potential of the existing urban forest can provide a useful comparison to the emissions sources in the inventory or to changes in the emissions sink that might result from future land use change.

Data and Models

- Sonoma County Estimates of 2010 Carbon Stocks by Landcover Class and Carbon Pool (Dogwood Springs Forestry 2013).
- U.S. Forest Service Forest Inventory and Analysis plots for the county.
- U.S. Department of Agriculture Forest Service and U.S. Department of Interior LANDFIRE program.
- SSURGO database for the county.
- Environmental Systems Research Institute ArcGIS extension “Soil Data Viewer”

Inventory Methods

The methods for Urban Forest Carbon Stock are the same as those for forested areas described above for Non-Agricultural Rural Lands Carbon Stock.

Forecast and Backcast Methods

A forecast and backcast of carbon stock was not conducted due to lack of future land use cover data. Although future land use data may be available from the County’s 2020 General Plan and 1990 forest land may be available from FMMP historical maps, these data sources are not detailed enough to forecast and backcast base year carbon stock accurately.

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Appendix C

Reduction Measure Details and Analysis Methods

C.1 Introduction

This appendix summarizes the calculations and assumptions used to quantify greenhouse gas (GHG) reductions and monetary costs and savings for the local, regional, and state measures included in the Sonoma Climate Action 2020 (CA2020) Community Climate Action Plan (CAP). The primary objective for each measure is provided along with information on measure implementation. The appendix begins with a general overview of the GHG and economic analysis, followed by specific details regarding each of the state, regional, and local emissions reduction strategies.

C.2 Overview of Analysis Methods

Emission reductions achieved by strategies were quantified using guidance provided by the California Air Resources Board (ARB), California Air Pollution Control Officers Association (CAPCOA), California Energy Commission (CEC), and the professional experience of the lead consultant obtained from preparing climate action plans for other jurisdictions in California. Most calculations were performed using standard factors, references, and assumptions rather than a detailed analysis of individual technologies. GHG savings attributed to the individual strategies exclude emissions reductions achieved by other overlapping actions. This avoids double counting emissions benefits and enables a cumulative assessment of emissions reductions achieved by CA2020. All reductions were quantified in terms of metric tons of carbon dioxide equivalent (MTCO₂e) and represent the annual emissions savings in 2020, compared to business-as-usual (BAU).

CA2020 also includes an analysis of 2040 and 2050 emissions reductions for the state measures under two scenarios. The first scenario includes only committed state policies as of 2014. The second scenario includes state policies that have been considered but are not yet adopted, as well as potential technology and market futures based on current proven technologies. The second scenario does not rely on any unproven technologies or assumptions about markets or personal behavioral shifts that are thought to be infeasible.

Monetary costs and savings are estimated using information specific to the county, when available, or for similar cities in the region, California, or United States, prioritized in that order. Most data are from public sources, including municipal governments in California, the California Public Utilities Commission (CPUC), Pacific Gas & Electric Company (PG&E), United States

Department of Energy (DOE), CEC, and U.S. Environmental Protection Agency (EPA). Costs estimated include initial capital cost and programmatic costs. Savings include reduced costs associated with electricity, natural gas, fuel usage, and required maintenance. Ranges were provided for most strategies due to the uncertainties and variability associated with estimating project costs. In general, ranges reflect differences in price estimates for technologies, based on the use of multiple data sources.

C.3 Presentation Framework and Common Assumptions

The following sections present a detailed overview of the emissions reduction strategies and analysis procedures. Measures are grouped by overall CA2020 reduction measure goal (see Chapter 4 for more information), and then grouped into state, regional, and local categories. The following information is provided for all strategies, as available.

1. **Objective:** Describes the intent and overall goal for each measure.
2. **Impact on Local Emissions:** Explains how the measure will affect emissions from local activities, including the annual expected GHG reduction achieved by 2020.
3. **Implementation Information:** Provides a summary of implementation actions that are associated with each measure, community-specific implementation information can be found in Chapter 5.
4. **Assumptions:** Identifies assumptions used in calculating emission reductions and cost. Table C-1 includes a master list of assumptions for reference across many or most measures.
5. **Analysis Method:** Provides an overview of the method(s) for calculating GHG reductions and costs for both 2020 and for 2040/2050. Sufficient detail is presented to provide a basic overview of the approach, as opposed to an exhaustive list of all calculations and steps. In general, each measure uses similar methods to determine reductions for 2020 and for 2040/2050. In many cases, the only difference between 2020 and 2040/2050 is the data used for the calculations (e.g., socioeconomic data, water & electricity consumption, waste tons). Methods for quantifying costs/savings are also described here for applicable measures.
6. **Activity Data Sources:** Explains the source key activity data.
7. **Responsible Entities:** Lists agencies, departments, and other actors who are responsible for the success of the measure.
8. **Key Progress Indicators:** Identifies key data that can be collected to evaluate progress over time.

As noted in Table C-1 below, many of the same standard conversions and emissions factors are used to evaluate emissions reductions and costs for multiple strategies. Table C-3 presents the socioeconomic data for each community for each year.

Table C-1. Master List of Quantification Assumptions for the CAP

Parameter	Value	Unit	Source
Global Warming Potential			
CO ₂	1	-	IPCC 2013
CH ₄	28	-	IPCC 2013
N ₂ O	265	-	IPCC 2013
Conversions			
Days per year	365	days/year	Standard conversion
Pounds per metric ton	2,204.62	pounds/MT	Standard conversion
Kilograms per metric ton	1,000	kilograms/MT	Standard conversion
Grams per metric ton	1,000,000	grams/MT	Standard conversion
Grams per kilogram	1,000	grams/kilograms	Standard conversion
Metric ton per kilogram	0.001	MT/kg	Standard conversion
Therms per million British thermal units (MMBtu)	10	therms/MMBtu	Standard conversion
Energy use ratio: Single Family: Multi-family housing—Electricity	1.97	-	EIA 2009
Energy use ratio: Single Family: Multi-family housing—Natural gas	2.27	-	EIA 2009
Kilowatt-hour (kWh) per megawatt-hour (MWh)	1,000.00	kWh/MWh	Standard conversion
MWh per gigawatt-hours (GWh)	1,000.00	MWh/GWh	Standard conversion
kWh per GWh	1,000,000.00	kWh/GWh	Standard conversion
Minutes per hour	60.00	minutes/hour	Standard conversion
metric ton per ton	0.91	MT/ton	Standard conversion
Million gallons per gallon	0.0000010	million gallons/ gallon	Standard conversion
watts per kilowatt	1,000	W/kW	Standard conversion
Energy Ratio for gasoline	33.4	kWh/gallon-gasoline	CAPCOA 2010, VT-3, Page 310
Energy Ratio for diesel	37.7	kWh/gallon-gasoline	CAPCOA 2010, VT-3, Page 310

Parameter	Value	Unit	Source
gallons per acre-foot	325,851	gal/ac-ft	Standard conversion
Emission Factors			
2010 Energy			
Electricity			
CO ₂ (PG&E Electricity)	0.445	lbs/kWh	PG&E 2014a
CO ₂ (Healdsburg Electric Utility)	0.386	lbs/kWh	Crowley pers. comm.
CO ₂ (eGRID Electricity)	0.611	lbs/kWh	eGRID 9 th Edition v1.0 - CAMX
CO ₂ (Power & Water Resources Pooling Authority [PWRPA])	0.173	lbs/kWh	Sonoma County Water Agency
CH ₄	0.0000285	lbs/kWh	eGRID 9 th Edition v1.0 - CAMX
N ₂ O	0.0000060	lbs/kWh	eGRID 9 th Edition v1.0 - CAMX
Natural Gas			
CO ₂ (PG&E natural gas)	11.7	lbs/therm	PG&E 2013
CH ₄	0.005	kg/MMBtu	ICLEI Community Protocol - Table B.3
N ₂ O	0.0001	kg/MMBtu	ICLEI Community Protocol - Table B.3
Propane			
CO ₂	61.46	kg/MMBtu	ICLEI Community Protocol - Table B.4
CO ₂	5.59	kg/gal	ICLEI Community Protocol - Table B.4
CH ₄	0.011	kg CH ₄ /MMBtu	ICLEI Community Protocol - Table B.4
N ₂ O	0.0006	kg N ₂ O/MMBtu	ICLEI Community Protocol - Table B.4
Gasoline			
CO ₂	8.78	kg/gal	ICLEI Community Protocol - Table B.1
Diesel			
CO ₂	10.21	kg/gal	ICLEI Community Protocol - Table B.1

Parameter	Value	Unit	Source
2020 Energy			
Electricity			
CO ₂ (PG&E BAU)	0.500	lbs/kWh	Calculated by ICF (see Measure 2-S1)
CO ₂ (PG&E RPS-adjusted)	0.290	lbs/kWh	PG&E 2013
CO ₂ (Healdsburg Utility BAU)	0.386	lbs/kWh	Crowley pers. comm.
CO ₂ (Healdsburg Utility RPS-adjusted)	0.309	lbs/kWh	Crowley pers. comm.
CO ₂ (eGRID CAMX Region RPS-adjusted)	0.422	lbs/kWh	Calculated by ICF (see Measure 2-S1)
CO ₂ (PWRPA RPS-adjusted)	0.173	lbs/kWh	Simons pers. comm.
CO ₂ (Sonoma Clean Power – CleanStart)	0.203	lbs/kWh	Mersich pers. comm. and calculated (see Measure 2-S1)
CO ₂ (Sonoma Clean Power – EverGreen)	0.070	lbs/kWh	Sonoma Clean Power.
CO ₂ Non-Renewable System Power (“unspecified sources”)	0.944	lbs/kWh	ARB 2013
CH ₄ (PG&E and eGRID RPS-adjusted)	0.00002	lbs/kWh	Calculated by ICF (see Measure 2-S1)
N ₂ O (PG&E and eGRID RPS-adjusted)	0.0000042	lbs/kWh	Calculated by ICF (see Measure 2-S1)
T&D losses	6.84%	lbs/kWh	U.S. EPA 2014a
Offroad			
CO ₂ (gasoline)	8.78	kg/gal	Climate Registry Default Emission Factors 2014, Table 13.1
CO ₂ e (gasoline)	8.85	kg/gal	Calculated using CH ₄ and N ₂ O emission factors along with GWPs
CO ₂ (diesel)	10.21	kg/gal	Climate Registry Default Emission Factors 2014, Table 13.1
CO ₂ e(diesel)	10.30	kg/gal	Calculated using CH ₄ and N ₂ O emission factors along with GWPs
CO ₂ (liquefied petroleum gas [LPG])	5.79	kg/gal	Climate Registry 2013 EFs, Table 13.1
CO ₂ (compressed natural gas [CNG])	6.84	kg/gallon gas equivalent (gge)	Calculated using values below

Parameter	Value	Unit	Source
CH ₄ (agricultural gasoline)	1.26	grams/gal	Climate Registry 2013 EFs, Table 13.7
CH ₄ (agricultural diesel)	1.44	grams/gal	Climate Registry 2013 EFs, Table 13.7
CH ₄ (gasoline)	0.50	grams/gal	Climate Registry 2013 EFs, Table 13.7
CH ₄ (diesel)	0.58	grams/gal	Climate Registry 2013 EFs, Table 13.7
CH ₄ (LPG)	0.50	grams/gal	ICLEI U.S. Community Protocol Table TR.6.C.1
CH ₄ (CNG)	7.08	g/gge	Calculated using values below
N ₂ O (gasoline)	0.22	grams/gal	Climate Registry 2013 EFs, Table 13.7
N ₂ O (diesel)	0.26	grams/gal	Climate Registry 2013 EFs, Table 13.7
N ₂ O (LPG)	0.22	grams/gal	ICLEI U.S. Community Protocol Table TR.6.C.1
N ₂ O (CNG)	0.63	g/gge	Calculated using values below
CNG conversion to CO ₂	0.001906992	MT CO ₂ /m ³	Standard conversion
CNG conversion to CH ₄	0.000001973	MT CH ₄ /m ³	Standard conversion
CNG conversion to N ₂ O	0.000000176	MT N ₂ O/m ³	Standard conversion
CNG conversion to GGE	3.58689496	m ³ /gge	Standard conversion

Notes:

CAPCOA = California Air Pollution Control Officers; CEC = California Energy Commission; EIA = Energy Information Administration; EPA = U.S. Environmental Protection Agency; IPCC = Intergovernmental Panel on Climate Change; PG&E = Pacific Gas and Electric Company.

Table C-2. Trip Proportions in the County

Community	Home-Work	Home-School	Home-Other	Home-Home
Cloverdale	19%	9%	40%	31%
Cotati	15%	6%	43%	36%
Healdsburg	19%	11%	36%	34%
Petaluma	19%	9%	38%	34%
Rohnert Park	17%	8%	39%	36%
Sebastopol	16%	8%	38%	38%
Sonoma	17%	9%	41%	34%
Windsor	18%	10%	41%	30%
Unincorporated County	18%	10%	47%	25%

Table C-3. Socioeconomic Data by Community and Year

Community	1990	2010	2015	2020	2040	2050
Population						
Cloverdale	4,924	6,831	8,618	9,015	9,425	10,952
Cotati	5,714	6,471	7,265	7,483	7,777	8,809
Healdsburg	9,469	10,915	11,254	11,285	11,402	11,799
Petaluma	43,184	55,743	57,941	59,440	61,122	68,542
Rohnert Park	36,326	43,148	40,971	42,590	47,232	50,804
Santa Rosa	113,313	147,595	167,815	174,141	199,702	235,919
Sebastopol	7,004	7,774	7,379	7,497	7,613	8,188
Sonoma	8,121	9,128	10,648	11,009	11,165	11,692
Windsor	13,371	22,744	26,801	27,295	28,190	32,663
Unincorporated Sonoma County	146,796	148,265	145,186	147,094	126,139	138,961
Households						
Cloverdale	1,868	2,495	3,249	3,432	3,625	4,230
Cotati	2,281	2,532	3,041	3,162	3,321	3,777
Healdsburg	3,613	4,021	4,471	4,483	4,530	4,687
Petaluma	16,062	20,386	22,198	22,862	23,508	26,362
Rohnert Park	13,404	15,697	16,143	16,941	18,787	20,208
Santa Rosa	45,901	57,578	64,938	68,067	78,826	93,511
Sebastopol	2,842	3,321	3,345	3,431	3,521	3,803
Sonoma	3,866	4,373	5,060	5,123	5,196	5,441
Windsor	4,912	7,589	8,970	9,418	9,828	11,435
Unincorporated Sonoma County	54,633	54,411	58,357	59,249	51,801	57,373
Employment						
Cloverdale	2,455	3,012	3,624	3,928	4,324	4,492
Cotati	2,940	3,217	3,413	3,714	4,302	4,502
Healdsburg	6,926	7,351	7,399	7,447	7,447	7,447
Petaluma	26,145	31,537	33,644	35,738	38,488	39,897

Community	1990	2010	2015	2020	2040	2050
Rohnert Park	15,288	15,038	17,393	21,460	21,460	21,460
Santa Rosa	58,761	73,670	79,667	87,224	95,253	98,422
Sebastopol	4,301	5,102	5,507	6,147	6,668	6,827
Sonoma	4,937	5,746	6,350	6,954	7,978	8,178
Windsor	4,898	8,963	9,609	10,283	11,280	11,626
Unincorporated Sonoma County	45,413	41,486	44,367	47,257	49,852	51,579

C.4 State Emissions Reduction Strategies

C.4.1 State Reductions by Goal for 2020

State measures apply to all communities in Sonoma County. They are implemented by state agencies but will affect emissions at the local level in each community. For example, CPUC will implement the Renewables Portfolio Standard (RPS), which applies to all municipal and investor-owned utilities and therefore the emissions associated with electricity consumed in the county.

Methods for calculating GHG reductions associated with state reduction strategies were adopted from the Assembly Bill (AB) 32 Scoping Plan (California Air Resources Board 2008, 2013). The statewide reductions were scaled to Sonoma County communities using activity data, such as socioeconomics, energy use, vehicle miles traveled (VMT), etc. These measures were assumed to be implemented first, before any regional or local reduction measures. Thus, regional measures build on state measures, and local measures build on regional measures.

C.4.2 State Reductions by Goal for 2040 and 2050

State measure reductions for 2040 and 2050 were estimated using one scenario that relied only on committed policies and a second scenario including committed policies, uncommitted policies as well as foreseeable technology and market futures. These two scenarios were drawn from a 2013 study, *Estimating Policy-Driven Greenhouse Gas Emissions Trajectories in California: The California Greenhouse Gas Inventory Spreadsheet (GHGIS) Model* by Jeffery Greenblatt of Lawrence Berkeley National Laboratory, which presented statewide emissions between 2010 and 2050. This study did not present a BAU scenario, where emissions increase with growth in the absence of any reduction efforts. Thus in order to identify reductions compared to BAU, CA2020 uses growth factors for BAU from 2010 to 2050 from a CEC report, *Scenarios for Meeting California's 2050 Climate Goals*, by Max Wei et al. (2013).

These growth factors were then applied to the 2010 base inventory used in the Greenblatt 2013 study, in order to derive an approximate 2010 to 2050 BAU case comparable with the Greenblatt 2013 different scenario cases. By comparing the state reductions between the BAU forecast and the two 2010 to 2050 state reduction scenarios, reduction percentages for each sector were derived. These reduction percentages were then applied to the BAU forecast for the different Sonoma County communities examined in this study. Specific reductions for individual state measures for 2040 or 2050 were not identified; the analysis was limited to identifying reductions on a sector basis.

C.5 Regional Measures

Regional measures apply to the entire county or multiple communities. Entities like the Sonoma County Energy Independence Office (SCEIO) offer programs that are available to residents in every

community. In other instances, such as Sonoma Clean Power (SCP) or the North Sonoma County Air Pollution Control District (NSCAPCD), services from regional entities are available only to communities within the agency's jurisdiction. They are implemented by regional agencies but will affect local emissions in each community. For example, SCP provides its customers with renewable energy, which reduces emissions associated with standard grid-supplied electricity from PG&E.

The reductions were calculated using measure-specific data from regional agencies applied at the community level. These measures were assumed to be implemented second, after state measures but before local measures. Thus, regional measures build on state measures, and local measures build on regional measures. This order of operations helps avoid double-counting emission reductions from state and regional measures.

C.6 Local Measures

Local measures will be implemented by participating cities and by the County. Each jurisdiction will implement its own suite of local measures, depending on the individual goals, capabilities, and characteristics in each community. Each jurisdiction has also chosen the level of participation for each local measure (e.g., the percentage of homes or businesses participating).

The reductions were calculated using measure-specific data at the community level. These measures will build upon state and regional measures and are assumed to be implemented after state and regional measures. This approach helps avoid double-counting emission reductions from state and regional measures.

C.7 Goal 1: Increase Building Energy Efficiency

Measure 1-S1. Title 24 Standards for Commercial and Residential Buildings

Objective: Title 24 requires that buildings be designed to conserve energy and water. CALGreen mandatory and voluntary measures became effective on January 1, 2011. The current energy efficiency standards in Title 24 were adopted in 2013 and took effect on January 1, 2014. The standards are planned to be updated periodically in the future.

Impact on Local Emissions: Title 24 will reduce the amount of electricity and natural gas consumed in buildings within the Sonoma County communities. Reduced electricity consumption reduces demand from power plants that generate GHG emissions. Reduced natural gas consumption results in direct GHG emission reductions from combustion in buildings (such as for natural gas water heaters). These reductions occur within the geographic boundaries of the communities. This measure would reduce GHG emissions in the building energy sector. Total countywide reductions from this measure are anticipated to be 14,440 MTCO₂e.

Implementation Information: The California Building Standards Commission is responsible for adopting and updating Title 24 standards, which then become the default standards for

communities throughout the state. Building departments in each Sonoma County community implement this measure through local building code adoption.

Assumptions:

- State action would apply to new buildings constructed between 2010 and 2020.
- Energy efficiency in the single-family and multi-family residential 2013 Title 24 Standards (effective 2014) increased by 25% and 14%, respectively, relative to the 2008 Standard (California Energy Commission 2012). Energy efficiency in the residential standards is assumed to increase by 17% every 3 years after 2014.
- Energy efficiency in the nonresidential 2013 Title 24 Standard (effective 2014) increased by 30%, relative to the 2008 Standard (California Energy Commission 2012). Efficiency is assumed to increase by 7% every 3 years after 2014.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. This measure only applies to new building construction occurring after 2010, and therefore only new energy consumed from 2010–2020. This is about 9–15% of countywide energy use in 2020.
2. Energy reductions in 2020 for each community were calculated based on the assumed energy efficiency increases in the Title 24 standards and the annual fraction of new energy (energy consumed for buildings constructed from 2011–2020) subject to each code revision (33% of new energy consumption subject to the 2008 code [years 2011–2013], 33% of new energy consumption subject to the 2014 code [years 2014–2016], and 33% of new energy consumption subject to the 2017 code [years 2017–2019]). Energy efficiency increases were multiplied by annual electricity and natural gas consumption in 2020 from new development (new development energy for this measure is considered to be the difference between 2020 consumption and 2010 consumption) to get the amount of energy reduced.
3. Emissions reductions achieved by the measure were quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: The California Building Standards Commission and building departments in each community.

Key Progress Indicators: Electricity use (kilowatt-hours [kWh]) and natural gas use (therms) in each community.

Measure 1-S2. Lighting Efficiency and Toxins Reduction Act (AB 1109)

Objective: Assembly Bill 1109 (2007), the Lighting Efficiency and Toxins Reduction Act, is structured to reduce statewide electricity consumption from indoor residential lighting by at least 50% from 2007 levels, and by at least 25% from 2007 levels for indoor commercial and outdoor

lighting, by 2018. CEC is required to prescribe, by regulation, standards for energy conservation and efficiency, including the adoption of efficiency standards for outdoor lighting.

Impact on Local Emissions: Measure 1-S2 will reduce the amount of electricity consumed in buildings for lighting within all Sonoma County communities. Reduced electricity consumption reduces demand from power plants that generate GHG emissions. Total countywide reductions from this measure are anticipated to be 21,085 MTCO₂e.

Implementation Information: CEC is responsible for implementing this measure through the prescription of minimum efficiency lighting standards affecting all lighting sold in Sonoma County. Implementation of this measure would be gradual through 2020 as older lighting is replaced with newer, more efficient lighting.

Assumptions:

- The percentage of electricity used for other appliances and lighting is 58.5% (calculated from EIA 2009, Table CE4.10 values for the “Marine” Region).
- The percentage of “other appliances and lighting” that is lighting is 50%
- State action would apply to buildings constructed before 2010.
- 5.2% of nonresidential electricity is used for outdoor lighting (California Energy Commission 2006).
- 28.9% of nonresidential electricity is used for indoor lighting (California Energy Commission 2006).
- 17.2% of residential electricity is used for indoor lighting (California Energy Commission 2014).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Electricity usage from lighting in existing residential and nonresidential developments was estimated by multiplying energy use in 2010 by the fraction of energy that is used for outdoor and indoor lighting, as indicated above.
2. Energy reductions achieved by AB 1109 were calculated by multiplying the estimated lighting consumption by the state goals for residential and nonresidential developments.
3. GHG emissions reductions achieved by the measure were quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: CEC and local lighting vendors.

Key Progress Indicators: Electricity use (kWh) for indoor residential lighting and indoor commercial and outdoor lighting in each community.

Measure 1-S3. Industrial Boiler Efficiency

Objective: This measure would require one or more of the following: annual tuning of all boilers, the installation of an oxygen trim system, and/or a non-condensing economizer to maximize boiler efficiency. A source could also replace an existing boiler with a new one that is equipped with these systems. This measure would be implemented gradually as industrial facilities replace boilers.

Impact on Local Emissions: Measure 1-S3 will reduce the amount of natural gas consumed in industrial buildings within the Sonoma County communities. Reduced natural gas consumption results in direct emission reductions from combustion in buildings. These reductions occur within the geographic boundaries of the communities. This measure would reduce GHG emissions in the building energy sector. Total countywide reductions from this measure are anticipated to be 345 MTCO₂e.

Implementation Information: ARB is responsible for implementing this measure.

Assumptions:

- The percentage of industrial natural gas emissions affected by this measure would be 80%.
- The boiler practices included in this measure will reduce statewide industrial natural gas emissions by 5% in 2020 (California Air Resources Board 2013).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. ARB estimates that implementation of the Industrial Boiler Efficiency measure will reduce statewide emissions from industrial natural gas use by 4% (this assumes 80% of the industrial natural gas in the state is affected, multiplied by a 5% reduction) (California Air Resources Board 2008a).
2. GHG reductions achieved by each community for this measure were quantified by multiplying 2020 BAU emissions from industrial natural gas consumption in new development by 0.04 (or 4%). Reductions from existing development were quantified by multiplying 2010 emissions from industrial natural gas consumption by 0.04.
3. New industrial natural gas consumption was determined by subtracting natural gas consumption in 2010 from natural gas consumption in 2020.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: ARB.

Key Progress Indicators: Natural gas use (therms) for industrial boilers and the number of industrial boiler efficiency projects implemented in each community.

Measure 1-C1. Community Energy Efficiency Retrofits for Existing Buildings

Objective: This measure encompasses all existing programs to improve the energy efficiency of community buildings (including homes and businesses) through retrofits. Existing programs which provide access to funding and other incentives include:

- Sonoma Property Assessed Clean Energy (PACE) Financing Marketplace including the Sonoma County Energy Independence Program (SCEIP) financing product
- Sonoma County Energy Watch (SCEW)
- Windsor PAYS program

Actual energy savings data (kWh and therms) were used to estimate GHG reductions for this measure.

Impact on Local Emissions: This measure will reduce the amount of electricity and natural gas consumed in buildings within the Sonoma County communities. Electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Reduced natural gas consumption results in direct emission reductions from combustion in buildings (such as for natural gas water heaters). These reductions occur within the geographic boundaries of the communities. This measure also reduces emissions from the water and wastewater sectors in addition to the building energy sector. Total countywide reductions from this measure are anticipated to be 3,954 MTCO₂e.

Implementation Information: County of Sonoma Energy and Sustainability Division (ESD) is the lead entity responsible for implementing the Sonoma PACE Financing Marketplace including the SCEIP product. ESD and PG&E are the lead entities responsible for implementing the SCEW program, and the Town of Windsor is the lead entity responsible for implementing its PAYS program. The Bay Area Regional Energy Network (BayREN) is another entity responsible for implementing energy efficiency programs in the county. Healdsburg Electric implements energy efficiency programs in its service area. The water service providers also implement energy efficiency upgrades through water conservation measures. Community Action Partnerships will play a role to help the communities expand energy retrofits throughout the county. The Regional Climate Protection Authority (RCPA) and local communities are working with each of these entities to develop outreach efforts to residences and businesses to use any further funding.

Assumptions:

- As noted above, actual energy savings data (kWh and therms) were used to estimate GHG reductions for this measure and thus no assumptions about market penetration or types of retrofits were necessary to estimate direct building energy reductions. However, in order to derive the secondary reductions in the water sector reductions, a number of assumptions had to be developed as indicated below.

- The following water use breakdown by end use was assumed (ConSol 2010, Yudelson 2010):

End Use	Percentage
Residential Outdoor Water Use	57%
Residential Indoor Water Use	43%
Nonresidential Outdoor Water Use	35%
Nonresidential Indoor Water Use	65%

- The percentage of residences with electric water heaters is 40.3% (EIA 2009)
- The percentage of commercial buildings with electric water heaters is 39.89% (EIA 2003 Pacific Region, table B32)
- The percentage of residences with natural gas water heaters is 56.5% (EIA 2009)
- The percentage of commercial buildings with natural gas water heaters is 60.11% (EIA 2003, Pacific Region, table B32)
- The amount of electricity required to heat gallon of hot water is 0.18 kWh/gallon (EPA 2010a)
- The amount of natural gas required to heat gallon of hot water is 0.009 therms/gallon (EPA 2010a)
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800
All Other Communities	111	725	800

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Actual energy (kWh and therms) and water savings (gallons) associated with the energy programs above were researched and obtained from RCPA with assistance from other entities. These are real energy savings achieved over the past few years.
2. Building energy-related GHG emissions reductions achieved by this measure were quantified by multiplying the actual energy reductions achieved by each program in 2014 by the appropriate RPS-adjusted utility emission factors. Actual energy reductions are:

Community	Total Annual Electricity Savings in 2014 (kWh)			Total Annual Natural Gas Savings in 2014 (therms)		
	PACE	Windsor PAYS	SCEW	PACE	Windsor PAYS	SCEW
Cloverdale	217,868	-	-	1,833	-	-
Cotati	317,148	-	-	47	-	-
Healdsburg	142,433	-	-	1,293	-	-
Petaluma	917,157	-	-	4,070	-	-
Rohnert Park	605,846	-	-	2,762	-	-
Sebastopol	301,641	-	-	4,758	-	-
Sonoma	230,894	-	-	982	-	-
Windsor	795,011	76,317	-	3,939	25,200	-
Unincorporated County	7,483,919	-	-	67,335	-	-
Countywide	-	-	10,536,311	-	-	27,443

3. Water energy-related reductions were quantified by:

- a. Multiplying the expected water savings by the water energy intensity factors
- b. Multiplying the resulting electricity values by the RPS-adjusted utility emission factors.
- c. Reductions in building energy consumption were calculated by multiplying the water savings by the percentage of hot water used in buildings, an assumed proportion of gas and electric water heaters, and the amount of energy it takes to heat a gallon of water for both heater types.

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020.

Activity Data Sources: Energy savings data from SCEIP/PACE, SCEW, and Windsor PAYS.

Responsible Entities: SCEIP/PACE, SCEW, and Windsor PAYS in collaboration with the communities.

Key Progress Indicators: Electricity savings (kWh) and natural gas savings (therms) in each community for each energy efficiency program.

Measure 1-C2. Expand Community Energy Efficiency Retrofits Program

Objective: Promote energy efficiency in existing residential buildings and commercial buildings, and remove funding barriers for energy efficiency improvements. Achieve the voluntary residential and nonresidential energy efficiency retrofit goals outlined in Table C-3 by 2020. Providing a variety of retrofit packages allows homeowners to select and customize retrofit options that meet their needs. RCPA will work with the communities to help businesses and

consumers anticipate implementation and compliance efforts and costs with the anticipated higher state standards.

Table C-3. Voluntary Energy Efficiency Retrofit Goals

Retrofit Level	Implementation Goal	Minimum Retrofits	Approx. % Energy Reduction
Level I	60% of participating existing single-family homes	<ul style="list-style-type: none"> Replace interior high use incandescent lamps with compact fluorescent lights Seal air leaks 	19% (elec) 9% (gas)
Level II	25% of participating existing single-family homes	<ul style="list-style-type: none"> All <i>Level I</i> retrofits Seal duct leaks Install a programmable thermostat Replace windows with double-pane, solar-control low E-argon gas wood frame windows 	22% (elec) 19% (gas)
Level III	15% of participating existing single-family homes	<ul style="list-style-type: none"> All <i>Level II</i> retrofits Insulate the attic Replace natural gas furnaces with ENERGY STAR labeled models Replace clothes washers with ENERGY STAR labeled models Replace refrigerators with models 15% better than standard ENERGY STAR labeled models Replace dishwashers with ENERGY STAR labeled models Replace gas water heaters with efficient models (EF = 0.62) 	32% (elec) 39% (gas)
Multi-family	10% of existing multi-family homes	<ul style="list-style-type: none"> Will vary on a case-by-case basis. Retrofits should reduce energy consumption (electricity and natural gas) by at least 15%, relative to existing conditions. 	15%
Nonresidential	5% of existing nonresidential buildings	<ul style="list-style-type: none"> Will vary on a case-by-case basis. Retrofits should reduce energy consumption (electricity and natural gas) by at least 20%, relative to existing conditions. 	20%

Source: U.S. Department of Energy 2013a

Impact on Local Emissions: This measure will reduce the amount of electricity and natural gas consumed in buildings within the Sonoma County communities. Electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Reduced natural gas consumption results in direct emission reductions from combustion in buildings (such as for natural gas water heaters). These reductions occur within the geographic boundaries of the communities.

Energy efficiency upgrades at residential, commercial and industrial buildings will reduce energy consumption and could provide a variety of co-benefits for residents and the workforce. For example, a well-built energy-efficient structure is more durable and directly reduces certain health risks (e.g., mold, dust mites). Energy efficient buildings also improve general comfort by equalizing room temperatures and reducing indoor humidity. Total countywide reductions from this measure are anticipated to be 12,394 MTCO₂e.

Implementation Information: SCEIO and RCPA are the lead agencies for implementing this measure. ESD and RCPA will work with the participating communities to implement energy efficiency retrofits. Actions may include: Implementing a low-income weatherization program, expanding energy efficiency outreach/education campaigns targeted at residents and businesses, promoting the smart grid, funding and scheduling energy efficiency tune-ups, promoting energy efficiency management services for large energy users and promoting energy efficiency financing tools.

Another action under this measure would be to support voluntary building energy efficiency audits such as those being delivered through the BayREN Home Energy Score pilot as part of real estate transactions through outreach and linkage to potential funding sources. The intent would be to make energy efficiency a routine part of a purchaser's considerations when buying residential or commercial real estate. In addition, expanding voluntary audits may be additional motivation for residential and commercial owners to invest in energy efficiency improvements to increase real estate value prior to sale.

Assumptions:

- Measure goals apply to “existing” residential and nonresidential buildings constructed before 2017.
- In 2020, 10% of all existing single-family and multi-family homes participate in this measure; 5% of all nonresidential buildings participate.
- In 2040, 20% of all existing single-family and multi-family homes participate in this measure; 20% of all nonresidential buildings participate.
- In 2050, 50% of all existing single-family and multi-family homes participate in this measure; 50% of all nonresidential buildings participate.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Energy savings associated with the single-family retrofit levels were estimated using the DOE's Home Energy Saver™ (HES).
2. Electricity and natural gas savings provided by the HES were multiplied by the single family home participation rate, the implementation goals (see Table C-3) and the estimated number of homes in 2017 to obtain total energy reductions for single-family residences.

3. Energy reductions achieved by multi-family retrofits were quantified assuming the upgrades would reduce energy consumption by 15%, relative to BAU conditions.
4. GHG emissions reductions achieved by the measure were quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.
5. Energy reductions achieved by nonresidential retrofits were quantified assuming the upgrades would reduce facility-wide energy use by 20%.
6. This reduction was multiplied by the forecasted electricity and natural gas consumption for participating buildings constructed before 2017.
7. Energy savings from the overlapping state and local measures were removed from the energy forecast to avoid double counting.
8. GHG emissions reductions achieved by the measure were quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. For single-family home reductions, the number of homes in 2017 was multiplied by the single-family participation rate chosen by each community and then by the measure implementation goals.
2. For multi-family homes, the number of multi-family homes in 2017 was multiplied by the multi-family participation rate chosen by each community and then by the assumed 15% reduction in energy consumed used in the 2020 analysis.
3. For nonresidential buildings, non-residential electricity and natural gas consumption was multiplied by the non-residential participation chosen by each community and then by the assumed 20% reduction in energy consumed used in the 2020 analysis.
4. All energy reductions were multiplied by the 2020 utility emission factors (the RPS-adjusted factor was used for electricity reductions).

Activity Data Sources: Energy consumption and savings data from the DOE's HES.

Responsible Entities: ESD and RCPA in collaboration with the communities.

Key Progress Indicators: Electricity savings (kWh) and natural gas savings (therms) in each community (or total electricity or natural gas consumption to reflect reduced usage).

Measure 1-L1. Expand the Green Building Ordinance Energy Code

Objective: Require new residential and nonresidential development to exceed CALGreen Title 24 standards through Tier 1 voluntary standards (15% reduction from 2010 Title 24 standards) or Tier 2 (30% reduction from 2010 Title 24 standards). This could involve requiring new development to comply with CALGreen Tier 1 or Tier 2 standards or another percentage beyond Title 24. Extend

this requirement to apply to future updates to the Title 24 code until zero net energy is achieved. Incorporate green building principles and practices into the planning, design, construction, management, renovation, operations, and demolition of all new buildings.

The percentage requirement beyond Title 24 standards for new homes and new nonresidential buildings in each community is as follows:

Community	Percentage Beyond Title 24 Standards 1
Cloverdale	-
Cotati	-
Healdsburg	-
Petaluma	-
Rohnert Park	-
Sebastopol	-
Sonoma	-
Windsor	10%
Unincorporated County	-

Impact on Local Emissions: This measure will reduce the amount of electricity and natural gas consumed in new and remodeled buildings within the communities by requiring a percentage energy reduction beyond the minimum CALGreen code.

Reducing electricity use directly reduces GHG emissions arising from electricity generation, although the emission reductions may not occur within the communities themselves. Reduced natural gas combustion (such as for natural gas water heaters) also results in direct emission reductions that will occur within the communities. Total countywide reductions from this measure are anticipated to be 80 MTCO₂e.

Implementation Information: Each community would be responsible for developing and implementing a new Green Building Ordinance consistent with the goals chosen as part of this measure.

Assumptions:

- All new buildings (residential and nonresidential) built in 2017 and later must comply with the Green Building Ordinance (GBO).
- The ratio of single-family household electricity and natural gas use to multi-family household electricity and natural gas use is 1.97 and 2.27, respectively (Energy Information Administration 2009)¹

¹ These ratios were calculated using electricity- and natural gas-use data from Table CE4.10 from the U.S. Energy Information Administration 2009 RECS Survey Data.

- Sonoma County communities are located in climate zone 4 (CAPCOA 2010).
- The energy reduction for each 1% improvement over 2008 Title 24 standards for Climate Zone 4 is as follows (CAPCOA 2010):
 - 0.09% reduction in electricity use for single-family homes
 - 0.91% reduction in natural gas use for single-family homes
 - 0.12% reduction in electricity use for multi-family homes
 - 0.88% reduction in natural gas use for multi-family homes
 - 0.27% reduction in electricity use for commercial buildings
 - 0.71% reduction in natural gas use for commercial buildings
- Energy reduction estimates for a 1% reduction beyond the most recent 2013 Title 24 standards are not available, so the CAPCOA 2008 standards estimates are used as a proxy.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Energy reductions associated with overlapping measures were subtracted from the energy used by all new buildings built from 2017 to 2020. This was done in order to determine the energy used by new buildings after the implementation of preceding measures, before the application of the new GBO.
2. New energy use (2017–2020) for single-family and multi-family homes was estimated by multiplying total residential energy use by the ratios listed in the assumptions section above, taking into consideration the number of single-family and multi-family homes within each community.
3. Energy reductions (electricity and natural gas) were then estimated by multiplying the new energy use for single-family homes, multi-family homes, and nonresidential buildings by the percentage reduction beyond T24 as specified by each community (e.g., 10% in the Town of Windsor) and then multiplying by the appropriate reduction factor each 1% reduction beyond 2008 T24 standards.
4. GHG emissions reductions achieved by this measure were quantified by multiplying the energy reductions for each building type by the appropriate utility emission factors, adjusted to account for renewable energy content.

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020.

Activity Data Sources: Energy use data from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County.

Key Progress Indicators: The number of new homes and businesses compliant with new GBOs, electricity savings (kWh) and natural gas savings (therms) in each community associated with GBO compliance, and/or total electricity or natural gas consumption for new development to reflect reduced usage associated.

Measure 1-L2. Outdoor Lighting

Objective: Adopt outdoor lighting standards to reduce electricity consumption above and beyond the requirements of AB 1109. Replace a certain percentage of incandescent outdoor lighting with light-emitting diode (LED) bulbs by 2020.

The percentage of incandescent outdoor lighting fixtures replaced with LEDs was determined by the communities on an individual basis as follows:

Community	Percentage LED Replacement
Cloverdale	-
Cotati	50%
Healdsburg	80%
Petaluma	50%
Rohnert Park	50%
Sebastopol	25%
Sonoma	80%
Windsor	25%
Unincorporated County	20%

Impact on Local Emissions: This measure will reduce the amount of electricity consumed in buildings within the Sonoma County communities for outdoor lighting. Electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 1,554 MTCO₂e.

Implementation Information: Implementation mechanisms will be chosen by each jurisdiction and may include developing a new ordinance requiring LED outdoor lighting for new development and/or providing incentives for bulb replacement in existing fixtures.

Assumptions:

- Approximately 5.10% of total residential electricity in each community is used for residential outdoor lighting (California Energy Commission 2014).

- Approximately 5.2% of total commercial electricity in each community is used for commercial outdoor lighting (California Energy Commission 2006).²
- In existing development, incandescent lamps are used for 59% of exterior lighting (Department of Energy 2012).
- Installation of an outdoor LED fixture achieves a 75% reduction in energy usage, relative to an incandescent bulb (U.S. Environmental Protection Agency 2011a).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Energy reductions achieved by replacing incandescent bulbs with LED bulbs in existing outdoor residential and non-residential lighting fixtures were calculated by first multiplying residential and non-residential BAU electricity consumption in 2017 by the outdoor electricity percentages listed in the assumptions above (to determine outdoor lighting electricity use).
2. Overlapping electricity reductions from other measures were subtracted from the residential and non-residential 2017 BAU outdoor lighting electricity to avoid double-counting reductions.
3. Residential and non-residential outdoor lighting electricity consumption was then multiplied by 59% to estimate the BAU amount of electricity consumed by incandescent bulbs.
4. This value was multiplied by the LED penetration rate chosen by each community and then by 75% to determine the amount of electricity saved through the use of LED bulbs.
5. GHG emissions reductions were then quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020, because this measure applies to existing development.

Activity Data Sources: Energy use data from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County.

Key Progress Indicators: The number of LED outdoor lights installed/sold, electricity savings (kWh) in each community associated with outdoor lighting upgrades, and/or total electricity consumption for outdoor lighting to reflect reduced usage associated with this measure.

Measure 1-L3. Shade Tree Planting

Objective: Expand on current urban tree planting policies and programs to establish a shade tree planting goal for each community to help reduce building energy use. The communities already

² For the PG&E service area, Figure 9-3.

have different tree planting programs, which vary by location (see Chapter 5 for more information).

The number of trees planted by 2020 was determined by the communities on an individual basis as follows.

Community	
Cloverdale	100
Cotati	100
Healdsburg	100
Petaluma	1,000
Rohnert Park	1,000
Sebastopol	400
Sonoma	50
Windsor	500
Unincorporated County	1,000

Impact on Local Emissions: This measure will provide additional shade around buildings to reduce the “heat island” effect in urban areas. Reducing heat will reduce the amount of electricity needed for cooling, which, in turn, reduces GHG emissions associated with generating electricity at power plants. Although the emission reductions won’t always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 45 MTCO₂e.

Implementation Information: Implementation mechanisms may include:

- establishing goals and funding sources for new trees planted on city/county property
- implementing a requirement to account for trees removed and planted as part of new construction
- requiring new development to plant shade trees (e.g., require a certain number of new trees per dwelling unit, new resident, square footage of building, or size of lot)
- providing rebates for the purchase of new trees and education about the benefits of shade trees and tree care for residents.

Assumptions:

- Tree planting requirements would take effect in 2017.
- Trees are planted adjacent to buildings where shading is provided; trees planted in the public right-of-way in places not providing building shade would not reduce building energy use and were not included in the calculations.

- Average tree planting age is 1 year and 96% of planted trees would survive, based on data from Los Angeles (McPherson et al. 2008).
- Trees would be a mix of maple, oak, and redwood (Sonoma County 2008).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Energy savings from reduced building cooling and energy increases from increased building heating needs were obtained from the U.S. Forest Service's (2011) Tree Carbon Calculator for each tree species. Increases in building heating needs are a small fraction of the energy savings from reduced building cooling.
2. The values were multiplied by the expected number of trees planted.
3. GHG emissions reductions achieved by the measure were quantified by multiplying the total energy reductions by the appropriate RPS-adjusted utility emission factors. Minor GHG increases from increased building heating needs were subtracted from the GHG reductions.
4. Carbon sequestration benefits from shade tree planting were not quantified as they are outside the scope of the CAP.

The communities would incur up-front costs to plant, stake, and mulch trees (assumed to be \$170/tree). Maintenance costs were estimated based on a study conducted by the City of Goleta (2009) (assumed to range from \$15.93 to \$70.39). Cost savings were not calculated for benefits such as air quality, health, property value, or intrinsic value improvements; some studies show a net benefit for trees when these co-benefits are monetized. A lifetime of 40 years for each tree was assumed (McPherson et al. 1999).

Analysis Method – 2040/2050: Reductions in 2040 and 2050 were calculated using the same method as described above. A greater amount of planted trees was selected by each community in 2040 and in 2050 to represent an increasing commitment to plant shade trees.

Activity Data Sources: Energy savings from reduced building cooling from the U.S. Forest Service's Tree Carbon Calculator.

Responsible Entities: Participating cities and the County.

Key Progress Indicators: The number of new trees planted in each community and/or total electricity or natural gas consumption to reflect reduced shading effects on cooling electricity usage associated with this measure.

Measure 1-L4. Co-Generation Facilities

Objective: Optimize the use of locally generated energy by encouraging, where feasible, co-generation facilities in new commercial and industrial facilities greater than 100,000 square feet. The communities will encourage co-generation facilities through a number of actions, such as

amending ordinances, removing regulatory barriers, providing financial incentives, and providing outreach (see implementation information below).

Background: For the same level of power output, combined heat and power (CHP) systems (or co-generation systems) use less input energy than traditional separate heat and power generation, resulting in fewer CO₂ emissions. Co-generation facilities simultaneously generate electricity and useful heat and are typically used in district heating systems, which are used in a central location to distribute heat to multiple buildings or facilities. In traditional power generation systems, heat is a by-product that is wasted by being released into the environment. In contrast, CHP systems harvest the thermal energy and use it to heat nearby buildings or processes, thus reducing the amount of natural gas or other fuel that would otherwise be combusted. In addition CHP systems lower the demand for grid electricity, thereby displacing the CO₂ emissions associated with the production of grid electricity (CAPCOA 2010).

CHP technologies, including microturbines, fuel cells, and reciprocating engines, can be implemented on a scale appropriate for residential neighborhoods, planned communities, mixed-use, and commercial developments. These systems typically have a generation capacity of ranging from 30–2,000 kW (CAPCOA 2010). Combustion turbines and backpressure steam turbines are more appropriate for industrial processes or very large commercial developments (CAPCOA 2010). Typical medium/large systems have capacity of 10 MW or greater (CAPCOA 2010, U.S. EPA n.d.).

The 2020 cogeneration electricity capacity target for each community is as follows:

Community	Co-Generation Goal (MWh)
Cloverdale	-
Cotati	-
Healdsburg	-
Petaluma	10
Rohnert Park	-
Sebastopol	-
Sonoma	-
Windsor	-
Unincorporated County	10

Impact on Local Emissions: This measure will replace grid electricity with electricity supplied by co-generation facilities, which is carbon neutral. Reducing demand for grid electricity will reduce GHG emissions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 3 MTCO₂e.

Implementation Information: Implementation mechanisms in each community could include developing new ordinances or offering incentives for co-generation facilities. For example, a Green Building Ordinance may include LEED certification credits (or other GBO compliance mechanisms) for the use of co-generation. The communities could offer financial incentives for CHP development by securing funding available through partnerships with utilities, state and federal government programs (e.g., tax credits, rebates, grants, and low-interest loans), energy performance contracts³, and non-profit organizations. The communities can also encourage cogeneration by removing any unintended regulatory barriers, such as standard interconnection requirements, net metering, and output-based regulations (U.S. EPA 2014b). The communities would need to identify land uses that would be appropriate for this measure, and then conduct outreach efforts that explain new ordinances or incentives that are being offered. Additional information on the successful implementation of CHP systems, including many case studies, can be found in the U.S. EPA Report *Combined Heat and Power: A Guide to Developing and Implementing Greenhouse Gas Reduction Programs* (U.S. EPA 2014b).

Assumptions: All assumptions used for the analysis of this measure are identified in Table C-1.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. To determine the amount of electricity that would be generated using cogeneration, the goal chosen by each community (i.e., 10 megawatt-hours [MWh]) was converted into kWh.
2. Electricity savings were then multiplied by the appropriate RPS-adjusted utility emission factors to determine GHG reductions.

Analysis Method – 2040/2050: Reductions in 2040 and 2050 were calculated using the same method as described above.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County.

Key Progress Indicators: The number of co-generation projects implemented in each community and/or the capacity (kW) and generation (kWh) for each new CHP facility.

³ “An energy performance contract is an arrangement with an energy service company that bundles together various elements of an energy-efficiency investment, such as installation, maintenance, and monitoring of energy-efficient equipment. These contracts, which often include a performance guarantee to ensure the investment’s success, are typically financed with money saved through reduced utility costs but the systems may also be financed using tax-exempt lease-purchasing agreements.” (U.S. EPA 2014b).

C.8 Goal 2: Increase Renewable Energy Use

Measure 2-S1. Renewables Portfolio Standard

Objective: The RPS obligates investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregators (CCAs) to procure an increasing amount of their electricity from eligible renewable sources. Senate Bill X1-2 (2011) requires regulated entities to meet RPS goals of 20% of retail sales from renewables by the end of 2013, 25% by the end of 2017, and the 33% by the end of 2020.

Impact on Local Emissions: The RPS will reduce the carbon intensity of electricity delivered to the county. Although the emission reductions won't always occur within the geographic boundaries of the communities, the indirect emissions associated with electricity consumed by the communities will be reduced. This measure will reduce GHG emissions in the building energy sector. Total countywide reductions from this measure are anticipated to be 181,793 MTCO_{2e}.

Implementation Information: CPUC, IOUs, ESPs, and CCAs will be responsible for implementing this measure by ensuring that an increasing amount of electricity comes from renewable sources.

Assumptions:

- The 2020 BAU electricity emission factor for PG&E is the average of emission factors from 2008–2012, to account for annual variation in emission factors.
- SCP's CleanStart emission factor will be 30% better than PG&E's 2020 emission factor.
- The 2020 renewable energy portfolio of all electricity supplied to the county is 33%.

Analysis Method - 2020: In 2010, PG&E supplied electricity to most residents in Sonoma County, and the City of Healdsburg municipal utility supplied electricity to Healdsburg residents. As of 2015, most residents in Sonoma County (except Healdsburg) purchase their electricity from SCP and the remainder purchase their power directly from PG&E. The following steps were used to quantify emission reductions for this measure:

1. GHG emissions due to electricity generation for delivery to Sonoma County in the 2020 BAU community emissions forecast were quantified using the utilities' BAU CO_{2e} intensities as of 2010 not assuming any effects of the RPS or the existence of SCP.
2. Because SCP did not exist in 2010, the 2020 BAU forecast uses a PG&E emissions factor for all locations other than Healdsburg.
3. Achievement of the RPS will reduce BAU carbon intensities. RPS-adjusted emissions factors for electricity were calculated assuming an increase of renewable energy to 33% in 2020. The calculated RPS-adjusted emissions factors are:

Utility	CO ₂ (lbs/kWh)	CH ₄ (lbs/MWh)	N ₂ O (lbs/MWh)
PG&E	0.290	-	-
Healdsburg Electric	0.309	-	-
PWRPA	0.173	-	-
SCP - CleanStart	0.203	-	-
SCP - EverGreen	0.070	-	-
eGRID CAMX Region*	0.422	0.020	0.004

* the eGRID CAMX emissions factors for CH₄ and N₂O were applied to all electricity in the absence of utility specific emissions factors.

- GHG emissions that would be generated by community electricity consumption in 2020 will therefore be lower as a result of the RPS-adjusted emission factors. These reductions were calculated by multiplying the forecasted 2020 community-wide electricity consumption by the RPS-adjusted emissions factors for PG&E and Healdsburg.
- The difference in emissions between the 2020 BAU and 2020 RPS scenarios represents the emissions reductions achieved by this state action.

Additional reductions beyond the RPS for SCP users are described below.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: CPUC.

Key Progress Indicators: Utility-specific GHG emission rates and energy generation portfolios.

Measure 2-S2. Solar Water Heaters

Objective: The Residential Solar Water Heater Program (AB 1470) creates a \$25 million per year, 10-year incentive program to encourage the installation of solar water heating systems that offset natural gas and electricity use in homes and businesses throughout the state. CPUC will design and implement a program of incentives for the installation of solar water heaters.

The estimate of solar water heaters to be installed for each community for both existing and new homes is the following (see Assumptions below for how these numbers were developed):

Community	Number of Solar Water Heaters		
	Existing Homes	New Homes	Total
Cloverdale	41	5	45
Cotati	38	3	42
Healdsburg	56	1	57
Petaluma	277	16	294
Rohnert Park	202	33	235
Sebastopol	42	2	44
Sonoma	63	2	65
Windsor	112	11	123
Unincorporated County	613	23	636
<i>Total Countywide</i>	1,444	96	1,540

Impact on Local Emissions: Measure 2-S2 will reduce the amount of natural gas and electricity consumed in buildings within the Sonoma County communities. Reduced natural gas consumption results in direct emission reductions from combustion in buildings (such as for natural gas water heaters). These reductions occur within the geographic boundaries of the communities. Reduced electricity consumption in water heaters results in a reduction of indirect emissions at the site of electricity generation (e.g., power plants). This measure would reduce GHG emissions in the building energy sector. Total countywide reductions from this measure are anticipated to be 345 MTCO₂e.

Implementation Information: CPUC is responsible for implementing this measure by providing incentives to property owners who install a solar water heater.

Assumptions:

- The number of solar water heaters installed statewide is 200,000 (California Air Resources Board 2008, Appendix 2 pg. I-26); the number of single-family houses in the state by 2020 is 16,000,000 (CA Department of Finance 2014). Based on this, approximately one in 80 single-family homes constructed between 2010 and 2020 will be retrofitted with a solar water heater.
- The annual reduction in natural gas for switching to a solar water heater is 130 therms (California Air Resources Board 2008, Appendix 2 pg. I-26).
- The annual reduction in electricity for switching to a solar water heater is 2,195 kWh (U.S. Department of Energy 2015, 12.03 kWh/day * 365 days/year ÷ 2 solar energy factor).
- The percentage of residences with natural gas water heaters is 56.5% (EIA 2009, Table HC8.6 values for the “Marine” Region)
- The percentage of residences with electric water heaters is 40.3% (EIA 2009, Table HC8.6 values for the “Marine” Region)

- State action would apply to buildings constructed before 2020.
- Natural gas solar water heaters reduce natural gas use by 130 therms (California Air Resources Board 2008).
- Electric solar water heaters reduce electricity use by 2,195 kWh (U.S. Department of Energy 2012a).
- 1,540 solar water heaters will be installed in the county as a result of the measure in 2020 (calculation).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Natural gas and electricity reductions were calculated by multiplying the expected energy reductions by the percentage of homes with each system type and estimated number of water heaters in the county.
2. GHG emissions reductions achieved by the measure were quantified by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: CPUC.

Key Progress Indicators: Electricity use (kWh) and natural gas use (therms) for water heating in each community and/or the number of solar water heaters installed in each community.

Measure 2-C1. Sonoma Clean Power

Objective: SCP is a CCA program and electricity provider that works with PG&E to provide their customers with electricity that has a higher renewable energy content. SCP offers two participation options for the CCA: the CleanStart option provides 33% renewable power in 2014, and the EverGreen option, which provides 100% renewable power. This measure includes the potential to increase participation in the CleanStart and EverGreen options by 2020.

Assembly Bill 117 (2002) enables California cities and counties, either individually or collectively, to supply electricity to customers within their community by establishing a CCA program. Unlike a municipal utility, a CCA does not own transmission and delivery systems, but is responsible for providing electricity to residents and businesses. The CCA may own electric generating facilities, but more often, it purchases electricity from private electricity generators.

Impact on Local Emissions: This measure will reduce the carbon intensity of electricity delivered to the county, which reduces GHG emissions at the power plants generating this electricity. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced. Total countywide reductions from this measure are anticipated to be 48,004 MTCO₂e.

Implementation Information: The communities who are members of SCP will work to increase participation in CleanStart and EverGreen, and will encourage new local distributed renewable systems. As SCP gathers momentum and capacity, the members will fund local energy efficiency programs as well as local renewables for CleanStart and EverGreen revenue.

Assumptions:

- The rates of participation for CleanStart and EverGreen are 77% and 5%, respectively, for all communities.
- New SCP CleanStart and EverGreen customers were assumed to be previous PG&E customers (this measure does not apply to Healdsburg because it has its own utility).
- The increase in SCP electricity for both CleanStart and EverGreen is equal to a decrease in PG&E electricity.

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. GHG emission reductions were calculated by first multiplying PG&E electricity in each community by the rates of participation for CleanStart and EverGreen, which were assumed to be 77% and 5%, respectively, for all communities.
2. Then, the new calculated SCP electricity was multiplied by the 2020 RPS-adjusted emission factors for PG&E.
3. Energy reductions from overlapping measures were accounted for to avoid double-counting reductions.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. PG&E electricity in 2040 and 2050 were multiplied by the same participation rates as in 2020 (77% & 5%) to determine new SCP electricity.
2. The calculated SCP electricity values were then multiplied by the 2020 RPS-adjusted emission factors for PG&E.

Activity Data Sources: Electricity consumption from PG&E.

Responsible Entities: SCP in collaboration with the communities.

Key Progress Indicators: GHG emission rates for SCP's CleanStart and EverGreen, the number of SCP customers for each, and the quantity of electricity supplied to customers (kWh).

Measure 2-L1. Solar in New Residential Development

Objective: Implement a requirement to install solar energy systems on new residential buildings to increase local renewable energy generation. Under this measure, the communities will also encourage or require solar installations on as many new multi-family developments as feasible.

The market penetration rate for new homes installing solar was determined by the communities on an individual basis as follows:

Community	Percentage of New Homes Installing Solar
Cloverdale	-
Cotati	50%
Healdsburg	8%
Petaluma	50%
Rohnert Park	15%
Sebastopol	100%
Sonoma	-
Windsor	25%
Unincorporated County	-

Impact on Local Emissions: This measure will replace grid electricity with on-site solar-generated electricity, which is carbon neutral, thereby reducing electricity consumption. Reducing demand for grid electricity reduces the GHG emissions associated with electricity generation at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 246 MTCO₂e.

Implementation Information: This could be implemented through discretionary approvals and permitting for new projects. This program may also include streamlined permitting, providing information to homeowners for low interest financing, assisting homeowners in purchasing solar photovoltaics through low-interest loans or property tax assessments, requiring that new development provide for solar access and build solar-ready features into buildings, and establishing guidelines for solar development. Funds may be provided through the Solar Sonoma County/Solar Action Alliance, and other sources. The communities may encourage solar installation by forming partnerships with PG&E and other private sector funding sources including SunRun, SolarCity, or other solar lease or power purchase agreement (PPA) companies. The communities would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations. The actual market penetration rates that each community will achieve will likely be influenced by how the community implements this measure. For example, adopting an ordinance to require solar in all new housing will lend itself to a 100% participation rate. If a community relies on the funding sources and financing options discussed above, market penetration would be achieved to the extent that funding is available, most likely resulting in less than a 100% penetration rate.

Assumptions:

- This measure only affects new single-family homes (those built in 2017 and later).
- The energy generated by solar photovoltaics (PV) is carbon neutral (CAPCOA 2010).
- A typical 4 kW residential solar system would generate 5,159 kWh per year (National Renewable Energy Laboratory n.d.).
- The amount of electricity generated by the panels will offset electricity provided by the utilities at a 1:1 ratio. Thus, a system that generates 5,159 kWh of solar energy will reduce GHG emissions associated with 5,159 kWh of utility electricity generation.
- Initial costs for a residential system (4 kW, roof-mounted) range from \$4.9 to \$5.7 per watt (Lawrence Berkeley National Laboratory and U.S. Department of Energy 2013).
- Solar energy systems would have a 25-year lifetime (U.S. Department of Energy 2013b).

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. The PVWatts model was used to calculate the energy potential of each single-family residential solar installation.
2. This value was multiplied by forecasted number of participating homes constructed between 2017 and 2020 in each community (based on penetration rates noted above) to determine total residential energy reductions achieved by the measure.
3. GHG emissions reductions were then quantified by multiplying the total energy reductions by the appropriate RPS-adjusted utility emission factors.

The cost analysis considered two financing scenarios:

- *Direct Purchase:* The building owner directly purchases, installs and maintains the solar panels
- *Power Purchase Agreement:* The building owner enters into a PPA with a local company who owns and maintains the solar panels.

Total capital costs under the direct purchase scenario were calculated based on an initial cost of \$4.9 to \$5.7 per watt installed. The lower residential cost includes rebate payments from the California Solar Initiative (CSI) at \$0.20 per watt and a federal investment tax credit (ITC) of 30% of the system cost, applied after the CSI rebate. The higher residential cost does not include a CSI rebate, because more than 99% of CSI the budget allotted for residential incentives had already been spent, as of May 2014 (California Energy Commission et al. 2014). Annual operating costs of \$0.02 per watt were assumed, based on the PVWatts model. Annual energy cost savings are based on electricity production (which decreases slightly each year due to system degradation), multiplied by the appropriate PG&E utility rates.

No up-front costs were assumed under the PPA scenario. Annual costs savings were estimated to be 10 to 20% off the retail value of the electricity generated (GreenZU 2014).

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County along with PG&E, PPA companies, and solar financing organizations.

Key Progress Indicators: The number of residential PV installations in new development and/or PV electric generation capacity (kW) or electricity generation (kWh).

Measure 2-L2. Solar in Existing Residential Buildings

Objective: Incentivize solar energy installation on existing residential buildings to increase renewable energy generation.

The market penetration rate for existing homes installing solar was determined by the communities on an individual basis as follows:

Community	Percentage of Existing (2017) Homes Installing Solar
Cloverdale	5%
Cotati	15%
Healdsburg	2%
Petaluma	15%
Rohnert Park	15%
Sebastopol	15%
Sonoma	11%
Windsor	15%
Unincorporated County	15%

Impact on Local Emissions: This measure will replace grid electricity with on-site solar-generated electricity, which is carbon neutral, thereby reducing electricity consumption. Reducing demand for grid electricity reduces the GHG emissions associated with electricity generation at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 9,942 MTCO_{2e}.

Implementation Information: This could be implemented through permitting for major remodels and incentives for existing homes. The communities could require all existing homes that undergo major remodels or renovations to install solar. This program may also include streamlined

permitting, providing information to homeowners for low-interest financing, assisting homeowners in purchasing solar PV through low-interest loans or property tax assessments, and establishing guidelines for solar development. Funds may be provided through the Solar Sonoma County/Solar Action Alliance, and PACE financing options available through ESD. The communities may encourage solar installation by forming partnerships with PG&E and other private sector funding sources including SunRun, SolarCity, or other solar lease or PPA companies. The communities would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations.

Assumptions:

- This measure only affects existing single-family homes (those built before 2017).
- The energy generated by solar PV is carbon neutral (CAPCOA 2010).
- A typical 4 kW residential solar system would generate 5,159 kWh per year (National Renewable Energy Laboratory n.d.).
- The amount of electricity generated by the panels will offset electricity provided by the utilities at a 1:1 ratio. Thus, a system that generates 5,159 kWh of solar energy will reduce GHG emissions associated with 5,159 kWh of utility electricity generation.
- Solar systems would have a 25-year lifetime (U.S. Department of Energy 2013b).

Analysis Method – 2020: The approach for calculating electricity, emissions reductions, and costs is similar to that described for Measure 2-L1, except that this measure applies to existing single-family homes using the penetration rates identified by each jurisdiction in the table above.

Analysis Method – 2040/2050: Reductions in 2040 and 2050 were calculated using the same method as described above. A higher participation rate was selected by each community in 2040 and in 2050 to represent an increasing commitment to outfit existing (pre-2017) homes with solar energy.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County along with PG&E, PPA companies, and solar financing organizations.

Key Progress Indicators: The number of residential PV installations in existing homes and/or PV electric generation capacity (kW) or electricity generation (kWh).

Measure 2-L3. Solar in New Non-Residential Developments

Objective: Implement a requirement to install solar energy systems on new non-residential development to increase local renewable energy generation. Under this measure, the communities will encourage or require solar installations on as many new non-residential developments as feasible.

Incorporate County of Sonoma – PV and electric vehicle (EV) ready ordinances, which require new construction to build structure, wiring and panel capacity for later addition of EV charging and solar PV installation.

The percentage of new nonresidential development constructed between 2017 and 2020 affected by this measure, chosen by each community would be required to incorporate solar energy for some or all of the project’s energy needs. These percentages are:

Community	Percentage of New Development Installing Solar
Cloverdale	-
Cotati	10%
Healdsburg	2%
Petaluma	10%
Rohnert Park	10%
Sebastopol	75%
Sonoma	-
Windsor	5%
Unincorporated County	-

Impact on Local Emissions: This measure will replace grid electricity with on-site solar-generated electricity, which is carbon neutral, thereby reducing electricity consumption. Reducing demand for grid electricity reduces the GHG emissions associated with electricity generation at power plants. Although the emission reductions won’t always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 528 MTCO₂e.

Implementation Information: This could be implemented through discretionary approvals and permitting for new projects. This program may also include streamlined permitting, providing information to developers for low interest financing, assisting developers in purchasing solar PV through low-interest loans or property tax assessments, requiring that new development provide for solar access and build solar-ready features into buildings, and establishing guidelines for solar development. Funds may be provided through the Solar Sonoma County/Solar Action Alliance and other sources. The communities may encourage solar installation by forming partnerships with PG&E and other private sector funding sources including SunRun, SolarCity, or other solar lease or PPA companies. The communities would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations. The actual market penetration rates that each community will achieve will likely be influenced by how the community implements this measure. For example, adopting an ordinance to require solar in all new non-residential development will lend itself to a 100% participation

rate. An ordinance with building-size specifications, such as an ordinance that requires solar only for buildings greater than a certain square footage, would result in a lower penetration rate.

Assumptions:

- This measure only affects new nonresidential buildings (buildings built in 2017 or after).
- Electricity use for nonresidential buildings constructed between 2017 and 2020 was estimated using a linear interpolation of 2010 electricity use and 2020 BAU electricity use.
- The energy generated by solar PV is carbon neutral (CAPCOA 2010).
- The amount of electricity generated by the panels will offset electricity provided by the utilities at a 1:1 ratio. Thus, a system that generates 50,000 kWh of solar energy will reduce GHG emissions associated with 50,000 kWh of utility electricity generation.
- The average system size is 40 kW.
- Initial costs for a nonresidential system (40 kW roof-mounted) ranges from \$4.3 to \$5.3 per watt (Lawrence Berkeley National Laboratory and U.S. Department of Energy 2013).

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. Nonresidential energy reductions were calculated by multiplying the forecasted electricity consumption for buildings constructed after 2017 by the participation rate for each community.
2. Electricity savings from overlapping state and local strategies were removed from the nonresidential energy forecast to avoid double counting.
3. GHG emissions reductions were then quantified by multiplying the total energy reductions by the appropriate RPS-adjusted utility emission factors.

The cost analysis considered two financing scenarios:

- *Direct Purchase:* The building owner purchases, installs, and maintains the solar panels
- *Power Purchase Agreement:* The building owner enters into a power purchase agreement (PPA) with a local company that installs, owns, and maintains the solar panels.

Total capital costs under the direct purchase scenario were calculated on a per-project basis based on an initial cost of \$4.3 to \$5.3 per watt installed. The lower nonresidential cost scenario includes the CSI performance based incentive of \$0.03 per kWh for the first 5 years of operation, as well as solar renewable energy certificate valued at \$10 per MWh. The higher cost scenarios only include the ITC. Annual operating costs of \$0.02 per watt were assumed, based on the PVWatts model. Annual energy cost savings were based on electricity production (which decreases slightly each year due to system degradation), multiplied by the appropriate PG&E utility rates.

No upfront costs were assumed under the PPA scenario. Annual costs savings were estimated to be 10 to 20% off the retail value of the electricity generated.

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County along with PG&E, PPA companies, and solar financing organizations.

Key Progress Indicators: The number of nonresidential PV installations in new development and/or PV electric generation capacity (kW) or electricity generation (kWh).

Measure 2-L4. Solar in Existing Non-Residential Buildings

Objective: Incentivize solar energy installation for existing nonresidential buildings to increase renewable energy generation.

Each community selected its own goal as to the percentage of existing non-residential buildings (pre-2017) to install solar energy by 2020. These percentages are:

Community	Percentage of Existing Development Installing Solar
Cloverdale	10%
Cotati	15%
Healdsburg	2%
Petaluma	20%
Rohnert Park	10%
Sebastopol	25%
Sonoma	-
Windsor	25%
Unincorporated County	25%

Impact on Local Emissions: This measure will replace grid electricity with on-site solar-generated electricity, which is carbon neutral, thereby reducing electricity consumption. Reducing demand for grid electricity reduces the GHG emissions associated with electricity generation at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 25,573 MTCO₂e.

Implementation Information: This measure could be implemented through discretionary approvals and permitting for existing projects as well as incentives for non-residential buildings outside the permitting process. The communities can require all existing buildings that undergo major remodels or renovations to install solar. This program may also include streamlined permitting, providing information to developers for low interest financing, assisting developers in

purchasing solar PV through low-interest loans or property tax assessments, and establishing guidelines for solar development. Funds may be provided through the Solar Sonoma County/Solar Action Alliance, and PACE financing options available through ESD. The communities may encourage solar installation by forming partnerships with PG&E and other private sector funding sources including SunRun, SolarCity, or other solar lease or PPA companies. The communities would be responsible for implementing this measure through coordination with relevant entities, such as PG&E, PPA companies, and solar financing organizations.

Assumptions:

This measure only affects existing nonresidential development (built before 2017).

Electricity use for nonresidential buildings constructed before 2017 was estimated using a linear interpolation of 2010 electricity use and 2020 electricity use.

The energy generated by solar PV is carbon neutral (CAPCOA 2010).

The amount of electricity generated by the panels will offset electricity provided by the utilities at a 1:1 ratio. Thus, a system that generates 50,000 kWh of solar energy will reduce GHG emissions associated with 50,000 kWh of utility electricity generation.

The average system size is 40 kW.

Initial costs for a nonresidential system (40 kW roof-mounted) ranges from \$4.3 to \$5.3 per watt (Lawrence Berkeley National Laboratory and U.S. Department of Energy 2013).

Analysis Method – 2020: The approach for calculating electricity, emissions reductions, and costs is similar to what is described above for Measure 2-L3, except that this measure applies to existing non-residential buildings using the penetration rates identified by each jurisdiction in the table above.

Analysis Method – 2040/2050: Reductions in 2040 and 2050 were calculated using the same method as described above. A higher participation rate was selected by each community in 2040 and in 2050 to represent an increasing commitment to outfit existing (pre-2017) non-residential buildings with solar energy.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities and the County along with P&E, PPA companies, and solar financing organizations.

Key Progress Indicators: The number of nonresidential PV installations in existing buildings and/or PV electric generation capacity (kW) or electricity generation (kWh).

C.9 Goal 3: Switch Equipment from Fossil Fuel to Electricity

Measure 3-C1. Stationary Fuel Switching Incentives

Objective: RCPA, SCP, SCEIO, and NSCAPCD will create a program and package to incentivize and finance fuel switching from residential propane to on-site PV electric generation. This measure may also include fuel switching from natural gas, wood, fuel oil, and other fossil fuels used in the residential sector to electricity as feasible based on the application.

Impact on Local Emissions: This measure will reduce the amount of propane (and possibly other fuels) consumed in buildings within the unincorporated areas of Sonoma County, where nearly all of the county's propane is consumed. Reduced propane consumption (or other fossil fuel use reduction) results in direct emission reductions from combustion in buildings. These reductions occur within the geographic boundary of the county. Total countywide reductions from this measure are anticipated to be 1,022 MTCO₂e.

Implementation Information: RCPA, SCP, SCEIO, and NSCAPCD will be responsible for creating the incentives to support this measure, in collaboration with other larger agencies such as the Bay Area Air Quality Management District (BAAQMD). These agencies will coordinate with the local communities to develop outreach efforts to achieve widespread implementation each community.

Assumptions:

- As determined in the GHG inventory, residential propane emissions for the entire county in 2010 were 4,925 MTCO₂e. These emissions were assumed to occur only in the unincorporated portions of the county.
- Participation in this measure in the unincorporated county would be 20% in 2020, 30% in 2040, and 50% in 2050

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. Residential propane emissions in the unincorporated county were projected to 2020 using the expected increases in housing between 2010 and 2020.
2. To estimate the amount of propane emissions reduced, it was assumed that there would be a reduction in propane use of 20% due to this measure (see assumptions); thus, 2020 propane use was multiplied by 0.20.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Similar to the 2020 method, 2040 and 2050 propane emissions were projected to 2040 and 2050 using housing data.

- Propane emissions in 2040 and 2050 were then multiplied by 30% and 50%, respectively, (see assumptions above) to determine the GHG reductions.

Activity Data Sources: Propane emissions from the GHG inventory.

Responsible Entities: RCPA, SCP, ESD, and NSCAPCD, along with the communities.

Key Progress Indicators: Residential propane usage, the number of on-site PV installations, and/or PV electric generation capacity (kW) or electricity generation (kWh).

Measure 3-L1. Convert to Electric Water Heating

Objective: Replace residential natural gas water heating equipment with electric water heating. Create an ordinance for new development and incentivize the installation of electric water heaters for existing development.

The market penetration rate for homes converting from natural gas to electric water heating was determined by the communities on an individual basis as follows:

Community	Percentage of Households with Natural Gas Heaters Installing Electric Water Heaters
Cloverdale	-
Cotati	-
Healdsburg	1%
Petaluma	10%
Rohnert Park	5%
Sebastopol	10%
Sonoma	-
Windsor	10%
Unincorporated County	-

Impact on Local Emissions: This measure will reduce the amount of natural gas consumed by water heating, thereby directly reducing GHG emissions from gas combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 2,215 MTCO_{2e}.

Implementation Information: Implementation mechanisms in each community could include developing ordinances to require electric water heating for new development or implementing incentives for installing electric water heaters in existing buildings. The communities would need to develop outreach efforts to increase awareness among community members.

Assumptions:

- The number of homes converting from natural gas to electric water heating is in addition to the number of homes installing solar water heating under Measure 2-S2 (Solar Water Heaters).
- The percentage of indoor water used in residences that is heated is 33% (AquaCraft 2014)
- The percentage of water used in residences that is used for indoor purposes is 43% (ConSol 2010)
- Heating a gallon of hot water requires 0.009 therms of natural gas or 0.18 kWh of electricity (EPA 2010a).
- The proportion of homes with natural gas heaters is 56.5% (U.S. Energy Information Administration 2009).

Analysis Method – 2020: The following steps were used to quantity emission reductions for this measure:

1. Energy savings were estimated by first multiplying the BAU water use for each community with the proportions of hot water and indoor water used in residences (see assumptions above).
2. Water reductions from overlapping water measures were subtracted from the total BAU water use for each community to avoid double-counting reductions.
3. Then, the quantity of natural gas (in therms) associated with heating BAU residential water in 2020 was determined using the hot water consumption rates, the estimates for the percentage of homes that use natural gas water heaters, and the associated energy required from natural gas heaters to heat one gallon of water listed above.
4. Overlapping energy reductions from Measure 2-S2 (Solar Water Heating) were subtracted to avoid double counting energy reductions.
5. The amount of therms from natural gas heaters was then multiplied by the measure participation rate chosen by each community to get the amount of therms that would be displaced by electric water heaters.
6. To calculate the associated emissions reductions, the displaced therms were multiplied by the appropriate emission factor for natural gas.
7. Switching to electric water heaters would result in an increase in electricity-related emissions, which were calculated using the following steps:
 - a. The amount of displaced therms from natural gas heaters was converted into equivalent units of electricity (kWh) using the ratio of energy required to heat a gallon of water of electricity to natural gas (see assumptions).
 - b. The resulting number of kWh was multiplied by the appropriate RPS-adjusted utility emission factors to get the emissions increase resulting from the increased electricity use.

- c. These electricity emission increases were then subtracted from the displaced natural gas emission reductions to get the total net measure emission reductions.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. BAU hot water use in 2040 and 2050 was calculated using BAU water consumption from the GHG inventory and the assumptions listed above.
2. The quantity of natural gas (in therms) associated with heating BAU residential water in 2040 and 2050 was determined using the hot water consumption rates, the estimates for the percentage of homes that use natural gas water heaters, and the associated energy required from natural gas heaters to heat one gallon of water listed above.
3. Overlapping energy reductions from Measure 2-S2 (Solar Water Heating) were subtracted to avoid double counting energy reductions.
4. The amount of therms from natural gas heaters was then multiplied by the measure participation rate chosen by each community for 2040 and 2050 to get the amount of therms that would be displaced by electric water heaters.
5. To calculate the associated emissions reductions, the displaced therms were multiplied by the appropriate emission factor for natural gas.
6. Switching to electric water heaters would result in an increase in electricity-related emissions in 2040 and 2050, which were calculated using the steps described above for 2020.

Activity Data Sources: Energy use data was obtained from PG&E and Healdsburg Electric.

Responsible Entities: Participating cities.

Key Progress Indicators: Electricity use (kWh) and natural gas use (therms) for water heating in each community and/or the number of solar water heaters installed in each community.

C.10 Goal 4: Reduce Travel Demand Through Focused Growth

Measure 4-L1. Mixed-Use Development in City Centers and Along Transit Corridors

Objective: The communities would focus new residential and commercial development in their city centers and along existing and planned transit corridors. Mixed-use development (such as residential use above commercial uses) in such locations would improve the diversity of nearby land uses and facilitate easier access to retail and commercial destinations. Improving the jobs/housing balance would also facilitate access to work destinations. Development adjacent to transit centers and along active transit corridors (commonly called “transit-oriented

development” or TOD) would increase the amount of trips that can be completed via transit instead of personal vehicles.

The communities will identify and support mixed use development in city centers and TOD locations through their existing and future General Plans, Area Plans, and Specific Plans. The communities will look for opportunities to improve transit and shuttles that serve these areas and update zoning codes as needed to encourage development along transit corridors, adjacent to transit hubs, and in downtown areas, including mixed-use developments.

The percentage of projected growth resulting in mixed-use development (in city centers and TOD locations) was determined by the communities on an individual basis as follows:

Community	Percentage of Growth Resulting In Mixed-Use Development
Cloverdale	15%
Cotati	70%
Healdsburg	20%
Petaluma	60%
Rohnert Park	20%
Sebastopol	60%
Sonoma	20%
Windsor	50%
Unincorporated County	20%

Impact on Local Emissions: Locating diverse land uses in proximity to each other, such as residential uses in the same neighborhood as retail and office buildings, means residents have less need to travel outside of the neighborhood to meet their daily needs. Mixed-use development encourages walking and bicycling and reduces the length of automobile trips, thereby reducing VMT compared to traditional development patterns. New development near existing and planned high-quality transit⁴ and other transit lines facilitates increased transit use by people traveling to or from the project site, also resulting in reduced VMT.

When VMT is reduced, vehicle fuel consumption is also reduced. Reduced vehicle fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

CAPCOA indicates that mixed-use development can result in a 9 to 30% reduction in VMT, based on two reports: *Travel and the Built Environment – A Meta-Analysis* (Ewing and Cervero 2010) and *Measuring the effects of mixed land uses on housing values* (Song and Knaap 2004). Additional literature cited by CAPCOA that supports VMT reductions from mixed-use developments includes

⁴ High-quality transit is defined as fixed-route bus service with intervals no longer than 15 minutes during peak commute hours.

Crediting Low-Traffic Developments (Nelson\Nygaard 2005) and *A Quick-Response Method of Estimating Travel Impacts from Land-Use Changes* (Criterion Planner/Engineers and Fehr & Peers Associates 2001).

Mixed-use development is also widely considered an effective means of reducing traffic congestion. Ranking in the EPA top-ten Smart Growth planning principles, and achieving higher levels of support from planners, policy makers and elected officials and developers, mixing a variety of land uses is generally considered a strategy that optimizes use of transportation infrastructure, improves community quality-of-life, and reduces vehicle travel and related concerns over global warming. Total countywide reductions from this measure are anticipated to be 3,485 MTCO_{2e}.

Implementation Information: The communities will develop appropriate tools to encourage mixed-use, infill, and transit-oriented development for cities and urbanized unincorporated areas. The primary method will be through updated General Plans and Specific Plans and associated land use designations and site zoning. Policies could include updating zoning codes and improving transit and shuttle service in areas targeted for mixed-use development. The communities would promote and apply existing policies and incentives to further encourage mixed-use, infill, and transit-oriented development. Potential incentives could include reduced parking requirements, reductions in building and permit fees, density increases and other related items.

Assumptions:

- This measure would reduce BAU VMT growth between 2017 and 2020 by 3.9% to 13.5%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 8.8 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the difference in VMT between 2020 and 2017 to get the amount of VMT reduced.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the difference in VMT between 2020 and 2040 and between 2020 and 2050.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from the Sonoma County Transportation Authority (SCTA).

Responsible Entities: Participating cities and the County.

Key Progress Indicators: The percentage of growth resulting in mixed-use development in each community, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 4-L2. Increase Transit Accessibility

Objective: Encourage all new residential projects consisting of 25 units or more to be located within 0.5 mile of a transit node, shuttle service, or bus route with regularly scheduled, daily service. Consider requirements such as reduced parking, unbundled parking, subsidized public transportation passes, or ride-matching programs, based on site-specific review.

The percentage of growth that will result in 25+ unit residential development located 0.5 mile from a transit station was determined by the communities on an individual basis as follows:

Community	Percentage of Residential Growth Located Near Transit
Cloverdale	5%
Cotati	15%
Healdsburg	20%
Petaluma	15%
Rohnert Park	75%
Sebastopol	15%
Sonoma	15%
Windsor	15%
Unincorporated County	0%

Impact on Local Emissions: This measure will increase transit use, thereby reducing use of personal vehicles. As a result, total fuel consumption in passenger vehicles will be reduced. Reduced vehicle fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 1,057 MTCO₂e.

Implementation Information: Each community will identify potential areas for TOD and prepare policies and incentives to encourage development near high-quality transit service. Strategies include updating General Plans and Specific Plans and zoning codes and developing new ordinances requiring transit accessibility to encourage TOD. Potential incentives could also include reduced parking requirements, reductions in building and permit fees, density increases

and other related items. The communities may also work with RCPA/SCTA and transit agencies on this measure.

Assumptions:

- This measure would reduce BAU VMT growth between 2017 and 2020 by 0.4%–5.3%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 2.7 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reductions in passenger vehicle VMT were calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the corresponding VMT reduction percentage was multiplied by the difference in VMT between 2020 and 2017 to get the amount of VMT reduced.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the difference in VMT between 2020 and 2040 and between 2020 and 2050.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from the SCTA.

Responsible Entities: Participating cities and the County, and RCPA/SCTA.

Key Progress Indicators: The percentage of growth resulting in 25+ unit residential development located 0.5 mile from a transit station in each community, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 4-L3. Supporting Land Use Measures

Objective: Encourage new development to provide amenities to support transit and other modes of transportation, including transit stops, bicycle facilities, good pedestrian networks, car-sharing locations, and electric vehicle charging stations.

- Encourage residential developments at a variety of price points to increase options for workers (especially public serving employees) of Sonoma to live within the county.

The implementation of this program was determined by the communities on an individual basis as follows:

Community	Measure Included?
Cloverdale	Yes
Cotati	Yes
Healdsburg	Yes
Petaluma	Yes
Rohnert Park	Yes
Sebastopol	Yes
Sonoma	Yes
Windsor	Yes
Unincorporated County	Yes

Impact on Local Emissions: This measure will increase transit use, thereby reducing use of personal vehicles. As a result, total fuel consumption in passenger vehicles will be reduced. Reduced vehicle fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

Implementation Information: Each community will identify appropriate supporting land use strategies to implement for their community and develop specific policies, ordinances and/or guidelines to implement and monitor them. Potential incentives could include reduced parking requirements, reductions in building and permit fees, increased density and other related items. The communities may also work with RCPA/SCTA on this measure.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: Cities and the County, and RCPA/SCTA.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 4-L4. Affordable Housing Linked to Transit

Objective: Encourage affordable housing developments to locate near transit corridors, transit hubs, and downtown cores. This includes below-market-rate (BMR) housing, which provides greater opportunity for lower income families to live closer to jobs centers and achieve jobs/housing match near transit.

For development with more than 5 units, the percentage of units that will be affordable housing units was determined by the communities on an individual basis as follows:

Community	Percentage of New Development that is Affordable Housing
Cloverdale	15%
Cotati	15%
Healdsburg	15%
Petaluma	23%
Rohnert Park	15%
Sebastopol	20%
Sonoma	20%
Windsor	15%
Unincorporated County	0%

Impact on Local Emissions: Similar to mixed-use development, this measure will increase transit use, thereby reducing use of personal vehicles. As a result, total fuel consumption in passenger vehicles will be reduced. Reduced vehicle fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 166 MTCO_{2e}.

According to CAPCOA (2010):

“Income has a statistically significant effect on the probability that a commuter will take transit or walk to work. BMR housing provides greater opportunity for lower income families to live closer to jobs centers and achieve jobs/housing match near transit. It also addresses to some degree the risk that new transit oriented development would displace lower income families. This strategy potentially encourages building a greater percentage of smaller units that allow a greater number of families to be accommodated on infill and transit-oriented development sites within a given building footprint and height limit. Lower income families tend to have lower levels of auto ownership, allowing buildings to be designed with less parking which, in some cases, represents the difference between a project being economically viable or not.”

Implementation Information: Each community would develop policies and incentives to encourage affordable housing development for cities and unincorporated county. The communities would draft new ordinances or offer incentives encouraging the affordable housing development near transit hubs and city-centers. Potential incentives could include reduced parking requirements, reductions in building and permit fees, increased density and other related items. The communities may also work with RCPA/SCTA on this measure.

Assumptions:

- This measure would reduce BAU VMT growth between 2017 and 2020 by 0.1% to 0.6% (Fehr & Peers 2014a, 2014b). This is about 424,000 VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the difference in VMT between 2020 and 2017 to get the amount of VMT reduced.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the difference in VMT between 2020 and 2040 and between 2020 and 2050.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from the SCTA.

Responsible Entities: Each city and the County, and RCPA/SCTA.

Key Progress Indicators: The percentage of units that will be affordable housing units, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

C.11 Goal 5: Encourage a Shift Toward Low-Carbon Transportation Options

Measure 5-C1. Improve and Increase Transit Service

Objective: Implement Sonoma County’s *Comprehensive Transportation Plan* – look for opportunities to increase bus service, implement bus preferential treatments, implement bus rapid transit (BRT) and/or express service, improve transit marketing, and improve transit amenities.

Impact on Local Emissions: This measure will increase the use of transit in the county and improve the efficiency of the transit network. Increasing transit usage means that residents and workers will take transit instead of driving their personal vehicles, reducing fossil fuel use. Through network efficiency improvements, buses will consume less fuel as they are driven more efficiently. As a result, the total fossil fuel consumption in vehicles (passenger vehicles and transit vehicles) driven in the communities will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic

boundaries of the communities. Total countywide reductions from this measure are anticipated to be 147 MTCO₂e.

Implementation Information: Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit would be the lead agencies to implement this measure, with assistance from SCTA. Each transit agency would determine funding needs and identify service gaps or high-demand routes that could be expanded as part of this measure. The agencies would coordinate with SCTA and the local communities as needed to develop and locate new routes or implement BRT routes.

Communities would also implement the *Sonoma County Comprehensive Transportation Plan*, which identifies opportunities to increase bus service, implement bus preferential treatments, implement BRT and/or express service, improve connections to ferry service, improve transit marketing, and improve transit amenities. SCTA and the communities would work with local transit agencies to make service plan improvements outlined in the *Comprehensive Transportation Plan*. Sonoma County transit agencies and SCTA would search for funding opportunities from grants or other sources to finance unfunded service needs. In addition, the agencies would continue to assess other service plan needs.

Assumptions:

- The network expansion component of this measure would reduce community-wide passenger vehicle VMT by 0% to 0.03%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 570,000 VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The service frequency/speed component of this measure would reduce community-wide passenger vehicle VMT by 0% to 0.01%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 100,000 VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- Fehr & Peers estimates that this measure will increase transit VMT in the county by 6.3%, leading to an annual increase in VMT of 66,049 in 2020 (Gilster pers. comm.). This estimate is based on the proposed network expansion for each community and current revenue miles within each community for each transit agency in the county, including Petaluma Transit, Sonoma County Transit, and Golden Gate Transit. The combined net effect to VMT from this measure would be a reduction of 604,000.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the passenger VMT reduction percentage was multiplied by the corresponding 2020 VMT value to get the amount of passenger VMT reduced.

3. To quantify GHG reductions, the passenger VMT reduction was multiplied by weighted passenger vehicle emission factors used in the inventory.
4. The transit vehicle VMT increase for each community was multiplied by transit bus emission factors used in the inventory and subtracted from the passenger vehicle GHG reductions to obtain net reductions for this measure.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from SCTA and revenue transit vehicle miles from the communities or the 2010 National Transit Database.

Responsible Entities: RCPA/SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-C2. Supporting Transit Measures

Objective: Support transit expansion with the following actions:

- Encourage coordination amongst transit agencies to conduct a countywide transit study to identify opportunities for efficiencies, improve transfers/connections, and identify service gaps. Work with Sonoma County Transit and other transit service providers to amend routes to serve unmet needs, locations, improve frequencies and hours within each community. Look for cross-jurisdictional grant opportunities to fund transit studies and improvements.
- Plan to integrate all transit agencies in the county onto Clipper Card. Find opportunities to accelerate implementation.
- Support system-wide roll-out of real-time bus arrival information at bus stops, online, and via mobile devices for all transit agencies serving the county.

Impact on Local Emissions: This measure will increase the use of transit in the county. Increasing transit usage means that residents and workers will take transit instead of driving their personal vehicles. As a result, fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities.

Implementation Information: SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit would be the lead agencies to implement this measure. The transit agencies would need

to work together to improve efficiency, transfers and service gaps, especially between transit services. SCTA would work with the transit agencies to identify funding for and implement real-time bus arrival information. SCTA would also need to work with the Metropolitan Transportation Commission (MTC) of the Bay Area to bring Clipper Card to Sonoma County.

With the support of Sonoma County and the communities, local transit agency staff would coordinate with each other and other regional agencies to identify and implement service improvements, integrate Clipper Card use into the system, and provide real-time bus arrival information for patrons.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: RCPA/SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-C3. Sonoma-Marin Area Rail Transit

Objective: Ensure policies support the Sonoma-Marin Area Rail Transit (SMART) corridor, such as transit-oriented development at planned SMART stations, future local transit planning for SMART, and pedestrian and bicycle facilities to connect to SMART stations.

Additional Discussion: A rough estimate of potential daily SMART GHG emissions was prepared by using the latest estimate of ridership for the 2015 Initial Operating Segment (IOS) of 2,900 trips/weekday⁵ (Dowling 2011), 330,000 miles/year and 375,000 gallons/year (SMART 2013), and 260 weekdays/year (ICF assumption). Using these assumptions, SMART would have daily GHG emissions of 15 MTCO₂. The forecast SMART riders would generate daily emissions of 19 MTCO₂e, assuming the average commute trip is 23 miles (Dowling 2011) at the model year 2012 average fuel efficiency of 23.6 mpg (U.S. Environmental Protection Agency 2013) and a 1.14 passenger occupancy for commuting (Federal Transit Administration 2010). The daily net benefit of SMART is a reduction of 4 MTCO₂e.

Long-term benefits: Federal Corporate Average Fuel Economy (CAFE) standards require the fleet average for new 2025 passenger vehicles to be 54.5 miles per gallon (mpg),⁶ but it would take a

⁵ This is the lowest ridership number in the Dowling 2011 study. The study estimates that ridership will rise to 4,800 trips/weekday in 2035 for the IOS and 5,050 to 6,550 trips in 2020 with the full project.

⁶ The National Highway Traffic Safety Administration estimates that actual CAFE performance levels will be lower than the target values in the standards (U.S. Environmental Protection Agency/National Highway Traffic Safety Administration 2010, 2012).

number of years after 2025 for the on-road fleet average to reach 54.5 mpg.⁷ At the forecast 2035 IOS ridership level of 4,800 trips/weekday (Dowling 2011) and still assuming the average commute trip is 23 miles (Dowling 2011), the SMART GHG emissions would still be 15 MT (due to no change in number of trains, just increased ridership), but the equivalent passenger vehicle GHG emissions (using 54.5 mpg fleet average) would be 16 MT. This comparison does not take into account any potential effect of the low-carbon fuel standard on train emissions or any improvements in train technology over time. This is evidence that, for the next few decades, SMART daily GHG emissions should be slightly less than equivalent passenger vehicle emissions.

Impact on Local Emissions: This measure will increase the use of rail transit in the county. Increasing rail usage means that residents and workers will take rail instead of driving their personal vehicles. As a result, fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities.

Implementation Information: SMART is the lead agency to implement this measure, including construction of new stations and pedestrian and bicycle facilities, and coordinating with the local communities to implement improvements. The communities and transit agencies would coordinate to adopt policies and plans that support the SMART corridor. SCTA will support SMART implementation through planning and advocacy for transportation funding.

Assumptions: N/A

Analysis Method: Reductions for this measure for 2020 were not added to 2020 forecasted emissions because SMART is already built into the BAU VMT forecast for each community and thus the reductions are already included.

Activity Data Sources: N/A

Responsible Entities: SMART.

Key Progress Indicators: SMART ridership, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-C4. Trip Reduction Ordinance

Objective: Develop and implement a Trip Reduction Ordinance (TRO) requiring employers with 50+ employees to offer one of the following: pre-tax transit expenses, transit or vanpool subsidy, free or low-cost shuttle, or an alternate trip reduction benefit. The TRO will also include a non-trip reduction alternative, in the form of purchase of an equivalent amount of GHG offsets, for employers choosing not to implement trip reductions. The TRO may also consider more ambitious recommendations such as specific transportation demand management (TDM) programs offered to all employees, annual monitoring and reporting requirements, or specific trip reduction or mode share target rates.

⁷ For example, the 2013 CAFE requirements for new vehicles is a fleet average of 31.1, but the on-road average mpg is 23.6.

Background: The existing Bay Area Commuter Benefits Program, developed by BAAQMD and MTC, currently requires employers with at least 50 employees to offer commuter benefits to their employees. The program gives employers the flexibility to offer one or more of the following benefits to employees:

- Option 1: Pre-Tax Benefit – Allow employees to exclude up to \$130 of their transit or vanpooling expenses each month from taxable income.
- Option 2: Employer-Provided Subsidy – Provide a subsidy to reduce or cover employees’ monthly transit or vanpool costs, up to \$75 per month.
- Option 3: Employer-Provided Transit – Provide a free or low-cost transit service for employees, such as a bus, shuttle, or vanpool service.
- Option 4: Alternative Commuter Benefit – Provide an alternative commuter benefit that is as effective in reducing single-occupancy commute trips as Options 1, 2, or 3.

The existing program is a pilot program authorized only through 2016 and only applies within the jurisdictional area of the BAAQMD and does not include the Northern Sonoma Air Pollution Control District. California Health and Safety (H&S) Code Section 40717.9 nominally prohibits public agencies from imposing mandatory “employee trip reduction programs”. BAAQMD (acting with MTC) has a legislative exemption from this prohibition for the pilot program. There is an Attorney General opinion that concludes the following: “An air pollution control district may adopt a regulation specifying a number of alternative means of emission reduction from which employers must choose, where one of the options is to implement an employee trip reduction plan, provided that the alternatives presented are reasonably practicable.” [79 Ops. Cal. Atty. Gen. 214 (1996)]. The same logic would apply to local governments.

This measure would create a new program for 2017 through 2020 through development of a model trip reduction ordinance that could be adopted by local communities throughout the county. This measure would require commuter benefits for employers with more than 50 employees or would require employers who do not want to implement trip reduction measures to purchase an equivalent amount of GHG emissions offsets. By providing an option that does not mandate trip reduction, such an ordinance would not be in conflict with the H&S Code prohibition.⁸

The RCPA would identify sources of valid GHG offsets that could be purchased by employers choosing the offset option. The RCPA will only identify GHG offset sources that have been verified as valid to an acceptable verification protocol.

Impact on Local Emissions: This measure will increase the use of transit, vanpools, carpools, and other alternative modes of transportation in the county and reduce single-occupancy vehicle

⁸ The City of Santa Monica has been implementing a Transportation Demand Management Ordinance since 1992 to the present and includes an option for employers to purchase Mobile Source Emissions Reduction Credits or submit a trip reduction plan. Approximately 83% of employers opted for the trip reduction plan option. For this CAP, the proposed option is purchase of GHG offset credits, since the CAP is a GHG reduction plan. See: <http://www.compassblueprint.org/Documents/City%20of%20Santa%20Monica%20TDM%20Jacquilyne%20Brooks.pdf>

travel as a result. This means that residents and workers will take transit (or vanpools/carpools) instead of driving their personal vehicles. As a result, the total fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 6,113 MTCO₂e.

Implementation Information: This measure requires regional and local effort. The regional lead agency is RCPA/SCTA, who is responsible for developing the model TRO, identifying any mandatory employer transportation benefits, conducting regional outreach and monitoring. The local communities would actually adopt the ordinance, conduct stakeholder outreach during ordinance development and assist with outreach efforts to employers and employees.

Assumptions:

- This measure would reduce commute (home-to-work) VMT by 2.7% for all communities (Fehr & Peers 2014a, 2014b). This is about 15.1 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-work trip percentage to get the amount of VMT reduced by this measure.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-work trip percentages to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from SCTA.

Responsible Entities: RCPA/SCTA in collaboration with the communities and local employers.

Key Progress Indicators: Number of businesses or employees participating in the TRO, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-C5. Supporting Measures for the Trip Reduction Ordinance: Transportation Demand Management Program

Objective: The following actions will support Measure 5-C4:

- Support employer-based TDM program efficiency: Look for opportunities for small businesses to share resources and/or create transportation management associations.
- Consider district-wide TDM programs in specified business districts.
- Support development of municipal-specific TDM programs.
- Consider recommendations to local agencies for TDM program requirements for new developments such as transit subsidies or parking cash-out.

Impact on Local Emissions: This measure will increase the use of transit, vanpools, carpools, and other alternative modes of transportation in the county. Increasing alternative modes of transportation means that residents and workers will take transit (or vanpools/carpools) instead of driving their personal vehicles. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities.

Implementation Information: This measure requires regional and local effort. SCTA staff would develop a TDM program for employers, which may include the strategies mentioned above. Staff at SCTA and in each community would promote the TDM program and assist interested employers in implementing strategies. Communities could consider offering financial incentives for employers because they will bear the costs of running the program. The regional lead agency is SCTA, who is responsible for developing the TRO program and assisting with any smaller TDM program sponsored by employer or business districts. The local communities would assist with outreach efforts to employers and employees.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: RCPA/SCTA in collaboration with the communities and local employers.

Key Progress Indicators: Number of businesses or employees participating in the TDM program, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-C6. Reduced Cost Transit Passes

Objective: Reduced cost transit passes would encourage commuters to take transit by providing financial incentive to switch from private automobile to bus or other transit mode, reducing commute-related VMT and associated GHG reductions. For example, the City of Santa Rosa offers commuters a \$10 monthly CityPass or Sonoma County Transit Pass. Employees must be

registered in the “Take a Free Ride” program, or employers must be registered in the City’s Trip Reduction Program.

If this measure is made mandatory by a jurisdiction, then the measure will also include a non-trip reduction alternative in the form of purchase of an equivalent amount of GHG offsets (see discussion of the GHG offset purchase option above under Measure 5-C4).

Impact on Local Emissions: This measure will increase the use of transit in the county. Increasing transit usage means that residents and workers will take transit instead of driving their personal vehicles. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 5,660 MTCO₂e.

Implementation Information: This measure requires regional and local coordination. SCTA would work to identify funding for and/or assist in subsidizing reduced transit passes. Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit would be responsible for rolling out and publicizing reduced transit passes. Agencies would encourage employers and new developments to provide reduced-cost monthly transit passes. Each community would partner with transit agencies to negotiate cost-sharing and facilitate transit pass distribution. Requirements could be implemented for new or expanded employers with 50 employees or more (to be consistent with Senate Bill [SB] 1339) and new residential projects of 25 units or more.

Assumptions:

- This measure would reduce commute (home-to-work) VMT by 2.5% for all communities (Fehr & Peers 2014a, 2014b). This is about 14 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-work trip percentage to get the amount of VMT reduced by this measure.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-work trip percentages to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from the SCTA.

Responsible Entities: RCPA/SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit in collaboration with the communities and local employers.

Key Progress Indicators: Number of reduced cost transit passes offered in each community, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-C7. Alternative Travel Marketing & Optimize Online Service

Objective: Conduct countywide marketing efforts (and consistent community-specific efforts) to provide information on alternate travel means, including transit, 511, shuttles, ride share, car share, bike routes, connection to bike/pedestrian advocacy groups, paratransit, etc.

Impact on Local Emissions: This measure will increase the use of transit, vanpools, carpools, and other alternative modes of transportation (e.g., walk, bike) in the county. Increasing alternative modes of transportation means that residents and workers will take transit (or vanpools/carpools) instead of driving their personal vehicles. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 4,528 MTCO₂e.

Implementation Information: SCTA would be the lead agency to implement this measure and would find funding for or subsidize communication channels to provide information on alternate travel means. Local communities would work with SCTA to ensure that consistency in service and information is maintained throughout the county. SMART will also be doing travel marketing for its services.

The communities would provide targeted marketing in various formats to employees, employers, residents, and developers. Agencies would update existing online resources with current TDM strategy information and promote the use of these online resources when implementing other TDM strategies. Marketing materials should provide accurate and timely information regarding commute reduction strategies. Information could be rolled into HR policies for new employee orientation. Real-time transit data could be made available online with trip planning tools, with mobile phone apps as a future development. These marketing efforts could be made mandatory for new residential projects consisting of 25 units or more, and new or expanded projects with 50 employees or more (consistent with SB 1339).

Assumptions:

- This measure would reduce commute (home-to-work) VMT by 2% for all communities (Fehr & Peers 2014a, 2014b). This is about 11.2 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-work trip percentage to get the amount of VMT reduced by this measure.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-work trip percentages to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from the SCTA.

Responsible Entities: RCPA/SCTA in collaboration with the communities.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-C8. Safe Routes to School

Objective: Create safe routes to school programs for communities where they currently do not exist and actively seek funding to implement programs in all communities. Safe routes to school programs educate parents and school-aged children on how to safely travel to school by transit, walking, biking, or carpooling. Consider expanding school pools⁹ or school bus programs (if there is unserved demand) or other school TDM measures.

Impact on Local Emissions: This measure will increase the use of school buses or school pools in the county, thus reducing personal vehicle use for home-school trips. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in

⁹ School pools are a form of ride-sharing that matches parents to children who cannot walk or bike and do not meet the requirements for busing.

direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 14,234 MTCO₂e.

Implementation Information: SCTA, working with local school districts, would be the lead agency to implement this measure and find funding for or subsidize safe routes to school programs. Local communities and school districts would need to coordinate on bus routes that cross communities. SCTA would partner with local schools to tailor the program to fit each school's needs and help look for funding to support the program.

Assumptions:

- This measure would reduce school (home-to-school) VMT by 4.5% for all communities (Fehr & Peers 2014a, 2014b). This is about 13.1 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- This measure, in conjunction with Measure 5-L5 (Traffic Calming), would also reduce total community-wide VMT by 0.05% to 0.1%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 3 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-school trip percentage to get the amount of VMT reduced by this measure.
3. Total community-wide VMT was multiplied by the corresponding VMT reduction (0.05%–0.10%) to determine the VMT that this measure would reduce in conjunction with Measure 5-L5 (Traffic Calming).
4. To quantify GHG reductions, the VMT reductions were multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-school trip percentages to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from SCTA.

Responsible Entities: RCPA/SCTA in collaboration with the communities.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-C9. Car-sharing Program

Objective: Build on the work that the Sonoma County Spare the Air Resources Team has already conducted to implement a car-sharing program. The program would be a large-operator based car-sharing program and could be supplemented with peer-to-peer car-sharing.¹⁰

Impact on Local Emissions: This measure will increase the use of car-sharing in the county, thus decreasing personal vehicle use. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities.

Implementation Information: RCPA/SCTA would be the lead agency to implement this measure, and would work with the Sonoma County Air Resources Team and find funding for or subsidize mobile device infrastructure needed to implement a car-sharing program. This effort will build on the work that the Sonoma County Air Resources Team has already done—which included hosting two focus group meetings to gauge interest and distributing informational door hangers and an online survey—to encourage peer-to-peer car-sharing services to introduce their services to the communities. RCPA/SCTA could consider partnering with commercial car-sharing service providers to identify locations or markets to roll out the service.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: RCPA/SCTA in collaboration with the communities.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-C10. Bike Sharing Program

Objective: A bike-share system would be started in the county to reduce VMT, similar to bike share systems in many cities across the country.

¹⁰ Peer-to-peer car-sharing is similar to other car-sharing business models, but typically involves a transaction between a person who has a car to share and a person who is in need of a car. The person who uses the car pays a fee with a smartphone or other mobile device to use the car for less than an hour up to a whole day or longer. Car-share cars are usually available at the owner's residence and transactions are completed with a mobile device, so little new infrastructure or staffing is required for a community to set-up such a program.

Impact on Local Emissions: This measure will increase the use of bikes for commuting in the county. Increasing bicycle use means that residents and workers will use bicycles instead of driving their personal vehicles. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities.

Implementation Information: SCTA would be the lead agency to implement the development of a bike sharing program. SCTA and each community would need to coordinate to find funding sources to implement a bike-share program and to identify the most appropriate service areas. BAAQMD and/or Northern Sonoma County Air Quality District could be a source of funding for such a program.

SCTA would also coordinate with the cities, county transit agencies, and SMART to develop policies and guidelines for the program, identify bike station locations, and implement the program through direct management or selection of a private management company. SCTA and the communities should consider collaborating and integrating with the SF Bay Area Bike Share program to incorporate best practices and lessons learned from the program's recent deployment.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: RCPA/SCTA in collaboration with the communities.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L1. Local Transportation Demand Management Program

Objective: Measure 5-C4 includes a mandatory TRO for employers with 50 employees or more. This measure supports voluntary TDM measures for employers with fewer than 50 employees, additional voluntary TDM measures (beyond the minimum TRO requirements) for larger employers, and requirements for TDM measures in new large residential projects. Options would include a suite of strategies, including, but not limited to, those listed below:

- Vanpool or carpool programs
- EV charging stations
- Reduced parking requirements for affordable or senior housing projects
- Reduced cost transit passes
- Unbundled parking costs, priced parking, or parking cash-out
- Bicycle amenities
- Car-share pods (central locations where users can find cars)

- Telecommuting and alternative work schedules
- Ride-matching services
- Emergency ride home

The participation rates for this measure were determined by the communities on an individual basis as follows:

Community	Percentage of Employees in Community that are Eligible	Percentage of Employees Participating
Cloverdale	100%	38%
Cotati	100%	38%
Healdsburg	100%	20%
Petaluma	-	-
Rohnert Park	100%	38%
Sebastopol	100%	38%
Sonoma	-	-
Windsor	-	-
Unincorporated County	100%	38%

Impact on Local Emissions: This measure will reduce single-occupancy vehicle travel and increase the use of transit, vanpools, carpools, and other alternative modes of transportation in the county, thus reducing VMT. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 2,975 MTCO₂e.

Implementation Information: Each community will define the threshold for application of the ordinance, the specific TDM measures to be implemented, and methods to methods for monitoring employer compliance. The communities may require certain TDM strategies (beyond the minimum TRO requirements) through the permitting process for businesses with 50 or more employees. Incentives for voluntary TDM by employers with fewer than 50 employees may also be used, such as reduced parking requirements, reductions in fees, and other related items. The communities may also work with RCPA/SCTA.

Assumptions:

- The percentage of employees in each community participating in this program was determined by the communities on an individual basis. Many of the communities chose 38%, per guidance from Fehr & Peers. This assumption stems from an assumption that 75% of employees will not fall under SB 1339 Commute Benefit Policies and a conservative reduction

of 50%, which assumes that the programs will not be as aggressive as assumed in CAPCOA methodology. ($75\% * 50\% = 37.5\% \sim 38\%$).

- This measure would reduce commute (home-to-work) VMT by 1% to 2%, depending on the community (Fehr & Peers 2014a, 2014b) in addition to the reductions due to Measure 5-C4 (Trip Reduction Ordinance). This is about 7.3 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-work trip percentage to get the amount of VMT reduced by this measure.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-work trip percentages to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from SCTA.

Responsible Entities: Each city, the County, and RCPA/SCTA.

Key Progress Indicators: Number of businesses or employees participating in the TDM program, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L2. Carpool-Incentives & Ride-Sharing Program

Objective: Create or promote a regional ride-sharing program and encourage participation by local employers through their TDM programs. Focus on large employers to create programs. Actively disseminate information to the community regarding the variety of ridesharing options from 511.org to Zimride, Enterprise Rideshare, and other private companies.

The participation rates for this measure were determined by the communities on an individual basis as follows. Suggested participation rates were provided to each community by Fehr & Peers,

and the communities could choose a different rate if desired. Fehr & Peers developed the suggested rates based on current participation rates in similar programs in the communities and the percentage of people who commute to work alone in each community:

Community	Percentage of Employees in Community that are Eligible	Percentage of Employees Participating
Cloverdale	100%	71%
Cotati	100%	78%
Healdsburg	100%	25%
Petaluma	-	-
Rohnert Park	100%	78%
Sebastopol	100%	78%
Sonoma	-	-
Windsor	-	-
Unincorporated County	100%	78%

Impact on Local Emissions: This measure will reduce single-occupancy vehicle travel and increase the use of carpools in the county, thus reducing VMT. As a result, the fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 5,709 MTCO₂e.

Implementation Information: Each participating community will develop a carpool incentive program attractive to employers, including managing the financial incentives for carpooling. For example, the City of Santa Rosa offers free parking in downtown garages and eligibility for monthly prize drawings to carpool commuters (and employers) registered in the City’s Trip Reduction program. Similar incentives could be provided by other communities. Additional strategies include connecting commuters to formal carpool organizers. Communities can consider using 511 ridesharing forums, dynamic rideshare apps (e.g., Carma, Zimride, Ridejoy), or helping to facilitate communication among employers in the same geographic area. Communities can also designate convenient locations as casual carpool pickup spots/park and ride lots. Other possible strategies include making the requirements for ridesharing services less restrictive to reduce the barrier to entry, such as lowering age limits or eliminating affiliation requirements. Connecting vanpool organizers with commuters would also be beneficial.

Assumptions:

- This measure would reduce commute (home-to-work) VMT by 1.3% to 3.9%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 13.9 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).
- The proportions of trip types are shown in Table C-2.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. For each community, the VMT reduction percentage was multiplied by the corresponding 2020 VMT value and then by the home-work trip percentage to get the amount of VMT reduced by this measure.
3. To quantify GHG reductions, the VMT reduction was multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. VMT reduction percentages were multiplied by the corresponding 2040 and 2050 VMT values and then by the home-work trip percentages to determine VMT reductions.
2. GHG reductions were quantified using the weighted vehicle emission factors from the inventory.

Activity Data Sources: VMT data and mode share data from SCTA.

Responsible Entities: Each city and the County, and RCPA/SCTA.

Key Progress Indicators: Number of businesses or employees participating in the program, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L3. Guaranteed Ride Home

Objective: Implement a guaranteed ride home program to provide a free car share, shuttle or taxi ride home in case of an emergency (illness, family crisis, unscheduled overtime) for employees who use an alternative to driving alone to work (public transit, carpooling, vanpooling, biking, or walking) on the day of the emergency. For example, the City of Santa Rosa has a guaranteed ride home program for employees (or employers) registered in the City’s Trip Reduction Program.

The implementation of this program was determined by the communities on an individual basis as follows:

Community	Measure Included?
Cloverdale	Yes
Cotati	Yes
Healdsburg	No
Petaluma	No
Rohnert Park	No
Sebastopol	Yes
Sonoma	No
Windsor	No
Unincorporated County	Yes

Impact on Local Emissions: This measure encourages greater use of commute alternatives by reducing the risk that an employee could become “stranded” at work in the event of an emergency. Increasing alternative transportation modes means employees will do less driving in their personal vehicles. As a result, the total fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

Implementation Information: Each community would be responsible for implementing this measure. The communities may work with RCPA/SCTA to implement this program.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: The communities and RCPA/SCTA.

Key Progress Indicators: Number of businesses or employees participating in the guaranteed ride home program, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L4. Supporting Bicycle/Pedestrian Measures

Objective: The following local actions will support bicycle use and pedestrians:

- Identify bicycle/pedestrian route gaps including improving connections across community boundaries. Prioritize funding and construction of routes that close key gaps across community boundaries.
- Encourage implementation of city and County bike/pedestrian master plans. Identify common barriers to implementation of current plans.
- Update municipal codes to require pedestrian and bicycle facilities (if needed).

- Work with transit agencies to increase bike storage on buses, at bus stops, and at transit hubs and ferry terminals.
- Require bicycle facilities at all park-and-ride lots and transit stations.
- Consider implementing bike sharing programs.

AB 1193 will help communities implement this measure by requiring the California Department of Transportation to create engineering standards for protected bike lanes, which, until now, have been discouraged by a complex approval processes and a lack of state guidance. This new class of lane will be separated from motor traffic by using a physical barrier, such as curbs, planters, or parked cars (Streetsblog LA 2014).

The implementation of this program was determined by the communities on an individual basis as follows:

Community	Measure Included?
Cloverdale	Yes
Cotati	Yes
Healdsburg	Yes
Petaluma	Yes
Rohnert Park	Yes
Sebastopol	Yes
Sonoma	Yes
Windsor	Yes
Unincorporated County	Yes

Impact on Local Emissions: This measure will increase the use of bicycles and walking in the county and thereby reduce single-occupancy vehicle travel. As a result, the total fossil fuel consumption in passenger vehicles will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

Implementation Information: SCTA will work with the cities and county transit agencies to coordinate the identification and implementation of cross-jurisdictional bicycle and pedestrian corridor projects. Each community will update municipal codes and prepare or update their bike/pedestrian master plan, as needed. As discussed above, the communities will need to identify route gaps and coordinate with the County and SCTA on routes that are cross-jurisdictional. The bike and pedestrian master plans will outline needed improvements and the areas identified for expansion. Communities will also coordinate with transit agencies to improve the bike-transit facilities.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: The communities and RCPA/SCTA.

Key Progress Indicators: Number of businesses or employees participating in the program, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L5. Traffic Calming

Objective: Implement traffic-calming measures in downtown cores, accident hotspot locations, near schools and libraries, etc. Project design will include pedestrian/bicycle safety and other traffic-calming measures that exceed current community requirements. Traffic-calming measures reduce motor vehicle speeds and encourage pedestrian and bicycle trips. Specific measures may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others (CAPCOA 2010).

The percentage implementation of traffic-calming measures on streets and intersections within downtown core area and near applicable schools was determined by the communities on an individual basis as follows:

Community	Percentage of Applicable Area with Traffic Calming
Cloverdale	90%
Cotati	100%
Healdsburg	50%
Petaluma	100%
Rohnert Park	100%
Sebastopol	100%
Sonoma	80%
Windsor	100%
Unincorporated County	100%

Impact on Local Emissions: Providing traffic-calming measures encourages people to walk or bike instead of using a vehicle. This mode shift will result in a decrease in VMT (CAPCOA 2010). This measure will also improve the efficiency of the transportation network, and therefore the efficiency of vehicles traveling in the county. As a result, the total fossil fuel consumption will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 1,205 MTCO₂e.

Implementation Information: Each community will develop a strategy to implement this measure appropriate to their community setting. Implementation may include holding public meetings to identify areas of concern for the community, conducting traffic studies to determine where traffic calming is needed, and securing funding to construct traffic-calming features. Traffic-calming measures can be made a condition of new development approvals where appropriate and can be incorporated in General Plans, Area Plans, and Specific Plans. Communities will select specific measures to implement based on the issues and characteristics of each area. The communities may also work with SCTA.

Assumptions:

- The percentage of applicable area to be affected by this measure was determined by the communities on an individual basis.
- This measure, in conjunction with Measure 5-C8 (Safe Routes to School), would reduce total community-wide VMT by 0.05% to 0.1%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 3 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reduction in passenger vehicle VMT was calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. Total community-wide VMT was multiplied by the corresponding VMT reduction percentage to determine the VMT that this measure would reduce in conjunction with Measure 5-C8 (Safe Routes to School).
3. To quantify GHG reductions, the VMT reductions were multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Total community-wide VMT in 2040 and 2050 was multiplied by 0.1% to determine the VMT that this measure would reduce in conjunction with Measure 5-C8 (Safe Routes to School).
2. To quantify GHG reductions, the VMT reductions were multiplied by weighted vehicle emission factors used in the inventory.

Activity Data Sources: VMT data and mode share data from the SCTA.

Responsible Entities: Each city and the County, and RCPA/SCTA.

Key Progress Indicators: The percentage implementation of traffic-calming measures, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L6. Parking Policies

Objective: Implement additional parking policies to promote reduction in single-occupancy vehicle travel, such as on-street market pricing in downtown core areas. Consider reduced parking requirements, shared parking, and in-lieu fees, in combination with providing transit and bicycle facilities, in appropriate areas.

The percentage increase in parking market-pricing and the percentage of applicable area subject to parking pricing for each community was determined by the communities on an individual basis as follows:

Community	Percentage Increase in Parking Market Prices	Percentage of Applicable Area that Is Subject to Parking Prices
Cloverdale	25%	10%
Cotati	-	-
Healdsburg	25%	50%
Petaluma	-	-
Rohnert Park	-	-
Sebastopol	-	-
Sonoma	-	-
Windsor	-	-
Unincorporated County	25%	10%

Impact on Local Emissions: Parking pricing encourages more efficient use of parking facilities, reduces parking facility costs and land requirements, reduces vehicle traffic and encourages use of alternative modes (Victoria Transportation Institute 2015). This measure will increase the use of transit, vanpools, carpools, and other alternative modes of transportation in the county. Increasing alternative modes of transportation means that residents and workers will take transit (or vanpools/carpools) instead of driving their personal vehicles. As a result, the total fuel consumption in passenger vehicles driven in the communities will be reduced. Reduced vehicle fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 2,489 MTCO_{2e}.

Implementation Information: Each community would be responsible for implementing this measure. The communities may also work with SCTA. Staff would select parking pricing policies appropriate for their jurisdiction and develop a process for implementation and management, which may include updating municipal codes. The communities would draft new ordinances and/or general plan policies, or offer incentives encouraging reduced parking requirements and increased transit or bicycle facilities. Potential incentives could include tax breaks or deductions, or other rebates.

Assumptions:

The quantification of this measure is based entirely on parking pricing strategies. While this is only a single component of the overall measure, it is the most quantifiable aspect and was thus used as a proxy to estimate emission reductions. Other components of this measure, such as shared parking, prioritized parking, and providing transit and bicycle facilities, are more difficult to quantify accurately and were not included in the quantitative analysis of reductions.

This measure would reduce total community-wide VMT by 0.3% to 1.40%, depending on the community (Fehr & Peers 2014a, 2014b). This is about 6.1 million VMT countywide. This estimate is based on CAPCOA methodology (CAPCOA 2010).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The percentage reductions in passenger vehicle VMT were calculated by Fehr & Peers using CAPCOA methodology (CAPCOA 2010).
2. Total community-wide VMT was multiplied by the corresponding VMT reduction percentage to determine the VMT that this measure would reduce. To quantify GHG reductions, the VMT reductions were multiplied by weighted vehicle emission factors used in the inventory.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Total community-wide VMT in 2040 and 2050 was multiplied by the corresponding VMT reduction percentage to determine the VMT that this measure would reduce.
2. To quantify GHG reductions, the VMT reductions were multiplied by weighted vehicle emission factors used in the inventory.

Activity Data Sources: VMT data and mode share data from SCTA.

Responsible Entities: The communities and RCPA/SCTA.

Key Progress Indicators: The percentage increase in parking pricing and the percentage of applicable area subject to parking pricing, VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

Measure 5-L7. Supporting Parking Policy Measures

Objective: Offer prioritized parking for hybrid/EV cars, carpools, vanpools at city-centered corridors, new developments, public parking areas, and municipal facilities. Consider amending zoning code to require new parking lots to provide prioritized parking for carpools, vanpools, hybrids, and EVs, and provide charging facilities.

The implementation of this program was determined by the communities on an individual basis as follows:

Community	Measure Included?
Cloverdale	Yes
Cotati	Yes
Healdsburg	Yes
Petaluma	Yes
Rohnert Park	No
Sebastopol	Yes
Sonoma	Yes
Windsor	Yes
Unincorporated County	Yes

Impact on Local Emissions: This measure will support a reduction in single-occupancy vehicle travel and increase the use of transit, vanpools, carpools, and other alternative modes of transportation in the county. Increasing alternative modes of transportation means that residents and workers will take transit (or vanpools/carpools) instead of driving their personal vehicles. As a result, the total fossil fuel consumption in passenger vehicles driven in the communities will be reduced. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

Implementation Information: The communities will identify supporting parking policy strategies appropriate for their jurisdiction and develop specific policies and guidelines to implement and monitor them. Implementation could include new ordinances and/or general plan policies, zoning code amendments, or incentives encouraging prioritized parking requirements for alternatively fueled vehicles or carpools. Potential incentives could include tax breaks or deductions, or other rebates. The communities may also work with RCPA/SCTA.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: Each city and the County, and RCPA/SCTA.

Key Progress Indicators: VMT by mode for each community, mode share percentages, and/or gasoline/diesel fuel usage/sales in the county.

C.12 Goal 6: Increase Vehicle and Equipment Fuel Efficiency

Measure 6-S1. Pavley Emissions Standards for Passenger Vehicles and the Low Carbon Fuel Standard (LCFS)

Objective: This measure includes two separate state actions: the so-called Pavley Standards and the low carbon fuel standard (LCFS). Pavley will reduce GHG emissions from automobiles and light-duty trucks (2009 model years and newer) by 30% from 2002 levels by the year 2016. The state's vehicle efficiency standards have been harmonized with federal vehicle efficiency standards. The LCFS would reduce GHG emissions by requiring a minimum 10% reduction in the carbon intensity of transportation fuels sold in California by the year 2020.

Impact on Local Emissions: Pavley requires that vehicle manufacturers increase the average fuel efficiency of their new vehicles. As county residents and businesses purchase these vehicles to replace their older, less fuel efficient vehicles, the total fuel consumption in vehicles driven in the communities will be reduced. Reduced vehicle fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. The LCFS requires fuel producers and importers to reduce the carbon content of their fuels. The communities will be purchasing and using these low carbon fuels as they are introduced into the market, offsetting the higher-carbon fuels they were previously using. When combusted, the new low carbon fuels produce fewer GHG emissions, resulting in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. This measure would reduce GHG emissions in the transportation sector. Total countywide reductions from this measure are anticipated to be 333,030 MTCO₂e.

Implementation Information: ARB is responsible for implementing this measure.

Assumptions: All assumptions used for the analysis of this measure are identified in Table C-1 and contained within the EMFAC2011 model.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. ARB's EMFAC2011 model provides GHG emission factors that account for the *combined* statewide impact of Pavley and LCFS; the model does not separate these impacts, so the GHG emission reductions were combined. EMFAC2011 estimates the number of new, more fuel efficient vehicles sold and driven in the county, along with the impact of LCFS fuel combusted in vehicles in the county. It then calculates the fleet-wide emission rate based on the penetration of new vehicles and fuels.
2. The new, lower emission rates were used to determine emission reductions in each community (when compared to the BAU emission rates in absence of Pavley and the LCFS).
3. The 2020 VMT forecast for each community was multiplied by the EMFAC2011 emission factors to obtain GHG emissions assuming implementation of Pavley and LCFS.

4. Local GHG emissions reductions achieved by Pavley and LCFS were calculated by subtracting the Pavley and LCFS adjusted emissions from the 2020 BAU emissions for the transportation sector.
5. Because Measure 7-C1 (Shift Sonoma County) and Measure 7-L1 (Electric Vehicle Charging Station Program) would promote a larger fraction of electric vehicles in Sonoma County than would occur under BAU, the BAU vehicle emissions associated with the equivalent amount of electric vehicles added due to these measures were removed prior to calculating the reductions due to Pavley/LCFS (e.g., the Pavley/LCFS reductions were applied to the Sonoma 2020 vehicle fleet after application of the regional and local EV measures).

Activity Data Sources: VMT data was obtained from SCTA.

Responsible Entities: ARB.

Key Progress Indicators: Average fleet-wide vehicle efficiency; the carbon content of fuels sold in the county.

Measure 6-S2. Advanced Clean Cars

Objective: The Advanced Clean Car (ACC) rule will further reduce GHG emissions from automobiles and light-duty trucks for 2017–2025 vehicle model years. The state’s vehicle efficiency standards have been harmonized with federal vehicle efficiency standards.

Impact on Local Emissions: ACC requires that vehicle manufacturers continue to increase the average fuel efficiency of their new vehicles, beyond the Pavley requirements (which only go through 2016). As county residents and businesses purchase these vehicles to replace their older, less fuel efficient vehicles, the total fuel consumption in vehicles driven in the communities will be reduced. Reduced vehicle fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. This measure would reduce GHG emissions in the transportation sector. Total countywide reductions from this measure are anticipated to be 9,679 MTCO₂e.

Implementation Information: ARB is responsible for implementing this measure.

Assumptions:

- The ACC rule will reduce statewide emissions from passenger vehicles by 3.8 million MTCO₂e in 2020 (California Air Resources Board 2013). This is a 2.5% reduction in emissions.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The EMFAC2011 model does not include emissions benefits from the ACC rule. Local reductions achieved by the ACC rule were therefore obtained by apportioning expected statewide reductions to the county level.

2. Emissions reductions achieved by the ACC rule within Sonoma County were quantified by multiplying GHG emissions from light-duty vehicles in each community by 2.5%.
3. Reductions achieved by Pavley and LCFS were removed from the light-duty emissions forecast to avoid double counting. Because Measure 7-C1 (Shift Sonoma County) and Measure 7-L1 (Electric Vehicle Charging Station Program) would promote a larger fraction of electric vehicles in Sonoma County than would occur under BAU, the BAU vehicle emissions associated with the equivalent amount of electric vehicles added due to these measures were also removed from the light-duty forecast prior to calculating the reductions due to ACC.
4. Because the ACC initiative will also promote EVs as will the regional and local EV measures (see discussion below), to avoid double-counting, the ACC reductions were reduced by the fraction of EVs assumed by the state to occur in absence of regional and local action, which is 2.6%.

Activity Data Sources: VMT data was obtained from SCTA.

Responsible Entities: ARB.

Key Progress Indicators: Average fleet-wide vehicle efficiency.

Measure 6-S3. Assembly Bill 32 Vehicle Efficiency Measures

Objective: The AB 32 scoping plan includes several vehicle efficiency measures that focus on maintenance practices. The Tire Pressure Program will increase vehicle efficiency by assuring properly inflated automobile tires to reduce rolling resistance. The Heavy-Duty Vehicle Aerodynamic Efficiency Program will increase heavy-duty vehicle (long-haul trucks) efficiency by requiring installation of best available technology and/or ARB-approved technology to reduce aerodynamic drag and rolling resistance. Finally, the Heavy-Duty Vehicle Hybridization Program will reduce GHG emissions through the use of hybrid and zero-emission technology.

Implementation Information: ARB will work with the vehicle industry to implement these measures. The tire inflation and tire program would affect vehicle service facilities such as dealerships, maintenance garages, oil change facilities, tire centers, and smog check facilities, and public education about proper tire inflation will be included. The Heavy-Duty Vehicle Aerodynamic Efficiency Program would require existing trucks/trailers to be retrofitted with the best available technology and/or ARB approved technology. Under the Heavy-Duty Vehicle Hybridization Program, ARB would adopt a regulation and/or incentive program for compliance.

Impact on Local Emissions: These measures will increase the average fuel efficiency for heavy-duty vehicles driven in the county. As average vehicle efficiency increases, the total fuel consumption in vehicles driven in the communities will be reduced. Reduced vehicle fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. This measure would reduce GHG emissions in the transportation sector. Total countywide reductions from this measure are anticipated to be 16,010 MTCO₂e.

Implementation Information: ARB is responsible for implementing this measure.

Assumptions:

- The Tire Pressure Program will reduce statewide emissions from passenger vehicles by 0.6 million MTCO₂e (California Air Resources Board 2013). This is a 0.4% reduction in emissions.
- The Heavy-Duty Vehicle Aerodynamic Efficiency Program will reduce statewide emissions from heavy-duty vehicles by 0.7 million MTCO₂e (California Air Resources Board 2013). This is a 1.7% reduction in emissions.
- The Heavy-Duty Vehicle Hybridization Program will reduce statewide emissions from heavy-duty vehicles by 0.1 million MTCO₂e (California Air Resources Board 2013). This is a 0.2% reduction in emissions.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Emissions reductions achieved by the Tire Pressure and Heavy-Duty Vehicle Programs were quantified by multiplying GHG emissions from light-duty vehicles and heavy-duty vehicles in each community by 0.4% and 1.9% (1.7% + 0.2% = 1.9%), respectively.
2. Reductions achieved by Pavley, LCFS, and ACC were removed from the light-duty emissions forecast to avoid double counting.

Activity Data Sources: VMT data was obtained from SCTA.

Responsible Entities: ARB.

Key Progress Indicators: Average fleet-wide vehicle efficiency; statistics on the implementation of each program in the county.

C.13 Goal 7: Encourage a Shift Toward Low-Carbon Fuels in Vehicles and Equipment

Measure 7-S1. Low Carbon Fuel Standard: Off-Road

Objective: The LCFS will also affect fuels used in off-road vehicles. Refer to Measure 6-S1 for the description of LCFS.

Impact on Local Emissions: The LCFS requires fuel producers and importers to reduce the carbon content of their fuels. Off-road equipment operators (such as construction companies, contractors, etc.) will be purchasing these low carbon fuels as they are introduced into the market, offsetting the higher-carbon fuels they were previously using. When combusted, the new low carbon fuels produce fewer GHG emissions, resulting in direct emission reductions from

combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 5,182 MTCO₂e.

Implementation Information: ARB is responsible for implementing this measure.

Assumptions:

- LCFS will reduce statewide emissions from transportation-based fuels¹¹ by 15 million MTCO₂e (California Air Resources Board 2011a). This is equivalent to an 8.9% reduction in emissions from transportation fuels. Fuels used in off-road vehicles will be affected by this measure

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. GHG reductions achieved by the LCFS for off-road vehicles within each community were quantified by multiplying BAU off-road emissions by 8.9%.

Activity Data Sources: VMT data was obtained from SCTA.

Responsible Entities: ARB.

Key Progress Indicators: The carbon content of fuels sold in the county.

Measure 7-C1. Shift Sonoma County (Electric Vehicles)

Objective: With RCPA/SCTA as the lead, and in partnership with SCP, this measure would implement a regional EV promotion program. The specifics of the incentive, financing, and education programs offered will be further developed in the Shift Sonoma County initiative but may include incentives for EV home, commercial or institutional chargers, promotion of EV purchase, preferential public parking, working with employers to provide preferential parking and charging stations, working with the hospitality and wineries to promote an “EV/wine trail,” demonstration projects, education and outreach. The specific goal will be developed through Shift Sonoma County. This analysis assumes that the target will be 5% of the countywide light-duty vehicle fleet.

Impact on Local Emissions: As county residents and businesses purchase EVs to replace their current, diesel and gasoline vehicles, the total fossil fuel consumption in vehicles driven in the communities will be reduced and replaced with electricity. Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 11,353 MTCO₂e.

Implementation Information: This measure requires regional and local coordination. RCPA/SCTA will design the program, identify funding sources, and serve as a focal point for implementation in cooperation with SCP.

Assumptions:

¹¹ Excludes aviation fuel, residual fuel oil, and lubricants.

- 75% of EV purchasers will apply for the clean vehicle rebates.
- Average annual VMT per vehicle for vehicles replaced by EVs will be 10,000 miles.
- Roughly 40% of the total electric vehicles targeted in this measure will be powered by SCP's EverGreen electricity.
- The remaining percentage of vehicles (~60%) will be powered by the countywide mix of electricity (which includes SCP's EverGreen & CleanStart, PG&E, and Healdsburg municipal utility).
- While the ARB Zero Emissions Vehicle (ZEV) program would also promote EVs, this measure does not take any credit for the ZEV program and thus no double-counting would occur.

Analysis Method - 2020: Reductions from this measure were quantified by determining the emissions reduced associated with gasoline and the diesel vehicles replaced by EVs and the increased emissions associated with increased electricity use to identify the net reduction. The following steps were used to quantify emission reductions for this measure:

1. Existing EVs were estimated by identifying the number of clean vehicle rebates (battery electric vehicle [BEV], plug-in hybrid electric vehicle [PHEV], and fuel cell EV) as of April 2015 (~1,672) and assuming that only 75% of EV purchasers apply for the rebate, resulting in a 2015 estimate of 2,229 EVs (Center for Sustainable Energy 2015).
2. According to EMFAC2011, the total number of light-duty vehicles in the county in 2020 is anticipated to be 179,433.
3. 5% of the 2020 light-duty vehicle fleet, including both gasoline/diesel vehicles and existing EVs (179,433 + 2,229) would be 9,083 EVs. This measure would involve 6,854 new EVs (9,083 – 2,229). It was assumed that roughly 40% of these vehicles (3,000) will be powered by SCP's EverGreen electricity. The remaining 3,854 vehicles would be powered by the countywide mix of electricity.
4. Fleet vehicles were apportioned to Healdsburg and the rest of the communities using household counts for 2020, because Healdsburg has a different electricity emissions factor than the rest of the county.
5. Offset 2020 vehicle emissions are based on 2020 BAU vehicle emissions prior to the application of Pavley/LCFS or ACC state measure because vehicles being replaced are likely to be older (hence BAU-type) vehicles.
6. Based on the assumptions listed above, the average amount of fuel-related emissions reductions per vehicle would be 2.6 MTCO_{2e}/year.
7. 2020 Electricity emissions for the new EVs are based on 2020 electricity emissions factors for SCP EverGreen for the 3,000 vehicles and the countywide mix of electricity (SCP and PG&E [based on assumed share] for all areas except Healdsburg and for the Healdsburg utility for Healdsburg) for the 3,854 vehicles. The emission factors applied after application of the state

RPS measure and the regional CCA measure as the 2020 electricity would be obtained from providers compliant with these measures. Using 10,000 miles/EV/year, the average increase in electricity emissions per EV would be approximately 80 kilograms of carbon dioxide equivalent (kgCO₂e) for vehicles powered by EverGreen Electricity, 331 kgCO₂e for other, non-EverGreen electric vehicles in Sonoma County and 353 kgCO₂e in Healdsburg.

8. Other state programs, such as ARB mandates for ZEVs, Pavley/LCFS, ACC, and Cap & Trade induced changes in fuel prices would also increase the amount of EVs in Sonoma County, but the precise influence of such state-wide programs are difficult to ascertain at the county level. Thus, the “full” value of replacing gasoline and diesel light-duty vehicles is credited to this measure, recognizing that growth in EVs may occur due to a combination of Shift Sonoma County, state measures, and other factors.¹² In order to avoid double-counting with reductions accounted for the Pavley/LCFS/ACC state measures, the BAU vehicle emissions offset due to the regional EV measure (and the Local EV measure) were removed prior to estimating the Pavley/LCFS and ACC state reductions (e.g., this regional EV measure was applied first to the BAU vehicle emissions, then the local EV measure and then Pavley/LCFS and ACC were applied to the rest of the fleet).
9. Because the ACC initiative will also promote EVs, to avoid double-counting, the ACC reductions were reduced by the fraction of EVs assumed by the state to occur in absence of regional and local action, which is 2.6%.

Analysis Method – 2040/2050: This measure was not extended to 2040 and 2050 to avoid potential double-counting with state reduction scenarios used in the scenario analysis. However, the region may continue to promote EVs in the post-2020 period depending on the necessity and cost-effectiveness of doing so.

Activity Data Sources: VMT data obtained from SCTA and the number of EV charging stations from RCPA.

Responsible Entities: RCPA/SCTA and SCP in collaboration with the communities.

Key Progress Indicators: The number of EVs registered in Sonoma County, the number of EV charging stations installed, the amount of electricity distributed/sold by the charging stations (kWh), the number of Clean Vehicle Rebate Project rebates issued, and/or gasoline/diesel fuel usage/sales in the county.

Measure 7-C2. Alternative Fuels for Transit Vehicles.

Objective: Work with transit agencies to replace diesel and gasoline buses with hybrid buses, compressed natural gas (CNG) buses, or electric buses. Establish a goal to replace at least 50% of the bus fleet with alternatively fueled buses. This measure may also include the replacement of diesel and gasoline buses with electric buses as feasible.

¹²¹² No credit is taken in this plan for the effect of the ZEV requirements or Cap & Trade; as a result there is no potential for double-counting for the state measures.

Impact on Local Emissions: As transit agencies in the county purchase hybrid or alternatively fueled buses to replace their current diesel and gasoline buses, the total fossil fuel consumption in buses driven in the communities will be reduced either through increased fuel efficiency (in the case of hybrid buses) or through the replacement of fossil fuel with cleaner-burning and less emissions-intensive CNG (in the case of CNG buses). Reduced fossil fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 40 MTCO₂e.

Implementation Information: This measure requires regional and local coordination. SCTA will identify funding sources and serve as a focal point for the transportation agencies involved: Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit. The transportation agencies will also work to find funding opportunities and coordinate with SCTA to procure the new vehicles.

Assumptions:

- For light-duty autos, switching from gasoline to CNG would result in a 25% reduction (average of 0.20 and 0.30). Switching from diesel fuel to biodiesel would result in a 15% reduction (average of 0.10 and 0.20) (California Energy Commission 2007).
- For heavy-duty vehicles/buses, switching from gasoline to CNG would result in a 17% reduction (average of 0.11 and 0.23). Switching from diesel fuel to biodiesel would result in a 12% reduction (average of 0.10 and 0.13) (California Energy Commission 2007).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Reductions from this measure were quantified by first obtaining the number of revenue transit vehicle miles in Healdsburg, Petaluma, and Sonoma. The number of miles by vehicle type were also obtained (i.e., number of bus miles, van miles, light-duty auto miles). These data were obtained from either personal communications with a community contact, or the 2010 National Transit Database.
2. To determine the number of transit vehicle miles in 2020, the 2010 values were scaled using each community's expected growth in total VMT between 2020 and 2010.
3. Appropriate vehicle emission factors for each vehicle type were obtained from the on-road sector of the GHG inventory (from EMFAC2011) and were multiplied by the corresponding number of miles for each vehicle type and for each community to estimate the total transit vehicle emissions in 2020.
4. Reductions in emissions were then determined by multiplying the total transit vehicle emissions by the goal chosen by each community (i.e., 50% of transit fleet to be alternatively fueled) and by the percentage reduction in emissions from switching to alternative fuels (see above).

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Transit VMT in 2040 and 2050 was scaled from the 2010 values using the total community-wide VMT growth between 2010 and 2040/2050.
2. Vehicle emission factors were used from the EMFAC2011 model for 2035, which is the furthest year available.
3. Emissions reductions were then determined by multiplying transit emissions by region-wide goals of 75% for 2040 and 100% for 2050.

Activity Data Sources: Revenue transit vehicle miles from the communities or the 2010 National Transit Database.

Responsible Entities: RCPA/SCTA, Sonoma County Transit, Petaluma Transit, and Santa Rosa Transit.

Key Progress Indicators: The number of new hybrid buses or CNG (or other alternatively fueled) buses purchased by each transit agency, the number of gasoline/diesel buses retired by each transit agency, actual fuel consumption for new and existing buses (gallons diesel, gasoline, or CNG), and/or actual fuel savings.

Measure 7-L1. Electric Vehicle Charging Station Program

Objective: Develop local charging stations to support electric vehicles. This measure is in addition to the regional EV measure (Measure 7-C1: Shift Sonoma County).

The number of new charging stations to be installed in each community was determined by the communities on an individual basis as follows:

Community	Charging Stations
Cloverdale	2
Cotati	5
Healdsburg	20
Petaluma	5
Rohnert Park	5
Sebastopol	5
Sonoma	3
Windsor	50
Unincorporated County	5

Impact on Local Emissions: As county residents and businesses purchase EVs to replace their current fossil fuel powered vehicles, the total fuel consumption in vehicles driven in the

communities will be reduced and replaced with electricity. Reduced vehicle fossil fuel combustion results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 60 MTCO₂e.

Implementation Information: The communities would work with PG&E and SCP to identify grants and other funding sources to help finance the installation of charging stations throughout the county. In addition, SCP, ESD (through available PACE financing options), and NSCAPCD would create a package to install and finance charging stations.

Assumptions:

- Installation of Level I and Level II charging stations would serve four PHEV and/or BEV per day.
- The electric vehicle charging stations would output 27 kWh per day, or 9,855 kWh per year.
- The charging station output of 27 kWh per day assumes the following:
 - The stations would be Level 2 AC charging stations
 - Assumed split of PHEV-10, PHEV-20, PHEV-40, and BEVs of 16%/16%/31%/37%¹³
 - Usage would be 4 vehicles per day
 - Charging time would be 2 hours per vehicle
- Charging PHEV and BEV would consume the following quantities of electricity:
 - PHEV 10-mile range: 4.1 kWh per charge
 - PHEV 20-mile range: 4.8 kWh per charge
 - PHEV 40-mile range and BEV 75-mile range: 5.8 kWh per charge
- PHEV and BEV would replace new vehicles with an average fuel economy of 34 miles per gallon.
- The fuel economy of electric vehicles in 2020 is 135 miles per gallon of gasoline equivalent (GGE) (AEO 2014).
- The conversion of gallon of gasoline equivalents to kWh for electric vehicles is 33.7 kWh/gallon.
- The average efficiency of electric vehicles is 4 miles per kWh, calculated by dividing the two assumptions above.
- 20% of total vehicle charging occurs at the public charging stations (80% occurs in the home). Consequently, to be conservative in attributing emission reductions to the action of installing public charging stations, only 20% of total displaced emission reductions from EVs are attributed to this measure (ECOtality 2013).

¹³ PHEV-XX = Plug-in Hybrid Electric Vehicle with a XX mile all electric range, BEV = Battery Electric Vehicle

- The charging stations will not be funded by LCFS credits and are therefore in addition to the state’s plan for EVs under LCFS.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Because this measure would promote a larger fraction of electric vehicles in Sonoma County than would occur under BAU, the BAU vehicle emissions associated with the equivalent amount of electric vehicles added due to this measure were removed prior to calculating the reductions due to Pavley/LCFS/ACC (e.g., the Pavley/LCFS/ACC reductions were applied to the Sonoma 2020 vehicle fleet after application of the regional and local EV measures).
2. GHG emissions generated by EVs are attributed to VMT in all-electric mode (i.e., E-VMT) and gasoline mode. The E-VMT calculation was based on the anticipated future fleet mix, vehicle range, and charging times required for Level I and Level II charging stations.
3. Miles traveled in all-electric mode were assumed to displace miles traveled using a gasoline-engine with an average fuel economy of 34 miles per gallon.
4. Emissions reductions were therefore determined as the difference between the emissions attributable to the EV and the emissions that would have otherwise occurred using an average conventional gasoline vehicle.

Total GHG reductions for these new EVs were multiplied by 20% to account for only the percentage of charging that occurs at public stations (versus the 80% of charging that occurs in the home).

Analysis Method – 2040/2050: This measure was not extended to 2040 and 2050 to avoid potential double-counting with state reduction scenarios used in the scenario analysis. However, Sonoma County communities may continue to incentivize expansion of the charging network as necessary and cost-effective in the post-2020 period.

Activity Data Sources: VMT data obtained from SCTA and the number of EV charging stations from each community.

Responsible Entities: RCPA/SCTA, SCP, ESD (through available PACE financing options), NSCAPCD, PG&E, and Healdsburg Electric in collaboration with the cities.

Key Progress Indicators: The number of EV charging stations installed, the amount of electricity distributed/sold by the charging stations (kWh), the number of Clean Vehicle Rebate Project rebates issued, and/or gasoline/diesel fuel usage/sales in the county.

Measure 7-L2. Electrify Construction Equipment

Objective: Establish a goal such that a percentage of construction equipment uses alternative fuels or electricity in place of diesel and gasoline. Equipment could include electric or hybrid-electric dozers, excavators, or loaders, all of which are on the market. Diesel generators could also be replaced with electricity hookups. Construction equipment powered by other alternative fuels, such as CNG, is also available. New development would be required to provide a construction

equipment management plan that meets the local community requirements for use of alternative-fueled equipment (including electrical equipment) during project construction.

The electrification goal for construction equipment was determined by the communities on an individual basis as follows:

Community	Electrification Percentage
Cloverdale	-
Cotati	10%
Healdsburg	10%
Petaluma	10%
Rohnert Park	-
Sebastopol	10%
Sonoma	-
Windsor	5%
Unincorporated County	-

Impact on Local Emissions: As electric construction equipment replaces current diesel and gasoline-powered equipment, the total fuel consumption for construction equipment operation in the communities will be reduced and replaced with electricity. Reduced fuel consumption results in direct emission reductions from combustion. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 365 MTCO₂e.

Implementation Information: Each community would work in close cooperation with the air district to draft an ordinance and develop outreach programs to be consistent with current air district rules and California Environmental Quality Act (CEQA) Guidelines. The air district sets air quality related requirements on construction vehicles and also provides mitigation options related to construction vehicles through Voluntary Emission Reduction Agreement programs, which may overlap with this measure.

This measure could be implemented through discretionary approvals and permitting for new projects. Communities could provide incentives for electric and more efficient construction equipment to developers and contractors, such as rebates and subsidies and information on financing for this equipment. Encourage the use of alternative fuels for construction equipment on-site, where feasible, such as CNG, liquefied natural gas, propane, or biodiesel. Require a certain percentage of all construction equipment on new development projects to be electrically powered as a condition of approval; this could be incorporated into the construction contracts.

Assumptions:

- Construction equipment that uses alternative fuel will be divided up equally among alternative fuels, with electric, hybrid electric, CNG, and biodiesel each representing 25% of the replaced gasoline and diesel equipment.
- Switching from gasoline and diesel equipment to hybrid electric equipment would reduce emissions by 25.0% (ForConstructionPros.com n.d.)
- Switching from diesel equipment to CNG equipment would reduce emissions by 18.3% (ARB 2008)
- Switching from gasoline and diesel equipment to biodiesel equipment would reduce emissions by 15.0% (NREL 2008)

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Emission reductions from Measure 7-S1, *Low Carbon Fuel Standard*, were subtracted to avoid double-counting reductions.
2. The OFFROAD2011 model calculates vehicle operating emissions and fuel usage by equipment type (industrial equipment, oil drilling equipment, etc.), fuel type (e.g., diesel, gasoline) and average horsepower.
3. It was assumed that 25% of the fuel targeted would be replaced with each of the following: electric equipment, hybrid electric equipment, CNG equipment, and biodiesel equipment.
4. Emissions reductions achieved by the electric vehicle component of this measure were calculated as follows:
 - a. Determining the ratio of construction equipment emissions for each community and fuel type relative to the countywide construction emissions for that fuel type (e.g., Cloverdale gasoline emissions/countywide gasoline emissions), because the OFFROAD model only outputs emissions at the county level.
 - b. That ratio was multiplied by the countywide values for each fuel type to determine the amount and type of fuel consumed in each community (i.e., countywide fuel use was apportioned to each community using the emissions ratios).
 - c. Fuel consumption was then multiplied by the penetration rate chosen by each community to quantify the amount of construction equipment fuel that would be targeted by this measure.
 - d. Emission reductions were estimated by converting the amount of fuel affected by the electric component of the measure into GHG emissions, using fuel emissions factors for gasoline and diesel of 8.85 kg CO₂e/gallon and 10.30 kg CO₂e/gallon, respectively.
 - e. The increase in electricity use from new electric equipment was determined by converting the gallons of reduced fuel into electricity using energy/fuel equivalency ratios of 33.4 kWh/gallon gasoline and 37.7 kWh/gallon diesel.

- f. The increase in electricity-related emissions was then quantified using the appropriate RPS-adjusted emission factors.
 - g. Net GHG reductions were determined by subtracting the increase in electricity emissions from the reduction in fuel-related emissions.
5. Emissions reductions achieved by switching to hybrid electric, CNG, and biodiesel equipment were quantified as follows:
- a. Multiplying the off-road construction equipment inventory emissions for each community by the penetration rate chosen by each community.
 - b. This value was multiplied by 25% to determine the quantity of emissions subject to replacement by each alternative fuel, and then this was multiplied by the specific emission reduction percentage for each fuel type (see assumptions above).

Total costs not quantified. Upfront cost is assumed to be negligible; equipment costs vary significantly based on other features besides energy source.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. The amount and type of fuel consumed in each community was determined using the methods described above for 2020.
2. Fuel consumption was then multiplied by the penetration rate chosen by each community for 2040 and 2050 to quantify the amount of construction equipment fuel that would be targeted by this measure.
3. Emission reductions were estimated by converting the amount of fuel affected by the electric component of the measure into GHG emissions, using fuel emissions factors for gasoline and diesel of 8.85 kg CO₂e/gallon and 10.30 kg CO₂e/gallon, respectively.
4. The increase in electricity use from new electric equipment was determined by converting the gallons of reduced fuel into electricity using energy/fuel equivalency ratios of 33.4 kWh/gallon gasoline and 37.7 kWh/gallon diesel.
5. The increase in electricity-related emissions was then quantified using the appropriate 2020 RPS-adjusted emission factors.
6. Net GHG reductions were determined by subtracting the increase in electricity emissions from the reduction in fuel-related emissions.

Activity Data Sources: Construction equipment fuel usage and operating data from the OFFROAD2007 model.

Responsible Entities: The communities and BAAQMD/NSCAPCD.

Key Progress Indicators: Construction equipment fuel use.

Measure 7-L3. Reduce Fossil Fuel Use in Equipment through Efficiency or Fuel Switching

This voluntary measure would include supporting farmers to reduce fuel use in agricultural equipment by converting equipment currently using gasoline, diesel, or liquefied petroleum gas to alternative fuels with lower GHG intensity (such as natural gas, biofuels, or solar electricity) as feasible, keep equipment maintained and in good working order, replace old equipment with newer and more efficient equipment, and use global positioning systems (GPS) to optimize equipment operation. Encourage farmers to participate in ARB's Carl Moyer Program, which provides incentives for engines that beat emissions standards. A particular focus may be expanding renewable energy use for water pumps and wind machines.

This measure would set a goal to reduce equipment GHG emissions by 5–10% for equipment that can feasibly be run on renewable fuels or lower GHG-intensive fuels.

Reductions for this measure were not quantified due to a lack of a comprehensive inventory of water pumps and wind machines. In addition, this measure may overlap with the 100% Sustainable Wine Region activities. A cost-effectiveness analysis was not conducted.

C.14 Goal 8: Reduce Idling

Measure 8-L1. Idling Ordinance

Objective: Limit idling of all commercial vehicles to 3 minutes except as necessary for the loading or unloading of cargo within a period not to exceed 30 minutes.

The idling limit in each community was determined by the communities on an individual basis as follows:

Community	Idling Time (min)
Cloverdale	3
Cotati	3
Healdsburg	3
Petaluma	3
Rohnert Park	3
Sebastopol	3
Sonoma	5 State law only – no additional action)
Windsor	5 (State law only – no additional action)
Unincorporated County	3

Impact on Local Emissions: Reduced idling means that commercial vehicles will be running their engines for a smaller amount of time while stopped, reducing fossil fuel use. Reduced fossil fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 13,120 MTCO₂e.

Implementation Information: Each community would adopt and implement a new commercial vehicle idling ordinance. The communities could also work with RCPA and/or BAAQMD and NSCAPCD to implement the ordinance.

Assumptions:

- The following idling fuel consumption rates were assumed:
 - High idle: 1.2 gallons/hour (EPA 2009).
 - Low idle: 0.6 gallons/hour (EPA 2009).
 - Average idle: 0.9 gallons/hour (average of 1.2 and 0.6).
- The emissions rate of a tractor trailer truck in motion is 17.23 kilograms CO₂ per hour (CalEEMOD)
- The fuel consumption rate for a tractor trailer truck in motion is 1.69 gallons/hour (17.23 kg/hr / 10.21 kg/gallon¹⁴)
- The operating time of a commercial vehicle would be 480 minutes per day (8 hours/day) (assumption)
- The BAU percentage of time spent idling for commercial vehicles would be 9.4%, based on the average of various commercial vehicle types (UC Davis 2006).

¹⁴ Climate Registry Default Emission Factors 2014.

- Idling time for commercial vehicles is 45 minutes per day (480 minutes * 9.4%)
- Idling fuel consumption is 0.68 gallons of diesel per day (0.9 gallons/hr * 1 hr/60 minutes * 45 minutes)
- Running (vehicle in motion) fuel consumption is 12.23 gallons of diesel per day [(480 minutes – 45 minutes idling) * 1.69 gallons/hour]
- Fuel consumption due to idling is 5% [0.68 gallons / (0.68 gallons + 12.23 gallons)]

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. First, the total estimated amount of diesel fuel consumed by commercial vehicles in each community was estimated by using the commercial vehicle emissions from the on-road sector of the GHG inventory and a diesel fuel emission factor of 10.30 kg CO₂e per gallon. Note that the factor of 10.21 kg CO₂ per gallon used in the assumptions above only accounts for CO₂, not CO₂e. The factor of 10.30 kg CO₂e per gallon was calculated based on the CO₂, CH₄, and N₂O factors from the Climate Registry.
2. The total commercial vehicle diesel consumption was multiplied by 5% to estimate fuel consumption due to idling (see assumptions).
3. The fuel consumption due to idling was then multiplied by diesel emission factors to estimate the BAU GHG emissions due to idling.
4. The communities each chose an idling limit (e.g., 3 minutes), so a percentage reduction figure was determined using 5 minutes as a baseline, per California regulations. For example, a 3-minute limit would be a 40% reduction in idling emissions [(5–3)/5 = 40%].
5. The percentage reduction in idling emissions for each community was then multiplied by total BAU idling emissions to determine emission reductions from this measure.

No capital costs were assumed given that automatic engine shut down/start up systems should already be installed to comply with ARB's idling regulation. Annual cost savings were based on avoided fuel use, reduced maintenance (e.g., fewer oil changes), and reduced engine overhauls. The mileage per gallon for construction vehicles was assumed to be 10.85 miles per gallon (National Commission on Energy Policy 2004), and the avoided maintenance cost per mile was calculated at \$0.08 (based on a \$25 oil change every 3,000 miles and a \$7,000 engine overhaul every 100,000 miles).

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Emission reductions from overlapping measures were subtracted from the inventory emissions to avoid double counting reductions.
2. The total estimated amount of diesel fuel consumed by commercial vehicles in each community in 2040 and 2050 was estimated by using the commercial vehicle emissions from

the on-road sector of the GHG inventory and a factor of 10.30 kg CO₂e per gallon (see assumptions).

3. Then, the total commercial vehicle diesel consumption was multiplied by 5% to estimate fuel consumption due to idling (see assumptions).
4. Fuel consumption due to idling was then multiplied by diesel emission factors to estimate the 2040 and 2050 BAU GHG emissions due to idling.
5. The communities chose an idling limit for 2040 and 2050, so a percentage reduction figure was determined using 5 minutes as a baseline, per California regulations.
6. The percentage reduction in idling emissions for each community in 2040 and 2050 was then multiplied by the respective year's BAU idling emissions to determine emission reductions.

Activity Data Sources: N/A

Responsible Entities: Participating cities and the County, working with BAAQMD and NSCAPCD.

Key Progress Indicators: The idling limits in each community and/or diesel fuel usage/sales in the county.

Measure 8-L2. Idling Ordinance for Construction Equipment

Objective: Adopt an Ordinance limiting idling time for heavy-duty construction equipment beyond ARB or local air district regulations and if not already required as part of CEQA mitigation. CAPCOA (2010) recommends a 3-minute idling limit. Encourage contractors as part of permitting requirements or city contracts to submit a construction vehicle management plan that may include idling time requirements, hour meters on equipment, or documenting the horsepower, age, and fuel of all onsite equipment. California state law currently requires all off-road equipment fleets to limit idling to no more than 5 minutes.

The heavy-duty construction equipment idling limit in each community was determined by the communities on an individual basis as follows:

Community	Idling Time (min)
Cloverdale	5 (state law only)
Cotati	5 (state law only)
Healdsburg	5 (state law only)
Petaluma	3
Rohnert Park	3
Sebastopol	3
Sonoma	5 (state law only)
Windsor	5 (state law only)
Unincorporated County	3

Impact on Local Emissions: Reduced idling means that construction vehicles will be running their engines for a smaller amount of time while stopped, reducing fuel use. Reduced vehicle fuel consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities. Total countywide reductions from this measure are anticipated to be 256 MTCO₂e.

Implementation Information: Each community will adopt and implement a new construction vehicle idling ordinance. The ordinance may require contractors to submit a construction vehicle management plan as part of the permitting process for new development or in connection with contracts with the cities or the County. The communities could also work with RCPA and/or BAAQMD/NSCAPCD to implement the ordinance.

Assumptions:

- The following fuel idling rates were assumed:
 - High idle: 1.2 gallons/hour (EPA 2009).
 - Low idle: 0.6 gallons/hour (EPA 2009).
 - Average idle: 0.9 gallons/hour (average of 1.2 and 0.6).
- The idling rate of a tractor trailer truck is 17.23 kilograms CO₂ per hour (CalEEMOD)
- The fuel consumption rate for is 1.69 gallons/hour (17.23 kg/hr / 10.21 kg/gallon)
- The in-use time for heavy-duty construction equipment vehicle would be 480 minutes per day (8 hours/day)
- The BAU percentage of time spent idling for commercial vehicles, including construction equipment, would be 9.4%, based on the average of various vehicle and equipment types (UC Davis 2006).
- Idling time for heavy-duty construction equipment vehicles is 45 minutes per day (480 minutes * 9.4%)

- Idling fuel consumption is 0.68 gallons of diesel per day (0.9 gallons/hr * 1 hr/60 minutes * 45 minutes)
- Running (vehicle in motion) fuel consumption is 12.23 gallons of diesel per day [(480 minutes – 45 minutes idling) * 1.69 gallons/hour]
- Fuel consumption due to idling is 5% [0.68 gallons / (0.68 gallons + 12.23 gallons)]

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Emissions reductions from Measure 7-S1, *Low Carbon Fuel Standard*, were subtracted from the BAU emissions to avoid double counting reductions.
2. ARB's regulations for heavy duty vehicles (5 minutes) was used a proxy to determine the percentage reduction in potential idling emissions from implementing this measure in each community.
3. Reducing idling time from 5 minutes to 3 minutes, for example, is a 40% reduction $([5-3]/5 = 40\%)$.
4. Emissions savings associated with this measure were therefore calculated by multiplying BAU idling emissions by the community's corresponding reduction percentage (e.g., 0.40, for a 3-minute idling limit).

Idling emissions were quantified using off-road construction equipment inventory emissions and fuel consumption assumptions shown above and fuel emission factors for diesel shown in Table C-1 (see assumptions specific to OFFROAD).

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Emissions reductions in 2040 and 2050 were calculated by multiplying 2040 and 2050 idling emissions by the community's corresponding reduction percentage chosen for 2040 and 2050, based on the number of idling minutes.
2. Idling emissions were quantified using the same method as described above for 2020.

Activity Data Sources: N/A

Responsible Entities: Each city and the County, and BAAQMD/NSCAPCD.

Key Progress Indicators: The idling limits in each community and/or off-road diesel fuel usage/sales in the county.

C.15 Goal 9: Increase Solid Waste Diversion

Measure 9-C1. Waste Diversion Goal

Objective: Create a waste diversion goal for the entire county, such as increasing the waste diversion rate to 80% of the total waste stream by 2020. This measure could include any of the following:

- A sector-by-sector approach to waste diversion, focusing on certain sectors at a time.
- Recycling and composting programs/services as supporting measures.
- Ongoing participation in the countywide ordinance that bans the distribution of plastic carryout bags and imposes a fee on paper bags.
- A local ordinance to increase diversion of construction and demolition (C&D) waste.
- Continuation of the Waste Reduction Education and Outreach Program

Impact on Local Emissions: This measure will divert waste from landfills, which avoids the methane emissions associated with waste decomposition in the landfill. The actual emission reductions will occur at the landfill locations, which may or may not be within the county. The emissions associated with waste generated within the communities will be reduced, regardless of the actual location of the physical emission reductions. This measure does not include upstream lifecycle emission reductions associated with raw material manufacture, recycling processes, etc., because these reductions will occur outside of the community boundaries and are not already captured in the GHG emission inventories. The emission reductions for this measure reflect only the reductions that will show up in the inventory in future years (e.g., direct landfill emissions). Total countywide reductions from this measure are anticipated to be 26,229 MTCO₂e.

Implementation Information: As the agency responsible for waste management in the county, the Sonoma County Waste Management Authority (SCWMA) would be the lead agency for implementing this measure. SCWMA could create a fund for new and expanded waste collection programs that the communities could contribute money to, and facilitate countywide or individual community waste ordinances. Local communities would work with waste providers to identify baseline diversion rates, opportunities for additional waste diversion, and achievable diversion goals before a certain time period, all of which can be incorporated into the waste provider's contract with a community.

Assumptions:

- The BAU diversion rate for all communities is 72%
- The proportion and type of waste disposed and the corresponding emissions rate of each waste type (i.e., MTCO₂e/ton) would be constant between 2010 and 2020.

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. Implementation of this measure would increase the BAU diversion rate for each community by 2020.
2. The 2020 BAU waste-related GHG emissions were determined in the GHG inventory, and adjusted by subtracting GHG reductions from overlapping measures.
3. Then, a waste emission factor was calculated for each community by dividing the adjusted 2020 BAU waste emissions by the 2020 BAU waste tonnages.
4. The amount of additional waste that would be diverted under this measure was determined by subtracting the amount of waste diverted under a BAU scenario (and also including waste diverted from Measure 9-L1, to avoid double counting reductions) from the multiplication product of each community's 2020 BAU waste tons and the chosen new diversion rate (i.e., 80%).
5. To determine emission reductions, each community's new amount of BAU diverted waste was then multiplied by the corresponding waste emission factor.

Costs for this measure were estimated using an incremental cost per ton of \$11.25, which is based on cost data for a variety of waste types from a report on the City of Santa Monica's Zero Waste Strategic Operations Plan (City of Santa Monica 2013). The Santa Monica report considers a suite of program options for residential single-family, multi-family, and commercial sources, and estimates the incremental change in the annual cost for each program per ton diverted. Costs include collection, handling and processing costs, as well as administrative and overhead costs; savings include avoided disposal costs. Some programs—such as weekly organics and recyclable collection, biweekly refuse collection, and wet/dry collection for single- and multi-family residences, and behavior change market and wet/dry collection for commercial customers—were found to be highly cost effective, resulting in net cost savings on an annual basis. Other programs—such food scrap collection—were less cost effective, resulting in net annual costs. The cost per ton value was multiplied by each community's expected additional waste diversion tons to determine the annual net costs/savings.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Waste tons in 2040 and 2050, determined as part of the GHG inventory, were multiplied by the 80% diversion rate to estimate the amount of waste that would be prevented from entering landfills because of this measure.
2. Then, the waste tons were multiplied by the communities' waste emission factors (see Analysis Method – 2020) to determine the amount of GHG reductions that would result from the additional diverted waste.

Activity Data Sources: Waste tonnage data and diversion rates from SCWMA and CalRecycle.

Responsible Entities: SCWMA in collaboration with the communities.

Key Progress Indicators: The waste diversion rate in each community, the tonnage of waste sent to landfills, the tonnage of waste recycled, the tonnage of waste composted, and the tonnage of waste diverted to other ends.

Measure 9-L1. Create Construction and Demolition Reuse and Recycling Ordinance

Objective: Implement consistent countywide goals for C&D waste. This could follow the Petaluma model, which requires development projects to have a Construction Phase Recycling Plan that addresses the reuse and recycling of major waste materials, creates a minimum diversion rate for C&D waste on all projects (such as 75%), and requires an inventory of usable materials prior to any demolition.

Some communities already have C&D waste reduction or diversion policies or programs; this measure intends to implement consistent policies throughout the county.

The diversion rate for C&D waste selected by each community is shown in the following table. Communities that chose no further action for this measure have a diversion rate that is equal to the BAU diversion rate (72%):

Community	C&D Waste Diversion Rate
Cloverdale	72% (existing diversion rate – no further action)
Cotati	75%
Healdsburg	72% (existing diversion rate – no further action)
Petaluma	75%
Rohnert Park	72% (existing diversion rate – no further action)
Sebastopol	75%
Sonoma	72% (existing diversion rate – no further action)
Windsor	72% (existing diversion rate – no further action)
Unincorporated County	75%

Impact on Local Emissions: This measure will divert C&D waste from landfills, which avoids the methane emissions associated with that waste decomposing in the landfill. The actual emission reductions will occur at the landfill locations, which may not be within the boundaries of the county. The emissions associated with waste generated within the communities will be reduced, regardless of the actual location of the physical emission reductions. The emission reductions for this measure reflect only the reductions that will show up in the inventory in future years (e.g., direct landfill emissions). Total countywide reductions from this measure are anticipated to be 4 MTCO₂e.

Implementation Information: Each community will implement this measure through a C&D ordinance, with assistance from SCWMA. SCWMA could assist by drafting a model ordinance for use/adaptation by local communities.

Assumptions:

- The C&D diversion rate was determined by the communities on an individual basis.
- C&D waste emits 0.06 MT of CH₄ per short ton of waste (ICLEI 2012)
- Residential C&D waste consists of the following materials in the following proportions (Sonoma County Waste Management Agency 2007):
 - Concrete 0.5%
 - Asphalt paving 0.1%
 - Asphalt roofing 0.1%
 - Clean recyclable wood 0.6%
 - Other untreated/recycled wood 0.4%
 - Treated wood waste 1.3%
 - Clean gypsum board 0.6%
 - Rock, soil & fines 2.1%
 - Remainder/composite C&D 2.0%
- The oxidation rate for C&D waste is 0.10. Waste totals were multiplied by 0.90 (1-0.10) for the emissions calculations (ICLEI 2012).
- The methane collection efficiency for Redwood Landfill is 90% (Waste Management n.d.)
- The default methane collection efficiency for all other landfills is 75% (ICLEI)

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The amount of C&D waste recycled in each community was determined by first estimating the amount of total C&D waste generated by each community by using the total amount of waste (all waste types) generated in each community.
2. Because the methane collection rate at Redwood Landfill differs from the rate assumed at the other landfills, the amount of C&D waste was estimated for two categories: waste sent to the Redwood Landfill and waste sent to all other landfills.
3. The waste totals for each community were multiplied by the percentage of C&D waste generated in each community for the residential (see above) and commercial (see Table C-1) sectors.

4. Then, GHG emissions associated with C&D waste were estimated by multiplying the C&D waste totals by the C&D waste emission factor, oxidation rate, and the collection efficiencies for Redwood and all other landfills (see above).
5. To determine emission reductions for this measure, the total C&D waste emissions were multiplied by the difference between the C&D waste diversion goal chosen by each community and the overall waste diversion goal chosen for Measure 9-C1 (Waste Diversion Goal).

Analysis Method – 2040 and 2050: The following steps were used to quantify emission reductions for this measure:

1. The amount of C&D waste recycled in 2040 and 2050 was determined using the same method described above for 2020.
2. The amount of C&D waste was estimated for two categories: waste sent to the Redwood Landfill and waste sent to all other landfills.
3. The waste totals for each community were multiplied by the percentage of C&D waste generated in each community for the residential (see above) and commercial (see Table C-1) sectors.
4. Then, GHG emissions associated with C&D waste were estimated by multiplying the C&D waste totals by the C&D waste emission factor, oxidation rate, and the collection efficiencies for Redwood and all other landfills (see above).
5. To determine emission reductions for this measure, the total C&D waste emissions were multiplied by the difference between the C&D waste diversion goal chosen by each community for 2040 and 2050 and the overall waste diversion goal chosen for Measure 9-C1 for 2040 and 2050 (Waste Diversion Goal).

Activity Data Sources: Waste tonnage data and diversion rates from SCWMA and CalRecycle.

Responsible Entities: Each city, the County, and SCWMA.

Key Progress Indicators: The C&D waste diversion rate in each community, the tonnage of C&D waste sent to landfills, the tonnage of C&D waste recycled, the tonnage of waste composted, and the tonnage of C&D waste diverted to other ends.

C.16 Goal 10: Increase Capture and Use of Methane from Landfills

Measure 10-C1. Increase Landfill Methane Capture and Use for Energy

Objective: As appropriate, install methane capture technology and associated monitoring systems on all landfills without methane capture and that are not otherwise required to install or upgrade

equipment under the state rule, with a goal of reaching the highest feasible methane capture rate (i.e., approaching 100%). Increase methane capture at landfills that already capture methane by expanding existing collection wells. Support the development of new waste-to-energy (WTE) projects. Electricity generation capacity at the Central Disposal Site will increase from about 3 MW to about 3.25 MW to produce an additional 1.8 GWh by 2020.

Impact on Local Emissions: This measure will capture methane that would otherwise be emitted into the atmosphere from landfills, reducing direct emissions from the landfills themselves. The actual emission reductions will occur at the landfill locations, which may or may not be within the county. The emissions associated with waste generated within the communities will be reduced, regardless of the actual location of the physical emission reductions. Grid electricity will be replaced with WTE-generated electricity, which is carbon neutral. A reduction in the demand for grid electricity is associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Reductions from this measure reduce emissions from the building energy inventory sector. Total countywide reductions from this measure are anticipated to be 39,132 MTCO₂e.

Implementation Information: As the agency responsible for waste management in the county, SCWMA would be responsible for implementing this measure. SCWMA could create a fund for the installation of new and expanded WTE facilities at county landfills, and each of the communities could contribute money toward this fund. SCWMA and the communities will also work with the landfill owners and operators to install increased methane capture and WTE facilities at landfills serving the county.

Assumptions:

- The BAU methane capture rate at all key landfills that receive waste from the county is 75% except for Redwood Landfill, which has a capture rate of 90%.
- All key landfills that handle Sonoma County waste would increase methane capture rates to the following values:
 - Redwood Landfill: 95%
 - Potrero Hills Landfill: 99%
 - Keller Canyon Landfill: 90%
 - Hay Road Landfill: 90%
 - Central Disposal Site: 90%

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Emissions reductions associated with this measure were estimated by first using the BAU waste emissions for each community from waste sent to the key landfills listed above, the

assumed BAU methane capture rates of 75% for each of the above landfills, and the measure goal methane capture rates for each landfill, in the following equation:

$$(BAU\ emissions\ from\ waste\ sent\ to\ each\ landfill) / (1-75\%) * (1-new\ capture\ rate\ \%)$$

2. Using the equation above results in the emissions that would result if each landfill implemented the new capture rate.
3. To determine the reduction in emissions, the calculated emissions from each landfill (assuming the new capture rate) were subtracted from the corresponding BAU waste emissions.
4. The emissions reductions that would result from the WTE facilities at Central Disposal Site were calculated using the equation below. Reductions would occur because the methane-generated energy would offset the need for energy to be provided by PG&E and prevent GHG emissions from being generated.

$$Total\ methane\ captured\ (grams) \div 662\ grams\ methane\ per\ cubic\ meter * 35.3\ cubic\ feet\ per\ cubic\ meter * 1,012\ btus\ per\ cubic\ feet\ of\ methane * 0.85\ (combustion\ efficiency\ factor) * 0.00009\ kWh\ generated\ per\ btu\ of\ methane\ combusted = 1.8\ GWh\ of\ electricity\ generation$$

5. GHG emissions reductions were then determined by multiplying the resulting electricity production for each community by the appropriate RPS-adjusted utility emission factors.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. To calculate reductions in 2040 and 2050 for this measure, landfill emissions in 2040 and 2050 quantified for the GHG inventory were used in conjunction with the equations above.
2. The methane capture rates assumed in 2040 and 2050 are 99% for all landfills except for Redwood Landfill, for which a 95% capture rate was assumed.
3. GHG reductions from new WTE facilities were quantified using the equation above.

Activity Data Sources: Waste tonnage data and diversion rates from SCWMA and CalRecycle.

Responsible Entities: The SCWMA and the landfill owners/operators would be the primary responsible entities. Collaboration between SCWMA and the landfill owners/operators, and the communities may also be warranted.

Key Progress Indicators: The number of WTE projects implemented in each community, the quantity of methane captured at each WTE facility (or the methane capture rate), and/or the electricity generation capacity (kW) and actual generation (kWh) for each new WTE facility.

C.17 Goal 11: Reduce Water Consumption

Measure 11-C1. Countywide Water Conservation Support and Incentives

Objective: Sonoma County Water Agency will continue to work with local communities to incentivize local water conservation measures. Conservation measures could include water fixture retrofits at municipal buildings, and mandatory water conservation at large water users, such as golf courses or wineries.

Impact on Local Emissions: This measure will reduce GHG emissions in three ways:

1. *Water supply:* An overall reduction in water demand will reduce the amount of electricity needed to supply water to the communities. Electricity reductions will occur for water supply, treatment, distribution, and conveyance and will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions may not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced.
2. *Hot water heating:* Water conservation will reduce the demand for energy needed to heat that water. Energy reductions include both electricity and natural gas. Electricity reductions will directly reduce GHG emissions associated with grid electricity generation. Reduced natural gas consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.
3. *Wastewater treatment:* Water conservation will also reduce wastewater generation, which in turn will reduce GHG emissions associated with treating that wastewater. The location of the physical emission reduction depends on the location of the wastewater treatment plants (WWTPs); some reductions will occur within the boundaries of the communities, and some will occur outside the boundaries.

Implementation Information: The Sonoma County Water Agency (SCWA) is responsible for implementing this measure in cooperation with the local communities. SCWA would identify areas where additional conservation would be most effective and develop conservation goals. The local communities would work with SCWA to identify conservation opportunities, and to develop new ordinances or general plan policies pertaining to water conservation.

Assumptions: N/A

Analysis Method: This is a qualitative supporting measure.

Activity Data Sources: N/A

Responsible Entities: SCWA in collaboration with the communities.

Key Progress Indicators: Gallons of water saved in each community (or total water consumption to reflect reduced usage) and/or energy savings associated with water usage (or total energy consumption associated with water usage to reflect reduced water usage).

Measure 11-L1. Senate Bill SB X7-7 – Water Conservation Act of 2009

Objective: Meet (or exceed) the state-established per-capita water use reduction goal¹⁵ for 2020 as identified by SB X7-7 (2009). This statute requires urban water agencies throughout California to increase conservation to achieve a statewide goal of a 20% reduction in urban per-capita use (compared to nominal 2005 levels) by December 31, 2020 (referred to as the “20X2020 goal”). Each urban water retailer in the county subject to the law has established a 2020 per-capita urban water use target (in terms of gallons per capita per day, or GPCD) to meet this goal. Specific per-capita water use reduction goals vary by water agency.

The SB X7-7 goal for each community was determined using the appropriate Urban Water Management Plan. The reduction goals are as follows:

Community	Baseline GPCD	Target GPCD	Percentage Reduction ¹
Cloverdale	111	88	20%
Cotati	158	127	20%
Healdsburg	202	162	20%
Petaluma	170	136	20%
Rohnert Park	162	119	37%
Sebastopol	136	109	20%
Sonoma	204	173	10%
Windsor	152	129	15%
Unincorporated County ²	121	107	12%

¹ Not all water retailers will reduce GPCD by 20%. Per SB X7-7, water retailers can choose from one of four methods to establish their targets: (1) 80% of Base Daily Per Capita Use; (2) performance standards based on actual water use data for indoor residential water use, landscaped area, and commercial, industrial and institutional (CII) water use; (3) 95% of the San Francisco Bay hydrologic region; and (4) savings by water sector (indoor residential and CII) and landscape and water loss savings. For example, Windsor elected to use method 3, which specifies its target as 129 GPCD, which is only 15% lower than its baseline GPCD.

² Average reduction goal of Sweet Water Springs Water District and Valley of the Moon Water District

Impact on Local Emissions: This measure will reduce GHG emissions in three ways:

1. *Water supply:* An overall reduction in water demand will reduce the amount of electricity needed to supply water to the communities. Electricity reductions will occur for water supply, treatment, distribution, and conveyance and will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions may not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced.
2. *Hot water heating:* Water conservation will reduce the demand for energy needed to heat that water. Energy reductions include both electricity and natural gas. Electricity reductions will

¹⁵ The state goal is a 20% reduction in per-capita water use compared to baseline levels.

directly reduce GHG emissions associated with grid electricity generation. Reduced natural gas consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.

3. *Wastewater treatment*: Water conservation will also reduce wastewater generation, which in turn will reduce GHG emissions associated with treating that wastewater. The location of the physical emission reduction depends on the location of the WWTPs; some reductions will occur within the boundaries of the communities, and some will occur outside the boundaries.

This measure reduces emissions in the building energy and wastewater inventory sectors in addition to the water sector. Total countywide reductions from this measure are anticipated to be 16,653 MTCO₂e.

Implementation Information: Each urban water retailer in the county subject to the law has established a 2020 per-capita urban water use target to meet this goal and is responsible for implementing this measure. The communities would also need to work with the water retailers to implement water-saving measures at the local level. Water cutbacks would require the communities to engage their communities and encourage residents and businesses to find ways to save water.

Assumptions:

- All communities must implement this measure.
- Implementation of SB X7-7 will reduce per-capita water use, relative to BAU conditions.
- The percentage of residential water heated is 33% (AquaCraft 2014)
- The percentage of nonresidential water heated is 22% (Calculated from Yudelson 2010 and Aquacraft 2014)
- The percentage of residences with electric water heaters is 40.3% (EIA 2009)
- The percentage of commercial buildings with electric water heaters is 39.89% (EIA 2003 Pacific Region, table B32)
- The percentage of residences with natural gas water heaters is 56.5% (EIA 2009)
- The percentage of commercial buildings with natural gas water heaters is 60.11% (EIA 2003, Pacific Region, table B32)
- The amount of electricity required to heat gallon of hot water is 0.18 kWh/gallon (EPA 2010a)
- The amount of natural gas required to heat gallon of hot water is 0.009 therms/gallon (EPA 2010a)
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800
All Other Communities	111	725	800

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Water reductions achieved by SB X7-7 were calculated by multiplying the community population by the per-capita baseline water usage, and subtracting from that the product of the community population and the 2020 target per-capita water usage.
2. Water reductions were estimated for each source (groundwater, recycled water, municipal water) and end use (single family, multi-family, commercial etc.) using the inventory and forecast data.
3. Reductions in outdoor and indoor water use were determined using assumptions above and the reduction percentages for each community (see table above).
4. Electricity savings from reduced water movement and treatment were quantified by multiplying the estimated water reductions by the appropriate energy intensities.
5. Reductions in building energy consumption were calculated by multiplying the water reductions by the percentage of hot water used in buildings, an assumed proportion of gas and electric water heaters, and the amount of energy it takes to heat a gallon of water for both heater types.
6. Total energy reductions from water movement and hot water heating were multiplied by RPS-adjusted utility emission factors to estimate emissions reductions.
7. Reductions in emissions from wastewater treatment were also quantified by multiplying the water reduction by the wastewater treatment emissions for each community in 2020.

Although costs were not quantified for this measure, costs would include up-front costs of installing low-flow fixtures and other water saving appliances in homes and businesses, and savings would include reduced water bills.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. Water reductions in 2040 and 2050 achieved by SB X7-7 were calculated by first multiplying the 2040 and 2050 community populations by each community’s per-capita 2020 water usage and a reduction of 20% in 2040 and an additional 20% in 2050.
2. Savings were estimated by subtracting the 2040 and 2050 consumption based on the reduced per-capita rates from the baseline water consumption (determined by multiplying the baseline year per-capita consumption by the 2040 and 2050 populations).

3. Water reductions were estimated for each source (groundwater, recycled water, SCWA-provided water) and end use (single family, multi-family, commercial etc.) using the inventory and forecast data.
4. Reductions in outdoor and indoor water use were determined using the assumptions above and the reduction percentages for each community (see table above).
5. Electricity savings from reduced water movement and treatment were quantified by multiplying the estimated water reductions by the appropriate energy intensities.
6. Reductions in building energy consumption were calculated by multiplying the water reductions by the percentage of hot water used in buildings, an assumed proportion of gas and electric water heaters, and the amount of energy it takes to heat a gallon of water for both heater types.
7. Total energy reductions from water movement and hot water heating were multiplied by the 2020 RPS-adjusted utility emission factors to estimate emissions reductions.
8. Reductions in emissions from wastewater treatment were quantified by multiplying the water reductions percentage by the wastewater treatment emissions for each community in 2040 and 2050.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: The cities and the County, in collaboration with water providers.

Key Progress Indicators: The actual GPCD rates for each water retailer/community, and/or gallons of water saved in each community (or total water consumption to reflect reduced usage).

Measure 11-L2. Water Conservation for New Construction

Objective: Implement a water reduction target for new development that exceeds the SB X7-7 20% reduction target, such as a 30% reduction in water use for each community. To satisfy this goal, require adoption of the Voluntary CALGreen Tier 1 water efficiency measures for new residential and nonresidential construction. CALGreen voluntary measures recommend use of certain water-efficient appliances, and plumbing and irrigation systems, as well as more aggressive water savings targets.

The percentage of new homes and new nonresidential buildings participating in this measure in each community is as follows:

Community	Residential Participation	Nonresidential Participation
Cloverdale	-	-
Cotati	-	-
Healdsburg	-	-
Petaluma	100%	50%
Rohnert Park	100%	50%
Sebastopol	100%	50%
Sonoma	-	-
Windsor	100%	50%
Unincorporated County	-	-

Impact on Local Emissions: This measure will reduce GHG emissions in three ways:

1. *Water supply:* An overall reduction in water demand will reduce the amount of electricity needed to supply water to the communities. Electricity reductions will occur for water supply, treatment, distribution, and conveyance and will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions may not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced.
2. *Hot water heating:* Water conservation will reduce the demand for energy needed to heat that water. Energy reductions include both electricity and natural gas. Electricity reductions will directly reduce GHG emissions associated with grid electricity generation. Reduced natural gas consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.
3. *Wastewater treatment:* Water conservation will also reduce wastewater generation, which in turn will reduce GHG emissions associated with treating that wastewater. The location of the physical emission reduction depends on the location of the WWTPs; some reductions will occur within the boundaries of the communities, and some will occur outside the boundaries.

This measure reduces emissions in the building energy and wastewater inventory sectors in addition to the water sector. Total countywide reductions from this measure are anticipated to be 295 MTCO₂e.

Implementation Information: The communities will update building standards and codes for new buildings to require adoption of voluntary CALGreen Tier 1 water efficiency measures, including:

- Use of low-water irrigation systems
- Installation of rainwater systems
- Installation of water-efficient appliances and plumbing fixtures

- A 30% to 40% reduction over baseline indoor water use, and a 55% to 60% reduction in outdoor potable water use (CALGreen Tier 1 or 2).

The communities will use the Energy Watch partnership and work with SCP and PG&E to help implement this measure. The communities will also encourage “pay as you save” programs for energy and water efficiency.

Communities could apply for State Water Board’s grant money for the water-energy “standard offer” pilot project.

Assumptions:

- The following water use breakdown by end use was assumed (ConSol 2010; Yudelson 2010):

End Use	Percentage
Residential Outdoor Water Use	57%
Residential Indoor Water Use	43%
Nonresidential Outdoor Water Use	35%
Nonresidential Indoor Water Use	65%

- The following breakdown of water use by end use was assumed (CAPCOA 2010, Table WUW-1.1 and Table WUW-1.2):

End Use	Residential Percentage	Nonresidential Percentage
Toilet	33%	48%
Urinals	-	11%
Showerhead	22%	5%
Bathroom Faucet	-	3%
Kitchen Faucet	-	4%
Bathroom/Kitchen Faucet	18%	-
Standard/Compact Dishwasher	1%	2%
Top/Front-Loading Clothes washer	14%	-
Leaks, other	12%	-
Ice	-	1%
Laundry	-	0%
Other	-	26%

- The following fixture flow rates were used (California Building Standards Commission 2013):

Fixture Type	Baseline Flow	CALGreen Tier 1 flow	Flow Units
Residential			
Lavatory and Kitchen Faucets	1.8	1.5	gal/min
Dishwashers - Standard	6.5	4.3	gal/cycle
Dishwashers – Compact	4.5	3.5	gal/cycle
Toilets	1.28	0	gal/flush
Nonresidential			
Lavatory Faucets	0.5	0.35	gal/min
Kitchen Faucets	2.2	1.6	gal/min
Toilets	1.28	1.12	gal/flush

- The percentage of residences with electric water heaters is 40.3% (EIA 2009)
- The percentage of commercial buildings with electric water heaters is 39.89% (EIA 2003 Pacific Region, table B32)
- The percentage of residences with natural gas water heaters is 56.5% (EIA 2009)
- The percentage of commercial buildings with natural gas water heaters is 60.11% (EIA 2003, Pacific Region, table B32)
- The amount of electricity required to heat gallon of hot water is 0.18 kWh/gallon (EPA 2010a)
- The amount of natural gas required to heat gallon of hot water is 0.009 therms/gallon (EPA 2010a)
- All new residential and nonresidential buildings would comply with CALGreen Voluntary Tier 1 measures.
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800
All Other Communities	111	725	800

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Water savings were calculated on a per-fixture basis for new residential and nonresidential water use using the difference between the mandatory CALGreen flow requirements and the voluntary Tier 1 requirements.
2. Fixtures included lavatory and kitchen faucets, dishwashers, clothes washers and toilets/urinals.
3. Electricity savings from reduced water movement and treatment were quantified by multiplying the estimated water reductions by the appropriate water source energy intensities.
4. Reductions in building energy consumption were calculated by multiplying the water reductions by the percentage of hot water used in buildings, an assumed proportion of gas and electric water heaters, and the amount of energy it takes to heat a gallon of water for both heater types.
5. Water savings from overlapping state and local strategies were removed from the energy forecast to avoid double counting.
6. Total energy reductions from water movement and hot water heating were multiplied by RPS-adjusted utility emission factors to estimate emissions reductions.
7. Reductions in fugitive emissions from wastewater treatment were quantified by multiplying the percentage reduction in indoor water (i.e., water that will be treated as wastewater) by the 2020 wastewater treatment emissions in 2020.
8. GHG savings from electricity and natural gas reductions were then calculated by multiplying the energy reductions by the appropriate RPS-adjusted utility emission factors.

Costs were estimated for upgrading to low-flow plumbing fixtures for bathroom and kitchen faucets, toilets, and dishwashers in new residential and commercial buildings. Incremental costs per fixture were assumed to be negligible for residential toilets and faucets. Incremental costs for a residential dishwasher were estimated at \$12. To estimate total initial capital costs, this incremental cost was multiplied by the estimated number of plumbing fixtures per home and the number of new homes between 2017 and 2020.

Annual cost savings were calculated by multiplying the mitigated electricity, natural gas, and water usage—as calculated in the GHG Analysis—by the average residential utility rates. An average lifetime of 10 years was assumed for this measure, based on the effective useful life reported by CPUC (2009) for faucet aerators and low-flow showerheads.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. GHG reductions for this measure in 2040 and 2050 were estimated by applying the water reduction percentage achieved in 2020 to the water emissions in 2040 and 2050, which were quantified as part of the GHG inventory.

2. The 2020 reduction percentage was determined by dividing the reductions achieved in 2020 (methods described above) by the total water emissions in 2020.
3. Reductions that would be achieved by this measure in other sectors in 2040 and 2050 (i.e., wastewater and building energy) were determined by using the ratio of wastewater reductions in 2020 to the water reductions in 2020.
4. This ratio was applied to water reductions in 2040 and 2050 to determine wastewater reductions in these years.

The same process was used for building energy reductions that would be achieved by this measure, through the reduced use of hot water and the associated energy required to heat water.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (municipal water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: Each city and the County, in collaboration with water providers and RCPA.

Key Progress Indicators: Gallons of water saved in each community (or total water consumption for new development to reflect reduced usage) and/or energy savings associated with new development water usage (or total energy consumption associated with water usage to reflect reduced water usage).

Measure 11-L3. Water Conservation for Existing Buildings

Objective: Achieve a water reduction target for existing development that exceeds the SB X7-7 20% reduction target, such as a 30% reduction in water use by implementing a program to renovate existing buildings to achieve higher levels of water efficiency. Encourage existing buildings (constructed before 2015) to adopt voluntary CALGreen Tier 1 water efficiency measures.

The percentage of existing homes and existing nonresidential buildings participating in this measure in each community is as follows (as estimated each community):

Community	Residential Participation	Nonresidential Participation
Cloverdale	-	-
Cotati	-	-
Healdsburg	-	-
Petaluma	25%	50%
Rohnert Park	25%	50%
Sebastopol	25%	50%
Sonoma	-	-
Windsor	25%	10%
Unincorporated County	-	-

Impact on Local Emissions: This measure will reduce GHG emissions in three ways:

1. *Water supply:* An overall reduction in water demand will reduce the amount of electricity needed to supply water to the communities. Electricity reductions will occur for water supply, treatment, distribution, and conveyance and will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions may not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced.
2. *Hot water heating:* Water conservation will reduce the demand for energy needed to heat that water. Energy reductions include both electricity and natural gas. Electricity reductions will directly reduce GHG emissions associated with grid electricity generation. Reduced natural gas consumption results in direct GHG emission reductions. These reductions occur within the geographic boundaries of the communities.
3. *Wastewater treatment:* Water conservation will also reduce wastewater generation, which in turn will reduce GHG emissions associated with treating that wastewater. The location of the physical emission reduction depends on the location of the WWTPs; some reductions will occur within the boundaries of the communities, and some will occur outside the boundaries.

This measure reduces emissions in the building energy and wastewater inventory sectors in addition to the water sector. Total countywide reductions from this measure are anticipated to be 2,172 MTCO₂e.

Implementation Information: The communities could require water conservation upgrades for all existing buildings that undergo major remodels or renovations and/or incentivize water efficiency upgrades outside the permitting process. Education and outreach programs will help educate residents and businesses on the importance of water efficiency and how to reduce water use.

Rebate programs will help promote installation of water-efficient plumbing fixtures. The program could include:

- A Water Audit Program in collaboration with efforts by local water purveyors that offer free water audits.
- Development plans to ensure water conservation techniques are used (e.g., rain catchment systems, drought tolerant landscape).
- Requirements for water efficiency upgrades when permitting renovations or additions of existing buildings.
- Use of water conservation pricing (e.g. tiered rate structures) to the extent allowed by law to encourage efficient water use.
- Incentives for projects that demonstrate significant water conservation through use of innovative technologies.

The communities will use the Energy Watch partnership and work with SCP and PG&E to help implement this measure. The communities will also encourage “pay as you save” programs for energy and water efficiency.

Assumptions: The assumptions for this measure are similar to those described for Measure 11-L2, *Water Conservation for New Construction*. Analysis Method - 2020: The approach for calculating water and emissions reductions and costs is similar to what is described for Measure 11-L2, *Water Conservation for New Construction*. However, this measure applies to existing developments constructed before 2017.

Analysis Method – 2040/2050: No additional reductions would be achieved by this measure beyond 2020. Reductions in 2040 and 2050 are equal to the reductions achieved in 2020, because this measure applies to existing development.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (municipal water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: Each city and the County, in collaboration with water providers and RCPA.

Key Progress Indicators: Gallons of water saved in each community (or total water consumption for new development to reflect reduced usage) and/or energy savings associated with existing development water usage (or total energy consumption associated with water usage to reflect reduced water usage).

C.18 Goal 12: Increase Recycled Water and Greywater Use

Measure 12-C1. Recycled Water

Objective: Create a recycled water use goal to offset a certain percentage of potable water and agricultural water use by using recycled water for appropriate uses. For example, a community could aim to replace 20% of its total water use with recycled water, or aim to replace 80% of landscaping water use (or other uses of non-potable water, such as dust control or fire suppression) with recycled water. The communities could set an example by using only recycled water for landscaping at municipal facilities and parks. Develop public educational materials that support and encourage the use of recycled water.

Impact on Local Emissions: Reducing the demand for potable water through the use of recycled water will reduce the amount of electricity needed to supply that water to the communities because recycled water generally has a lower energy intensity than other sources of water. Because SCWA has a carbon neutral electricity supply to power its system (see Measure 14-C1), this measure would not reduce emissions for potable water already supplied by SCWA. As such, reductions consider the other water supply sources (such as groundwater supplied by other water agencies).

Electricity reductions will occur for water supply, treatment, distribution, and conveyance. These electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 146 MTCO_{2e}.

Implementation Information: The wastewater treatment providers in the county and the communities would coordinate to implement this measure. Funding sources would need to be identified for capital improvements for any new equipment. Wastewater treatment providers and the communities could also coordinate on the following strategies for implementation of this measure. Responsibilities would vary based on the nature of the strategy.

- Inventory potential non-potable uses of water for substitution by recycled water.
- Encourage the retrofit of irrigation systems to promote the use of recycled water at golf courses, parks and open spaces owned and operated by other entities, and take the lead in implementing these modifications at municipal government operated facilities.
- Encourage the retrofit of single-family and multi-family homes to promote the use of recycled water for landscaping and irrigation.
- Consider programs to collect stormwater for on-site reuse for landscape irrigation.

Assumptions:

- The analysis assumes SCWA-provided water is carbon neutral, so recycled water use reduces GHG emissions only to the extent that it replaces other water sources.

- The increase in recycled water would result in a proportional reduction of water from a community’s other water sources (e.g., a community with 50% SCWA-provided water and 50% local groundwater in the BAU case would now have 40% SCWA-provided water, 40% local groundwater, and 20% recycled water after this measure is implemented).
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800
All Other Communities	111	725	800

- Annual operations and maintenance costs assumed to be 1% of capital costs (City of Los Angeles 2006).
- Up-front capital costs assumed to range from \$30,000–\$60,000/MG recycled water (City of Los Angeles 2006).

Analysis Method – 2020: The following steps were used to quantify emission reductions for this measure:

1. The methods used to determine emissions reductions from this measure are based on altering the assumptions in the water sector of the GHG inventory. Each community has a certain water source profile (e.g., 49% SCWA water, 32% groundwater). These source profiles were altered for this measure to assume that the communities will increase the proportion of recycled water to 20% (from their current recycled water proportion).
2. This measure results in a reduction in water-related electricity consumed by each community because recycled water has a lower energy intensity than other sources of water conveyance (e.g., imported water).
3. Electricity savings from reduced water conveyance were quantified by multiplying the estimated water reductions by the appropriate energy intensities. Total energy reductions from water movement were multiplied by RPS-adjusted utility emission factors to estimate emissions reductions.

Up-front capital costs to expand the recycled water infrastructure (purple pipes) are based on cost estimates in the City of Los Angeles Recycled Water Master Plan (2006). One-time costs include the capital cost for new pipeline as well as costs for system accessories, including pumping, diurnal storage, and end-user retrofits.

Up-front costs are scaled for the county based on the estimated cost per million gallons (MG)—ranging from about \$30,000–\$60,000/MG, and the increased recycled water capacity calculated by the GHG Analysis. These costs can vary significantly depending on terrain, pipe size, and a host of other factors. Annual operating and maintenance costs are estimated at 1% of capital costs,

based on engineering cost analysis undertaken for recycled water projects in Los Angeles (City of Los Angeles 2006).

Annual savings to utilities were estimated based on the difference between avoided electricity costs (due to reduced water conveyance) and an increase in distribution electricity costs. Avoided water costs for utilities are not estimated, although this may represent an additional significant cost savings.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. To estimate 2040 and 2050 reductions associated with this measure, the method used in 2020 of adjusting the amount of recycled water in the GHG inventory was used.
2. The recycled water goals in 2040 and 2050 were assumed to stay constant at 20%.
3. Water-related energy reductions were multiplied by the 2020 RPS-adjusted utility emission factors to estimate GHG reductions.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: RCPA, Cloverdale, Petaluma, SCWA, and other wastewater treatment providers in collaboration with the communities.

Key Progress Indicators: The percentage of recycled water used in each community, gallons of recycled used, and/or gallons of potable water saved in each community (or total potable water consumption to reflect reduced usage).

Measure 12-L1. Greywater Use

Objective: Establish a goal to replace a certain percentage of potable water that was previously being used for residential non-potable uses (landscaping, toilet water, etc.) with greywater, such as 50%.

The greywater target penetration rate for residential non-potable water uses in each community is as follows:

Community	Residential Percentage Greywater (non-potable uses)
Cloverdale	-
Cotati	50%
Healdsburg	1%
Petaluma	2%
Rohnert Park	50%
Sebastopol	25%
Sonoma	-
Windsor	5%
Unincorporated County	10%

Impact on Local Emissions: Reducing the demand for potable water through the use of greywater will reduce water demand, which in turn will reduce the amount of electricity needed to supply that water. Electricity reductions will occur for water supply, treatment, distribution, and conveyance and will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions will not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 36 MTCO₂e.

Implementation Information: Each participating community will establish a greywater goal for this measure, and will work with water providers to assess progress toward the goals.

Assumptions:

- Residential outdoor water use is 57% of total residential usage (ConSol 2010).
- Residential indoor water use is 43% of total residential usage; of that percentage, 33% is toilet water use (ConSol 2010; CAPCOA 2010, Table WUW-1.1).
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800
All Other Communities	111	725	800

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

- The amount of water consumed for non-potable uses was determined for each community using the GHG inventory, water forecast data, and standard assumptions for outdoor and toilet water use (non-potable water) in residences.

2. The amount of non-potable water was then multiplied by the measure goal chosen by each community.
3. Typically, potable water is used for purposes that don't require potable water (e.g., landscaping).
4. The goal chosen by each community represents the amount of non-potable water that will be used for landscaping and other non-potable uses relative to the amount of water that is used for purposes that don't require potable water.
5. A theoretical 100% goal would imply that a community uses non-potable water for all purposes that do not necessitate potable water.
6. Water reductions by water source (groundwater, recycled water, SCWA-provided water) were determined using inventory and forecast data in order to adequately determine electricity reductions.
7. Electricity reductions from reduced water movement were quantified by multiplying the estimated water reductions by the appropriate water source energy intensities.
8. GHG savings from electricity reductions were then calculated by multiplying the electricity reductions by the appropriate RPS-adjusted utility emission factors.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. The amount of water consumed for non-potable uses in 2040 and 2050 was determined for each community using the GHG inventory, water forecast data, and standard assumptions for outdoor and toilet water use (non-potable water) in residences.
2. The amount of non-potable water was then multiplied by the measure goal chosen by each community for 2040 and 2050.
3. Water reductions by water source were determined using inventory and forecast data in order to adequately determine electricity reductions.
4. Electricity reductions from reduced water movement were quantified by multiplying the estimated water reductions by the appropriate water source energy intensities.
5. GHG savings from electricity reductions were then calculated by multiplying the electricity reductions by the 2020 RPS-adjusted utility emission factors.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: Each city and the County, in collaboration with water providers and RCPA.

Key Progress Indicators: The percentage of greywater used for residential non-potable water uses in each community, gallons of greywater used, and/or gallons of potable water saved in each community (or total potable water consumption to reflect reduced usage).

C.19 Goal 13: Increase Water and Wastewater Infrastructure Efficiency

Measure 13-C1. Infrastructure and Water Supply Improvement

Objective: Encourage SCWA and other water and wastewater service providers to reduce energy demand from their operations. This could include installing more efficient pumps or other equipment, install systems to enable off-peak pumping times, and improving the water conveyance infrastructure. The County and cities should also investigate new water supply sources, strive to reduce imported water by expanding and protecting local surface water and groundwater sources, and increase local water production by building new wells. Work with water agencies to maximize water pump efficiency to achieve a 20% reduction in energy use by 2020.

Impact on Local Emissions: This measure will reduce the amount of electricity consumed for water service operations within the Sonoma County communities. Electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 233 MTCO₂e.

Implementation Information: RCPA and communities would work with SCWA and other water providers to identify funding sources for capital improvements for the necessary water conveyance equipment upgrades. SCWA and other water providers would be responsible for installing and maintaining the new or upgraded equipment.

Assumptions:

- Energy use for water pumping and conveyance would be reduced region-wide by 20% in 2020, 30% in 2040, and 40% in 2050.
- Electricity associated with SCWA-provided water, groundwater and recycled water would be affected by this measure.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Energy savings were calculated by multiplying the 2020 BAU electricity use (from the GHG inventory and forecast data) for water pumping and conveyance by 20%. This was performed for each water source and the corresponding provider of electricity (SCWA, PG&E, Power and Water Resources Pooling Authority [PWRPA], Healdsburg Electric, etc.)

2. SCWA will be carbon-free by 2020, so electricity reductions associated with SCWA-supplied water will yield zero GHG emission reductions.
3. Total energy reductions due to the increase in efficiency were multiplied by RPS-adjusted utility emission factors to estimate emissions reductions.

Although costs were not quantified for this measure, costs would include up-front costs of installing more efficient pumps, and savings would include reduced utility bills for the water districts.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. BAU electricity in 2040 and 2050 for water pumping and conveyance was multiplied by 30% and 40%, respectively, to determine electricity reductions.
2. Electricity reductions were multiplied by the 2020 RPS-adjust utility emission factors to estimate GHG reductions.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: SCWA and RCPA in collaboration with the communities and retail water providers.

Key Progress Indicators: Implementation information on efficiency upgrades (such as the number and type of projects), actual water-related energy savings (kWh) from SCWA and other water service providers (or total water-related energy usage to reflect reduced energy usage), and/or water supply source information (such as percentage or gallons of SCWA water, groundwater, recycled water, etc.).

Measure 13-C2. Wastewater Treatment Equipment Efficiency

Objective: Work with wastewater treatment providers to reduce energy demand from their operations. This could include installing more efficient pumps or other equipment, installing systems to enable off-peak pumping times, and improving the wastewater conveyance infrastructure. Require all pumping and treatment equipment to be 25% more energy efficient at the time of replacement. Use best management practices for the treatment of wastewater.

Impact on Local Emissions: This measure will reduce the amount of electricity consumed for wastewater treatment operations. Electricity reductions are associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because

the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 529 MTCO₂e.

Implementation Information: RCPA and communities would work with wastewater treatment providers to encourage increased efficiency in wastewater treatment operations. All involved parties would coordinate and seek to identify funding sources for capital improvements on wastewater equipment.

This measure reduces emissions from the building energy sector, because utility-provided electricity is replaced with renewable electricity from the combustion of wastewater methane. However, because this measure applies specifically to wastewater treatment equipment it is categorized as wastewater measure.

Assumptions:

- The region-wide energy intensity for wastewater treatment is 1,911 kWh/million gallon wastewater treated (CAPCOA 2010). This value was used as a proxy for all WWTPs.
- Region-wide equipment efficiency would improve by 25% in 2020, 50% by 2050, and 60% by 2050
- Upfront installation costs range from \$0.50-\$0.25 per kWh in 2020 (California Energy Commission and the U.S. Department of Energy 2002; EPA 2010b).
- Annual maintenance savings assume to range from \$0.00-\$0.04 per kWh saved (California Energy Commission and the U.S. Department of Energy 2002; EPA 2010b).

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. The amount of electricity required to process total wastewater generated in 2020 by each community (provided in the GHG inventory) was determined by multiplying the 2020 wastewater volumes by CAPCOA's default value for wastewater treatment energy intensity (1,911 kWh per million gallon of wastewater).
2. To estimate the energy savings associated with this measure, the 2020 wastewater processing energy was multiplied by 25% for all communities, as this measure assumes that wastewater equipment will improve in efficiency by 25% region-wide.
3. The amount of electricity saved was then multiplied by the RPS-adjusted utility emission factors to determine the amount of GHG reduction.

WWTPs incur up-front installation costs to install energy efficient pumping systems. The upgrade of the equipment is a one-time event, and the implementation would be complete once the upgraded equipment begins operating.

WWTPs incur annual energy savings from offset energy production from the installed energy efficient pumping systems. Additionally, in the lower cost scenario, the WWTP incurs annual

maintenance savings, while the higher cost scenario assumes no net change to maintenance costs with the new equipment upgrades.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. 2040 and 2050 wastewater treatment energy was estimated by multiplying the 2040 and 2050 wastewater values, quantified as part of the GHG inventory, by the CAPCOA default value for wastewater treatment energy intensity.
2. Energy savings were estimated by then multiplying the wastewater treatment energy in 2040 and 2050 by 50% and 60%, respectively, which represent the improvements in efficiency that are assumed to occur.

Activity Data Sources: Wastewater generation and treatment data from SCWA, Cloverdale, Petaluma, and other wastewater service providers.

Responsible Entities: RCPA, Cloverdale, Petaluma, SCWA, and other wastewater treatment providers in collaboration with the communities.

Key Progress Indicators: Implementation information on efficiency upgrades (such as the number and type of projects) and/or actual wastewater-related energy savings (kWh) from SCWA and other wastewater service providers (or total wastewater-related energy usage to reflect reduced energy usage).

C.20 Goal 14: Increase Use of Renewable Energy in Water and Wastewater Systems

Measure 14-C1. Sonoma County Water Agency Carbon Free Water by 2015

Objective: In 2015, SCWA has contracted to procure 100% of its electricity needs through renewable and carbon free resources, thus achieving a carbon neutral electricity supply for its system.

Impact on Local Emissions: This measure will reduce the carbon intensity of electricity used by SCWA to deliver water to its contractors. Grid electricity will be replaced with carbon-neutral electricity. A reduction in the demand for grid electricity is associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 2,145 MTCO₂e.

Implementation Information: SCWA is responsible for implementing this measure. According to SCWA (Sonoma County Water Agency 2015):

“The SCWA is actively working to diversify its energy portfolio and reduce its energy and fuel needs through efficiency and renewable energy production. The Water Agency has three solar photovoltaic projects totaling almost 2 MW which account for 6% of its total electricity needs. The Water Agency procures local geothermal energy from Sonoma Clean Power’s EverGreen program for 5% of its electricity needs. The remainder of its energy needs are met through PWRPA carbon free sources of the Sonoma County Landfill Gas to Energy project, Lake Sonoma Warm Springs Dam hydropower, and other non-local hydropower sources in the Sierra Nevada mountains.”

Assumptions:

- 100% of SCWA-provided water will be carbon-free by 2020

Analysis Method: The following steps were used to quantify emission reductions for this measure:

1. The amount of electricity used by SCWA to supply the communities with water (from the GHG inventory) was assigned to PG&E and PWRPA based on the percentage of electricity that each utility supplies to SCWA.
2. This electricity was multiplied by the appropriate RPS-adjusted utility emission factors to determine emission reductions.

Activity Data Sources: Water use data, including total water use by community, water use by sector (single-family, multi-family, commercial, industrial, landscaping, etc.), and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans for each community and water retailer in the county. Water energy intensity values for each source of water were obtained from SCWA and CAPCOA (2010).

Responsible Entities: SCWA.

Key Progress Indicators: SCWA electricity consumption, electricity generation portfolio, and/or electricity emission factors.

Measure 14-L1. Green Energy for Water Production and Wastewater Processing in Healdsburg and Cloverdale

Objective: Healdsburg would use green energy (100% renewable) sources for a certain percentage of their water production and/or conveyance. Cloverdale has implemented solar energy arrays at the city water and wastewater plants.

Impact on Local Emissions: This measure will reduce the carbon intensity of electricity used by Healdsburg and Cloverdale for water production and/or conveyance. Grid electricity will be replaced with carbon-neutral electricity. This will directly reduce GHG emissions associated with grid electricity generation. Although the emission reductions will not occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 412 MTCO₂e.

Implementation Information: Healdsburg will be responsible for implementing green energy projects at its water production and wastewater processing facilities. Cloverdale has already implemented solar arrays at its water and wastewater plants and will be responsible for continuing to ensure that the arrays are used to their maximum potential.

Assumptions:

- Healdsburg’s goal for the percentage of water conveyed using green electricity is 100% by 2020.
- In 2020, the expected solar production at the Cloverdale water and wastewater treatment plants are projected to be 668,621 kWh and 886,601 kWh, respectively.
- The following water electricity intensity values were used (CAPCOA 2010):

Community	Pre-Treatment (kWh/MG)	Groundwater (kWh/MG)	Recycled Water (kWh/MG)
Healdsburg	111	3,147	800

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. To estimate the reductions associated with Healdsburg’s green energy plans for water conveyance, the following steps were taken:
 - a. The projected BAU water consumption in 2020 from the water sector of the GHG inventory was first adjusted to account for water reductions from overlapping measures.
 - b. The adjusted 2020 water consumption was multiplied by the energy generation target chosen by Healdsburg to estimate the amount of water in 2020 that will be conveyed using renewable electricity.
 - c. The amount of renewable electricity required to convey this water was determined by multiplying the amount of water by the water conveyance energy intensities.
 - d. To determine emission reductions, the amount of renewable electricity was multiplied by the appropriate RPS-adjusted utility emission factors.
2. To determine the emission reductions associated with Cloverdale’s water and wastewater plant solar arrays, the projected amount of solar electricity that will be generated at the facilities was multiplied by the RPS-adjusted PG&E emission factors. Solar electricity projections were provided by the City of Cloverdale.

Analysis Method – 2040/2050: The following steps were used to quantify emission reductions for this measure:

1. 2040 and 2050 water consumption in Healdsburg was multiplied by the energy generation target chosen by Healdsburg in 2040 and 2050 and then by the water conveyance energy intensity to determine electricity reductions.
2. GHG reductions were estimated by multiplying the electricity reductions by the 2020 RPS-adjusted utility emission factors.
3. Emissions reductions at Cloverdale's water and wastewater plants were determined by multiplying the projected amount of solar electricity that will be generated in 2040 and 2050 by the 2020 RPS-adjusted PG&E emission factors.

Activity Data Sources: For Cloverdale, solar output data (kWh) for the Cloverdale Water Treatment Plant from the city. For Healdsburg, water use data and water use by source (SCWA water, groundwater, recycled water, etc.) obtained from SCWA and the Urban Water Management Plans and water energy intensity values for each source of water obtained from SCWA and CAPCOA (2010).

Responsible Entities: Cloverdale and Healdsburg.

Key Progress Indicators: Solar electric generation capacity (kW) or electricity generation (kWh) for Cloverdale's projects and the renewable portfolio for Healdsburg's electricity (or their electricity emission factor).

C.21 Goal 15: Reduce Emissions from Livestock Operations

Measure 15-L1. Methane Capture and Combustion at Dairies

Objective: Encourage installation of methane digesters to capture emissions from the decomposition of manure at dairies. The methane could be used on site as an alternative to natural gas in combustion, power production, or as a transportation fuel. Individual project proponents could also sell GHG credits associated with these installations on the voluntary carbon market.

Impact on Local Emissions: This measure will capture methane that would otherwise be emitted into the atmosphere from dairies, directly reducing GHG emissions. The emission reductions will occur at the dairy locations. Grid electricity will be replaced with methane-generated electricity, which is carbon neutral. A reduction in the demand for grid electricity is associated with GHG emission reductions because that electricity no longer needs to be generated at power plants. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. Total countywide reductions from this measure are anticipated to be 14,530 MTCO₂e.

Implementation Information: All dairy operations are located within the unincorporated area. The county would work with dairies to discuss relevant incentives and the feasibility of installing methane capture equipment.

Assumptions:

- By 2020, 20% of dairy cows in the county will feed the methane digesters, increasing to 40% in 2040, and 60% in 2050.
- 64% capture rate for biogas digesters (assumes a 75% collection efficiency from livestock housing with an 85% biogas collection efficiency)
- The electricity generated was assumed to offset PG&E electricity.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. 2020 BAU manure management emissions from dairy cows (quantified as part of the GHG inventory) were multiplied by 20% (assumed participation rate) and 64% (capture rate—see assumptions above) to determine GHG emission reductions from this measure.
2. To determine the energy potential of the captured emissions, the emissions were converted into methane by dividing by the global warming potential of methane (see Table C-1).
3. Then, the following formula was used to estimate the amount of kilowatt-hours that would be produced:

*Total methane captured (grams) ÷ 662 grams methane per cubic meter * 35.3 cubic feet per cubic meter * 1,012 btu per cubic foot of methane * 0.85 (combustion efficiency factor) * 0.00009 kWh generated per btu of methane combusted.*

4. Total energy production from captured emissions were multiplied by RPS-adjusted utility emission factors to estimate emissions reductions.

Methane capture equipment incurs upfront installation costs for a covered lagoon (including a digester and engine-generator set), hydrogen sulfide treatment, flare, and utility charges. Upfront costs vary depending on the technology but were estimated to be \$3,648,096 for this measure. Net operational savings were the sum of operations and maintenance costs (estimated at \$145,924), and cost savings from the offset electricity production from the installed methane capture systems.

Analysis Method – 2040 and 2050: Emissions in 2040 and 2050 were calculated using the same approach as described for 2020. 2040 and 2050 BAU manure emissions from dairy cows were used but multiplied by increased participation rates (see assumptions above). All other steps are identical to the 2020 approach.

Activity Data Sources: Dairy cow numbers from the County Agriculture Commissioner.

Responsible Entities: The County and the dairies.

Key Progress Indicators: The number of digesters installed, the quantity of methane captured by each digester (or the methane capture rate), and/or the electricity generation capacity (kW) and actual generation (kWh) for each new digester.

Measure 15-L2. Reduce Emissions from Enteric Fermentation

This voluntary measure would encourage dairies and livestock operations to explore ways to reduce GHG emissions from enteric fermentation (both methane and nitrous oxide). Potential methods for reducing these emissions include manipulating animal diet to inhibit a rumen environment favorable to methanogens. A range of potential emission mitigation options include dietary oils (such as whole cottonseed oil, sunflower oil, coconut oil, and palm oil), the use of corn or legume silage in place of grass silage, use of concentrate feeds, nitrates, ionophores, tannins, and improving forage quality and the overall efficiency of dietary nutrient use. Potential use of pomace from wine-making should also be explored.

Under this measure, the County would work with dairy and livestock operators to test potential feasible and cost-effective approaches suitable for application in Sonoma. The County would help to identify grant sources of funding to help in piloting and demonstrating promising approaches with voluntary dairy/livestock operator participation.

This is a supporting measure and thus reductions for this measure were not quantified and a cost-effectiveness analysis was not conducted.

C.22 Goal 16: Reduce Emissions from Fertilizer Use

Measure 16-L1. Optimize Fertilizer Use

Objective: Implement a policy to encourage voluntary agricultural practices that reduce or eliminate the need for fertilizer (especially synthetic fertilizer). Work with growers to provide incentives for organic fertilizers as an alternative. Create an outreach program to help growers optimize nitrogen application rates, decrease overall fertilizer inputs and cost, maintain current crop yields, and reduce emissions of nitrous oxide.

Impact on Local Emissions: This measure will reduce fugitive N₂O emissions associated with fertilizer application, a direct reduction in GHG emissions. Emission reductions will occur at the location where fertilizer is reduced. Total countywide reductions from this measure are anticipated to be 1,759 MTCO₂e.

Implementation Information: Sonoma County would lead this measure, given that the vast majority of agricultural activity is in the unincorporated county. Individual communities with agricultural activity in their community could cooperate with the County to implement this measure. The County would develop voluntary policies that encourage alternatives to synthetic fertilizers. The County would need to work with growers to discuss what incentives would be relevant and what levels of reduction would be feasible.

Assumptions:

- Fossil fuel-based fertilizer would be reduced by 20% in 2020, 40% in 2040, and 60% in 2050.

Analysis Method - 2020: The following steps were used to quantify emission reductions for this measure:

1. Fertilizer emissions (quantified as part of the GHG inventory) for each community were multiplied by the reduction goal percentage in 2020 to determine the amount of GHG reductions that would be achieved (i.e., fertilizer emissions were multiplied by 0.20).

Analysis Method – 2040 and 2050: The method described above to quantify emission reductions in 2020 was used to estimate reductions in 2040 and 2050 as well. Fertilizer emissions were multiplied by the participation rates for these years (see assumptions above) to determine GHG reductions.

Activity Data Sources: Acres of agricultural land by crop type from the Sonoma County Agricultural Commissioner.

Responsible Entities: The County and the agriculture industry in collaboration with the communities.

Key Progress Indicators: The amount and type of fossil fuel-based fertilizer applied to crops in each community.

C.23 Goal 17: Protect and Enhance the Value of Open and Working Lands

Measure 17-L1. Conserve Open Space and Working Lands

Under this measure, the communities would continue to work to preserve natural open space, working timberlands, and agricultural lands to prevent conversion of such lands to urban uses.

Natural and working lands are essential assets for Sonoma County as it prepares for climate change impacts because of the many ecosystem services they provide as well as their support for a healthy economy and the local quality of life, including recreational opportunities in many open space areas. Many adaptation objectives are furthered through the preservation and enhancement of green infrastructure, including trees, vegetation, and soils, as outlined in Chapter 5.

Natural green infrastructure can also help reduce carbon in the atmosphere by sequestering and storing carbon. Various ecological processes transfer carbon between the atmosphere, vegetation, and the soil, including photosynthesis, respiration, and decomposition. This terrestrial, or biologic, sequestration generates three primary pools of carbon stock in Sonoma County.

- Agricultural carbon stock

- Non-agricultural rural lands
- Urban forest carbon stock

Preservation of open space and working lands will help to preserve existing carbon stocks and annual sequestration and will provide the opportunities for enhanced sequestration under existing and future programs such as those described under Measure 18-L1 (Certification Programs) and Measure 19-L1 (Rangeland Carbon Farming).

This measure would not reduce GHG emissions on its own because it would preserve existing carbon stocks and annual sequestration levels. However, this measure would help avoid the loss of carbon stocks and annual sequestration and would help to support other GHG reduction measures by limiting urban expansion outside of cities and designated unincorporated urban areas, thus supporting the communities' focus on city-centered and transit-oriented development.

This is a supporting measure and reductions were not quantified.

C.24 Goal 18: Promote Sustainable Agriculture

Measure 18-L1. Certification Programs

Objective: Support sustainable agricultural certification programs that promote practices that will reduce GHG emissions and/or enhance carbon stocks and sequestration. Support rigorous standards in documenting, tracking, and disclosing sustainability practices that reduce GHG emissions.

There a variety of agricultural certification programs that have been developed or are being developed. A few of the certification programs being used by Sonoma County farmers include the following:

- *Certified Organic:* Certified organic foods are produced according to federal standards set by the USDA National Organic Program in 2002. Organic standards address many factors: soil quality, animal raising, pest and weed control, and use of input materials. The National Organic Program developed regulation and guidance on certification, production, handling and labeling of USDA organic products. The California Department of Food and Agriculture (CDFA)'s Organic Program is responsible for enforcement of the federal Organic Foods Production Act of 1990, and the California Organic Products Act of 2003. As one of the first organic certification agencies, California Certified Organic Farmers (CCOF) was instrumental in advocating for federal organic legislation. CCOF organic certification standards were used as a foundation for the USDA National Organic Program, finally making "certified organic" a federally regulated claim. CCOF continues to support farmers with the organic certification process from developing an organic system plant to remaining compliant and adding products or acreage down the road. Sonoma County has a large organic farming sector including organic vineyards, dairies, vegetable farms, and other products.

- Certified Biodynamic.* Biodynamics is a spiritual-ethical-ecological approach to agriculture, gardens, food production and nutrition. Biodynamics was first developed in the early 1920s based on the spiritual insights and practical suggestions of the Austrian writer, educator and social activist Dr. Rudolf Steiner (1861–1925). Most biodynamic initiatives seek to embody triple bottom line approaches (ecological, social and economic sustainability), taking inspiration from Steiner’s insights into social and economic life as well as agriculture. Biodynamics also emphasizes generating farm inputs from within a farm itself, reducing dependence on external sources and the corresponding GHG emissions associated with production and transportation. Biodynamics has an independent certification system managed by Demeter USA. Demeter certification in the United States uses the USDA organic standards as a foundation but goes beyond them in several important ways including the integration of crops and livestock on the farm, as well as a certain amount of wild or uncultivated land as part of its biodiversity requirement. It also requires use of the biodynamic preparations. In addition, whereas organic certification can be applied to just one part of a farm, certification must encompass the whole farm. Sonoma County reportedly has the highest number of certified Biodynamic farms in the country.
- Certified California Sustainable Winegrowing:* The California Sustainable Winegrowing Alliance (CSWA) developed a third-party certification program related to the California Sustainable Winegrowing Program (SWP) to increase the sustainability of the California wine industry by promoting the adoption of sustainable practices and ensuring continual improvement. The goals of the certification program, Certified California Sustainable Winegrowing (CCSW-Certified), are to enhance transparency, encourage statewide participation and advance the entire California wine industry toward best practices in environmental stewardship, conservation of natural resources and socially equitable business. Sustainable practices that are part of the CCSW program are designed to conserve water and energy, resulting in a reduction of GHG emissions. There are many Sonoma County vineyards and wineries that are certified or planning certification through the CCSW program.

This is not an exhaustive list of certification programs but only an example of some of the certification programs being used in the county. Through this measure, the County is not endorsing any specific certification program but is rather seeking to support the practices included in certification programs that are reducing or will reduce GHG emissions. A case study of one initiative is described below, but this measure would equally apply to other certification efforts.

100% Sustainable Wine Region Case Study: The Sonoma County Winegrape Commission, also known as Sonoma County Winegrowers (SCW), announced on January 15, 2014, that Sonoma County is committed to becoming the nation’s first 100% sustainable wine region through a three-phased program to be completed within the next five years.

The first phase of this effort will focus on helping winegrowers assess their sustainable vineyard practices through trainings and educational sessions focused on over 200 best management practices such as land use, canopy management, energy efficiency, water quality assessments,

carbon emissions; healthcare and training for employees and being a good neighbor and community member. Although many vineyards and wineries are already implementing sustainable practices, the goal is to assess, and collect the assessment data of 15,000 vineyard acres per year for the next four years until every acre of planted vines are under assessment for sustainability. As vineyard acres are assessed, phase two will involve the Sonoma County Winegrowers working with vineyard owners to achieve certification. Once the winegrower program has kicked off, focus will be expanded to work with wineries and winemakers to roll out sustainability assessments and certification all with a goal of 100% sustainability for the wine industry in Sonoma County by 2019. The key of sustainability is continuous improvement. Once all of the county's vineyards and wineries are recognized as sustainable, improvement plans will be developed to provide access to new production models, techniques and approaches.

To ensure the validity of the achievements, third-party verification and certification programs will be used such as the California Sustainable Winegrowing Alliance's Code of Sustainability that involves 15 chapters and over 200 best practice assessments for growers and wineries, focused on environmental, social and economic viability and continuous improvement with verification by a third-party certifier. Another critically important factor to this initiative is transparency, which will be accomplished through regular progress updates, an annual Sonoma County Wine Region Sustainability Report Card and a vineyard and winery real-time tracker on the SCW website.

Impact on Local Emissions: Sustainability measures may reduce emissions in a variety of ways, such as through a reduction in energy use (electricity, natural gas, or other fuel) or a reduction in fugitive GHG emissions associated with the winemaking process. For electricity reductions, emission reductions will occur at the power plants that would otherwise generate this electricity. Although the emission reductions won't always occur within the geographic boundaries of the communities, the emissions associated with electricity consumed by the communities will be reduced, because the electricity use will be reduced. For natural gas reductions, direct emission reductions from combustion occur within the geographic boundaries of the communities. For fugitive emission reductions, emission reductions will occur at the location where the practice occurs.

Implementation Information: SCW is voluntarily leading the 100% sustainable wine partnership with county wineries and vineyard owners and operators. Sonoma County would support this private initiative, given that the vast majority of vineyards and wineries are in the unincorporated county.

The County would provide support to the vineyard owners and operators and wineries to implement sustainability measures by cooperative development of a sequestration baseline for soil carbon in vineyards, by collecting data and quantifying the carbon reductions due to vineyard and winery measures implemented under this project and update the plan to demonstrate the GHG benefits of sustainable winegrowing and winemaking. The County would conduct outreach to the wine industry to identify if there are obstacles posed from County or other regulations to implementing sustainability measures and seek to provide regulatory relief where appropriate

and effective. The County would also assist vineyard owners/operators and wineries in obtaining grant funding where necessary to provide support to identify and implement measures.

The County would also work with the Agricultural Commissioner, the Resource Conservation Districts (RCDs), the Natural Resources Conservation Service (NRCS), UC Cooperative Extension and/or other parties in identifying research, analysis, study, and extension services that may assist in supporting certification efforts.

Assumptions: N/A

Analysis Method - 2020: The GHG reductions for this program overall have not been identified as the inventory of existing conditions and practices and the identified of specific practices to be implemented has not yet been completed. Cost analysis was not conducted.

Analysis Method – 2040 and 2050: Reductions for 2040 and 2050 were not calculated.

Activity Data Sources: N/A

Responsible Entities: SCW, County wineries and vineyard owners and operators are participating in the 100% sustainable wine region initiative.

Sonoma County, the Agricultural Commissioner, RCD, NRCS, UC Cooperative Extension, and/or other parties would work with this initiative and other certification initiatives as they progress.

Key Progress Indicators: Acres of farmland certified under third-party verified sustainable certification programs. Specific data, if available, on energy reductions, increased soil carbon content, and other improvements.

Measure 18-L2. Promote the Sale of Local, Sustainable, and Organic Grown Foods and/or Products

Under this measure, the County and local communities would support local farmer's markets to provide community residents with local, sustainable, and organic (or equivalent) sources of food. If the food sold at the local farmer's market is produced organically, it can displace carbon-intensive food production practices. While local food would result in a reduction in transportation emissions compared to food from further away, the transportation share of overall lifecycle emissions for most food is usually quite small compared to food production emissions. Thus the focus should be on reducing the carbon footprint of locally produced food.

This is a supporting measure and thus reductions for this measure were not quantified and a cost-effectiveness analysis was not conducted.

Measure 18-L3. Urban Agriculture

Under this measure, participating communities would amend zoning code to allow for small-scale urban farming areas and gardens in the cities. Having urban farming areas can educate the public about the benefits of urban agriculture (both environmental and economic). Under this measure, participating communities could partner with farming agencies and organizations to provide

training programs and/or seminars for urban farming. This measure would need to avoid areas that are suitable for infill and transit-oriented mixed land uses.

This is a supporting measure and thus reductions for this measure were not quantified and a cost-effectiveness analysis was not conducted.

C.25 Goal 19: Promote Sustainable Agriculture

Measure 19-L1. Rangeland Carbon Farming

This measure would promote increased carbon sequestration in Sonoma's working rangelands, an approach known as "carbon farming." Carbon sequestration can be increased by a variety of actions including, adding compost from local community waste or manure to the soil, planting hedgerows and riparian corridors, crop residue (e.g., leaves, pods, stems) management, prescribed grazing, range and critical area planting, filter strips and other measures.

The NRCS has approved a wide range of practices that increase organic matter (aka "soil carbon") in agricultural and rangeland soils. These measures not only increase soil carbon but also have a wide range of other environmental benefits, including reducing erosion, preventing compaction, managing nutrients, conserving water, improving water quality, managing pests (weeds, insects, diseases), providing food for domestic livestock, and providing food and cover for wildlife. The Gold Ridge RCD and Sonoma RCD, have supported sustainable agricultural systems and the implementation of many of these measures in Sonoma County.

Carbon Farm Plans developed by the Marin Carbon Project on three pilot farms in West Marin County have identified 20-year carbon sequestration benefits ranging from 5,000 to 8,000 MTCO₂e (Marin Carbon Project 2015).

Under this measure, the County will work with local agricultural entities to develop and implement education and outreach programs about carbon farming practices that will enhance carbon sequestration, increase soil health, climate resilience, and crop productivity. The County, with the support of the RCDs, NRCS, UC Cooperative Extension, and others, will assist farmers and ranchers in implementing and expanding carbon-farming practices that have been adopted by local ranchers and farmers as well as practices that have been supported by local, regional, and national conservation efforts and peer-reviewed research.

As discussed elsewhere in this CAP, the estimates of carbon stock in county agricultural lands could benefit from the collection of local data to derive a better understanding of existing levels. Developing a more detailed baseline inventory is feasible but requires more effort to collect data and complete estimates. The County, working with other partners, including UC Cooperative Extension, NRCS, academic researchers, farmers, ranchers, and other parties, will complete an inventory of agricultural carbon stocks and an estimate of annual sequestration within 2 years from adoption of the CAP. The baseline inventory will include estimates of aboveground and belowground carbon stocks in farmed lands and ranchlands. After completion of the baseline

inventory, the County shall periodically prepare an updated estimate of carbon stock at least every 5 years to estimate changes in the carbon stock over time. As part of the updated inventory, the County will collect data from local farmers and ranchers to identify changes in practices and conditions between inventory years to understand the contributions of changes in land management practice to the changes in carbon stocks over time.

To support Sonoma farmers and ranchers, the County will explore the potential development of a local carbon farming offset protocol to streamline procedures and practices and validate offset credits for use as CEQA mitigation. The protocol will need to follow the basic rules of “additionality” that are applied in all offset schemes and have sufficient rigor to verify the credit rationale and guarantee over time. The County may develop this for use only within Sonoma County or may seek economy of scale by combining with other communities in the San Francisco Bay Area and/or BAAQMD. Marin County’s recent 2015 Climate Action Plan Update includes development of a local carbon farming protocol as well, so the two counties may seek efficiencies by a coordinated effort.

Reductions for this measure were not quantified and a cost-effectiveness analysis was not conducted. However, examples of potential rangeland GHG reductions through increased soil sequestration are discussed in Section 2.5.

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C.26.2 Personal Communications

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- Gilster, Patrick. Transportation Planner/Engineer, Fehr & Peers. May 5, 2015—email to Brian Schuster, ICF International.

Mersich, Misty, Climate Protection Program Analyst, Regional Climate Protection Authority. June 9, 2014. Email communication to Brian Schuster, ICF International.

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Appendix D

Funding and Financing Options

This appendix provides information on funding and financing options available to support implementation of the emissions reduction strategies. The funding options may be available to Sonoma County (County), the cities, local and regional public agencies, community members, businesses, non-profit agencies, or a combination of entities, as noted below. The communities will pursue a number of financing strategies to support overall management of the Community Climate Action Plan (CAP). The communities may also promote several of the community-oriented funding options described below as part of CAP incentives, outreach, and education.

D.1 Federal and State Funding Options

D.1.1 California Air Resources Board Programs

The California Air Resources Board (ARB) manages a variety of air pollution incentives, grants, and credit programs that could be used to help fund local transportation strategies. The following programs offer grant opportunities over the next several years. Residents, businesses, and fleet operators may be eligible to receive funds or incentives, depending on the program rules.¹

- Air Quality Improvement Program (Assembly Bill 118).
- Enhanced Fleet Modernization Program (Assembly Bill 118).
- Carl Moyer Program—Voucher Incentive Program (administered by California Air Pollution Control Officers Association).
- Goods Movement Emission Reduction Program.
- Loan Incentives Program.
- Lower-Emission School Bus Program/School Bus Retrofit and Replacement Account.
- Providing Loan Assistance for California Equipment (PLACE) Program.
- Clean Vehicle Rebate Project (CVRP)
- California Capital Access Program (CalCAP)

D.1.2 California Cap-and-Trade Funding

The California Cap-and-Trade Program, a key element of AB 32, established greenhouse gas (GHG) emissions trading including allowances and offset. It is possible that in the future, agricultural soil sequestration (aka “carbon farming”) may qualify for offsets for the state’s cap and trade system,

¹ For more information on the ARB incentive programs, please visit: <http://www.arb.ca.gov/ba/fininfo.htm>.

generating a revenue source for farmers and ranchers who conduct qualifying actions.² In addition, the cap and trade program is generating proceeds through the sale of allowances and some of the proceeds are being used to fund transit and other improvements that reduce GHG emissions. There are also cap and trade offset credits derived from qualifying methane gas digester projects as well as Low Carbon Fuel Standard (LCFS) credits that may be used for installation of electric vehicle charging infrastructure.

D.1.3 California Department of Resources Recycling and Recovery Grant Program

California Department of Resources Recycling and Recovery (CalRecycle) grants are authorized by state legislation to assist public entities in the safe and effective management of the waste stream. Funds are intended to reduce, reuse, and recycle all waste; encourage development of recycled-content products and markets; protect public health; and foster environmental sustainability.³ There may also be options for state funding of agricultural composting measures as part of waste management and reduction.

D.1.4 Energy Upgrade California

Energy Upgrade California is funded by the American Recovery and Reinvestment Act, California utility ratepayers, and private contributions. It is administered by participating utilities, like PG&E. Under this program, a homeowner selects one of two energy upgrade packages, basic or advanced, with each offering different enhanced options. The program connects homeowners with home energy professionals, including participating contractors and Whole-House Home Energy Raters. It also offers rebates, incentives, and financing. For instance, homeowners can get up to \$4,000 back on an upgrade through a local utility. In addition, the County offers a \$1,000 incentive for homeowners who have completed an Advanced Upgrade Package and who host a Home Showcase Event.⁴

D.1.5 Energy Efficient Mortgage

Energy Efficiency Mortgages (EEMs) may be available to some county residents. An EEM credits a home's energy efficiency upgrades and gives borrowers the opportunity to finance cost-effective, energy-saving measures as part of a single mortgage. Borrowers typically need to have a home energy rater conduct a home energy assessment before financing is approved. This rating verifies that the home is energy-efficient. EEMs are typically used to purchase a new home that is already energy efficient, such as an ENERGY STAR-qualified home.⁵

² If local soil sequestration efforts are funded through offsets from the cap and trade system, such reductions cannot be counted as "local" GHG reductions because they would be allowing other GHG emissions covered by the cap and trade system, such as stationary source or mobile fuel emissions to continue occurring.

³ For more information on the CalRecycle Recycling and Recovery grants, please visit: <http://www.calrecycle.ca.gov/grants/>

⁴ For more information on Energy Upgrade California financial programs, please visit: <http://www.energyupgradeca.org/en/find-programs-and-assistance>

⁵ For more information on Energy Efficiency Mortgages, please visit: https://www.energystar.gov/index.cfm?c=mortgages.energy_efficient_mortgages

D.1.6 Federal Tax Credits for Energy Efficiency

Federal government tax credits are available to county residents through 2016. The tax credits provide a discount of 30% of cost with no upper limit for geothermal heat pumps, small wind turbines (residential), and solar energy systems. The 2016 tax credits also include 30% of the cost up to \$500 per 0.5 kilowatt (kW) of power capacity for fuel cells in a principal residence.⁶

D.1.7 State Funding for Infrastructure

The State's Infill Infrastructure Grant Program may be used by the County to help fund strategies that promote infill housing development. Grants are available to support funding for infrastructure improvements necessary for specific residential or mixed-use infill development projects.⁷

D.1.8 Strategic Growth Council Funding

The Strategic Growth Council (SGC) of the State Department of Conservation (DOC) manages competitive grants for cities, counties, and designated regional agencies that promote sustainable community planning and natural resource conservation. The DOC has allocated approximately \$18 million of Proposition 84 funds for competitive grants to support development, adoption, and implementation of Sustainable Community planning elements, including, but not limited to, CAPs and general plan amendments. The grants awarded from this solicitation will cover up to a 3-year project period. Grant requests for amounts from \$100,000 to \$1,000,000 will be considered.⁸

The Council's mission is to help make California's communities more sustainable by reducing GHG emissions, improving air and water quality, protecting natural resources and agricultural lands, improving transportation, encourage sustainable land use plans, etc. The Council offers the following grant programs:

- **Affordable Housing and Sustainable Communities (AHSC).** This program funds land-use, housing, transportation, and land preservation projects to support infill and compact development that reduces GHG emissions. These projects facilitate emission reductions by improving mobility options and increasing infill development, which decrease vehicle miles traveled, and by reducing land conversion.
- **Sustainable Agricultural Lands Conservation (SALC) Program.** This program supports the protection and management of California's agricultural lands. Through planning and permanent protection of farm and ranch lands via agricultural easements, the SALC program will prevent increases in GHG emissions by limiting opportunities for expansive, vehicle dependent forms of development in favor of more focused, compact, and transit oriented

⁶ For more information on federal tax credits for energy efficiency, please visit: https://www.energystar.gov/?c=tax_credits.tx_index

⁷ For more information on the State's Infill Infrastructure Grant Program, please visit: <http://www.hcd.ca.gov/fa/iig/>

⁸ For more information on Planning Grants from the Strategic Growth Council, please visit: http://sgc.ca.gov/m_grants.php

development within discrete growth boundaries. The SALC program will also support farm-scale conservation management practices that further promote reductions in GHG emissions and increases in soil carbon sequestration.

- **Urban Greening Grant (UGG) Program.** California voters passed the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006 (Proposition 84) on November 7, 2006. Among its provisions, the bond authorized the Legislature to appropriate \$70 million for urban greening projects and plans that reduce energy consumption, conserve water, improve air and water quality, and provide other community benefits.
- **Sustainable Communities Planning Grants and Incentives Program.** The Sustainable Communities Planning Grant is funded by Proposition 84, the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006. It added Division 43 to the Public Resources Code, Chapter 9, Sustainable Communities and Climate Change Reduction Section 75065(a), authorizing the Legislature to appropriate \$90 million for planning grants and planning incentives that reduce energy consumption, conserve water, improve air and water quality, and provide other community benefits. This grant program implements the vision of the Governor and Legislature to foster the development of sustainable communities throughout California. It is designed to help local governments meet the challenges of adopting land use plans and integrating strategies in order to transform communities and create long term prosperity. Sustainable communities shall promote equity, strengthen the economy, protect the environment, and promote healthy, safe communities.
- **Modeling Incentive Awards.** Funds for data gathering and model development necessary to comply with SB 375 (2008).

D.1.9 Transportation-Related Funding

The following funding sources that may be utilized to fund strategies related to transit, bicycle, or pedestrian improvements. Residents, businesses, and fleet operators can receive funds or incentives depending on the program.

- Safe, Accountable, Flexible, Efficient Transportation Equity Act—Legacy for Users (SAFETEA-LU)
- Surface Transportation Program (STP) Fund, Section 1108
- Congestion Mitigation and Air Quality Improvement Program(CMAQ), Section 1110
- Transportation Enhancement Activities (TEA)
- National Recreational Trails Program
- National Highway System Fund (NHS)
- National Highway Safety Act, Section 402
- Transit Enhancement Activity, Section 3003

- Section 3 Mass Transit Capital Grants
- Bridge Repair & Replacement Program (BRRP)
- Federal Transit Administration (FTA) 5309
- FTA Small Starts
- FTA Section 5311(f)
- California’s Bicycle Transportation Account
- Environmental Enhancement and Mitigation (EEM) Program
- Safe Routes to School (SR2S)
- Office of Traffic Safety (OTS)
- Transportation Development Act (TDA) Article III
- Transportation Funds for Clean Air (TFCA, formerly AB 434)
- Flexible Congestion Relief (FCR) Program
- State Highway Operations and Protection Program (SHOPP)

D.1.10 USDA Natural Resources Conservation Service

NRCS provides financial and technical assistance programs that help eligible agricultural producers:

- Construct or improve water management or irrigation structures
- Improve resource conditions such as soil quality, water quality, water quantity, air quality, habitat quality, and energy
- Implement conservation practices, or activities, such as conservation planning, that address natural resource concerns on their land

D.2 Regional and Local Funding Options

D.2.1 Bay Area Air Quality Management District

Bay Area Air Quality Management District (BAAQMD) offers several grant programs related to air quality improvement, as noted below. The air district also promotes state programs offered by ARB, such as the Carl Moyer Program. Residents, businesses, and fleet operators may be eligible to receive funds or incentives, depending on the program rules.⁹

- Mobile Source Incentive Fund (MSIF)
- Transportation Fund for Clean Air (TFCA) (County Program Manager Fund and Regional Fund)

⁹ For more information on the incentive programs, please visit: <http://www.baaqmd.gov/Divisions/Strategic-Incentives/Funding-Sources.aspx>.

- Cash for Retiring Vehicles - California Consumer Assistance Program (administered by the California Bureau of Automotive Repair)
- Environmental Justice Small Grants Program (administered by the California Environmental Protection Agency)
- Hybrid Electric Vehicle Purchase Vouchers (HVIP) (administered by CALSTART)
- Zero-Emission Agricultural Utility Terrain Vehicle (Agricultural UTV) Rebate Program (administered by the San Joaquin Valley Air Pollution Control District)
- Strategic Incentives Division (SID) Program
- The air district may be able to provide grants and other funds to support waste-related measures in the county.

D.2.2 Bay Area Regional Energy Network (BayREN) Energy Efficiency Programs

BayREN offers additional rebates for the Energy Upgrade California program, commercial PACE financing, codes & standards programs and a multi-family program. The PAYS On-Bill Efficiency Program is a joint effort of Bay Area cities and counties and their water agencies to partner in the implementation of a unique on-bill program that allows municipal water utility customers to pay for efficiency improvements through a monthly charge attached to their meter, with no up-front costs and the assurance that their utility bill savings will exceed the program charge.¹⁰

D.2.3 Golden Gate Transit

Golden Gate Transit is funded through tolls at the Golden Gate Bridge. Tolls could be altered to provide supplemental funding for expansion of transit.

D.2.4 Northern Sonoma County Air Pollution Control District Programs

NSCAPCD is the regional agency responsible for developing and implementing air quality plans for the northern part of Sonoma County. NSCAPCD also sponsors various air quality programs that can support implementation of several energy efficiency, transportation, and renewable energy strategies.

D.2.5 Sonoma County Energy Independence Office Programs

The Sonoma County Energy Independence Office (SCEIO) is a County of Sonoma Energy and Sustainability Division program that serves county residents and businesses as a central clearinghouse of information about energy efficiency, water conservation, and renewable energy generation. The office is designed to assist property owners and tenants find the information, resources, rebates, contractors and financing that fits their situation. SCEIO offers the following services.

¹⁰ For more information on BayREN programs, please visit: <https://www.bayareaenergyupgrade.org/get-fit-fast-upgrades>

- **Action Plan Tool:** A self-energy analysis tool that provides behavioral and upgrade recommendations, energy saving tips and group competitions for homeowners.
- **List of Contractors:** Property owners can use filters to search for the right participating contractor for the job.
- **Information on Rebates and Incentives:** Property owners can search for currently available rebates and incentives for the improvements they are planning.
- **Resources for Contractors:** Contractors may borrow tools from the on-line Building Performance Tool Lending Library, find out about education and training opportunities, participate in our monthly contractor forums, and access an array of contractor-oriented information and resources.
- **PACE Financing:** The County provides its own Property Assessed Clean Energy (PACE) financing program to property owners for energy efficiency, renewable generation, and water conservation upgrades, payable back to the County through the owner's property tax bill. The County PACE financing product is the SCEIP.
- **Financing Marketplace:** In addition to PACE financing provided by the County, SCEIP, there are other PACE financing programs available through the Sonoma County Energy Independence Office to property owners for financing upgrades.

D.2.6 Sonoma Energy Watch

Sonoma County Energy Watch (SCEW) is a local government partnership between the County of Sonoma and Pacific Gas and Electric Company (PG&E) designed to help save money and energy while reducing harmful impacts on the climate. SCEW provides energy efficiency services to local governments, nonprofit organizations, small businesses, and special districts in the County of Sonoma who are served by either PG&E or Sonoma Clean Power (SCP). SCEW provides the following services.¹¹

- **Free Energy Audits.** SCEW, in partnership with The Energy Alliance Association, provides no-cost, no-obligation lighting audits to determine opportunities for savings.
- **Incentives and Rebates.** SCEW offers rebates for direct install projects that are much higher than if customers were to approach PG&E directly. Core program rebates are also available for projects that reduce natural gas use. Building retrofit measures, including HVAC, boiler, chiller, and other improvements may also receive rebates.
- **Energy Efficiency Consulting.** SCEW can provide no-cost technical consultation and best practices advice in the areas of energy efficiency and conservation.
- **Financial Consultation.** There are several zero and low interest loans available to help pay for energy efficiency projects. SCEW can assist customers in finding funding and financing for project implementation.

¹¹ For more information on the Sonoma Energy Watch Partnership, including a list of available resources and incentives, please visit: <http://www.sonoma-county.org/gs/energy/scew/>

Between the program’s inception in 2009 and the end of 2014, nearly \$2 million in incentives have been paid for over 470 projects. The resulting energy savings are estimated to be 11,717,829 kWh/year.

D.2.7 Sonoma Clean Power

SCP is the community choice aggregator in the county and will be the lead for seeking to expand participation rates over time and increase the renewable portfolio for electricity generated to serve the county. As SCP gathers momentum and capacity, the members will fund local energy efficiency programs as well as local renewables for CleanStart and EverGreen revenue. SCP could also offer incentives and rebate programs to encourage energy efficiency and distributed renewable energy and could also play a part in supporting increases in electric vehicles (EVs) and EV infrastructure. SCP may be able to offer energy efficiency programs and financing for multi-family, single-family, and commercial properties, a feed-in-tariff, solar rebates, green home and green property loans, and energy audits and assessments. Resources offered by SCP could reduce program implementation and administration costs. There may also be opportunities for cooperation on community-scale alternative energy installations (e.g., solar).

D.2.8 Sonoma County Transportation Authority

SCTA administers funds from Measure M¹² generated within Sonoma County through a local sales tax for specific transportation projects in the county. SCTA also seeks and obtains state and federal funding for transportation projects.

D.2.9 Sonoma County Transit, Petaluma Transit, and Santa Rosa CityBus

These transit agencies aren’t sources of funds themselves, but they monitor funding sources and grant opportunities to improve their service and network. Transit prices (such as bus fares) could be used to provide funding for expansion and improvement of transit services.

D.2.10 Sonoma County Water Agency/Electric Vehicle Fleet National Demonstration Project

The Sonoma County Water Agency has joined a coalition of Bay Area local governments to pursue a grant through the Metropolitan Transportation Commission to fund fleet electric vehicles and charging infrastructure. The \$2.8 million grant will supplement the purchase of 90 electric vehicles and accompanying electric vehicle charging stations. Through the grant, the Water Agency has received funding to supplement the purchase of five electric vehicles. The grant will also fund the purchase of five Level 2 dual charging stations for fleet use. United States Department of Agriculture Natural Resources Conservation Service

¹² “To maintain local streets, fix potholes, accelerate widening Highway 101, improve interchanges, restore and enhance transit, support development of passenger rail, and build safe bike/pedestrian routes, shall the Sonoma County Transportation Authority be authorized to levy a 1/4 cent retail transactions and use tax for a period not to exceed 20 years, spend money raised by the tax on the projects proposed, and issue bonds to finance the projects.” See: <http://www.smartvoter.org/2004/11/02/ca/sn/meas/M/>

The USDA NRCS provides financial and technical assistance programs that help eligible agricultural producers:

- Construct or improve water management or irrigation structures
- Improve resource conditions such as soil quality, water quality, water quantity, air quality, habitat quality, and energy
- Implement conservation practices, or activities, such as conservation planning, that address natural resource concerns on their land

D.2.11 Utility Programs

PG&E and the local water service providers offer a variety of rebates and incentives for single-family homes, multi-family homes, and commercial and industrial developments. PG&E programs apply to energy efficiency improvements and renewable energy projects, whereas the water service provider programs apply to water conservation efforts.¹³ Resources offered by PG&E may reduce program implementation and administration costs. PG&E can also play a role in expanding EV infrastructure.

PG&E and SCP also offer net energy metering to customers who have solar or other small renewable generation systems. Participants who generate more electricity than they use get credited for that excess electricity.¹⁴

On-bill financing (OBF), offered by both PG&E and SCP, can be used to support commercial energy-efficiency retrofits. Funding from OBF is a no- or low interest loan that is paid back through the monthly utility bill. Lighting, refrigeration, heating ventilation and air conditioning, and energy efficient streetlights are all eligible projects.¹⁵

D.2.12 Local CEQA Mitigation

If the County establishes a local protocol that validates GHG reductions from voluntary agricultural activities, these reductions could be sold as local CEQA mitigation credit to projects requiring GHG reductions.¹⁶ In concept, this approach could also be used to fund other GHG

¹³ For more information on available PG&E incentive programs and rebates, please visit:

<http://www.pge.com/myhome/saveenergymoney/rebates/> and

<http://www.pge.com/en/mybusiness/save/rebates/index.page>. For more information on available water service provider programs, please visit: <http://www.marinwater.org/163/Rebates> and

<http://www.nmwd.com/conservation.php>.

¹⁴ For more information on net energy metering, please visit:

<http://www.pge.com/en/b2b/energytransmissionstorage/newgenerator/netenergymetering/index.page> and

<https://sonomacleanpower.org/netgreen/>

¹⁵ For more information on On-bill financing, please visit:

<http://www.pge.com/en/mybusiness/save/rebates/onbill/index.page?>

¹⁶ If GHG reductions are used as mitigation credits, then care would need to be taken to avoid double-counting local reductions. For example, if a residential project were to purchase mitigation credits from a qualifying agricultural GHG reduction effort to meet a local performance standard requirement, then the reductions could only count once for reducing residential emissions (not once for the residential project and a second time for the agricultural sector).

reduction measures wherein a new development project could pay an “in-lieu” fee to fund other GHG reduction measures instead of project-specific mitigation measures.

D.2.13 Water and Sewer Rates

Revenue from water and sewer rate increases can be used to fund water conveyance infrastructure and wastewater treatment plant improvement programs. Rates can also be used to fund water conservation programs.

D.3 Privately-Sponsored Funding Options

D.3.1 Property-Assessed Clean Energy

Property-Assessed Clean Energy (PACE) finance programs are intended to finance energy and water improvements within a home or business through a land-secured financing, and funds are repaid through property assessments. Municipalities are authorized to designate areas where property owners can enter into contractual assessments to receive long-term, low-interest financing for energy and water efficiency improvements and renewable energy installation on their property.

D.3.2 Power Purchase Agreements

Power purchase agreements (PPAs) involve a private company that purchases, installs, and maintains a renewable energy technology through a contract that typically lasts 15 years. After 15 years, the company would uninstall the technology, sign a new contract, or sell the system at fair market value.

D.3.3 Private Equity Loans

Builders who own and operate buildings (i.e., commercial buildings or apartment complexes) can use private equity to finance these improvements, with returns realized as future cost savings (e.g., reduced energy expenditures). As market conditions improve over time, rents can be increased to reflect improved facilities and defray the investment costs.

D.3.4 Voluntary Carbon Offset Market

Apart from the regulated cap and trade system, there are voluntary carbon offset systems where qualifying sellers of carbon credits can sell credits to willing buyers.

D.4 Future Funding Options for Implementation Costs

The communities are not proposing any local fees or taxes at this time. While current economic conditions and fiscal realities limit funding options for the local reduction measures, additional funding sources that are currently infeasible may become realistic as the economy recovers. Potential future funding options are described below.

D.4.1 Community Facilities District Special Taxes

Creating special district taxes would require voter approval and should be directed towards strategies that achieve broad benefits for the community (e.g., transit, pedestrian, and bicycle facilities). Any increase of tax rates will need to be highly sensitive to current local economic conditions and overall local, state, and national economic and financial context.

D.4.2 Development Impact Fees

New development impact fees may have some potential to provide funding, but such fees are best implemented when the real estate market and overall regional economic conditions are strong.

D.4.3 General Obligation Bond

A general obligation bond is a form of long term borrowing and could be utilized to fund municipal improvements.

D.4.4 Local Sales or Parcel Tax

Increasing local sales or parcel taxes could help fund ongoing implementation, operations, and maintenance efforts. Any increase of tax rates will need to be highly sensitive to current local economic conditions and overall local, state, and national economic and financial context.

D.4.5 Utility User Tax Increase

Increasing utility taxes could help fund ongoing implementation, operations, and maintenance efforts. Any increase of tax rates will need to be highly sensitive to current local economic conditions and overall local, state, and national economic and financial context.

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Appendix E

Municipal Greenhouse Gas Reduction Measures

E.1 Example Municipal Measures

Although municipal GHG reduction measures are not included in this countywide plan, a description of potential municipal measures are provided as an informational resource for communities interested in updating or developing strategies to reduce GHG emissions from local government operations.

Measure Number ¹	Measure Name	Measure Description
Building Energy		
E Energy-1	Green Municipal Buildings	Retrofit municipal buildings to reduce energy, water, waste, and resource use. Improvements could be made to lighting, HVAC, pumps/motors, insulation, windows, etc. Establish a goal to reduce energy use by a certain percentage (e.g., 20%) in all municipal facilities by 2020.
N Energy-1	Green Building Ordinance for Municipal Buildings	All new municipal buildings must exceed 2014 Title 24 Energy Efficiency Standards by at least 15%. Incorporate green building principles and practices into the planning, design, construction, management, renovation, operations, and demolition of all municipal facilities.
N Energy-2	Install solar panels on municipal facilities	Install solar photovoltaic (PV) panels on municipal buildings with the goal to offset a certain percentage of all electricity consumed by municipal buildings and properties. Require that, where feasible, new or major rehabilitation of municipal buildings are constructed to allow for easy, cost effective installation of solar energy systems in the future. In line with the CPUC's Zero Net Energy Goals incorporate solar on all new municipal buildings. Implement a goal for the total kW of solar installed on government buildings in each city and county-wide. Potential goals might be: <ul style="list-style-type: none"> • Aggressive – 100% of all electricity use will be generated by solar • Medium – 50% of all electricity use will be generated by solar • Low commitment – 25% of all electricity use will be generated by solar
N Energy-3	Install energy-efficient street lights	Require that all streetlights use energy-efficient lamps or fixtures. Replace all mercury vapor or high pressure sodium lights with LEDs or Induction. Also install lighting meters on streetlights at key distribution points. Lighting meters will enable jurisdictions to track electricity consumption more accurately and target specific locations for efficiency upgrades.
N Energy-4	Existing Building Retrofit Program	Conduct energy efficiency retrofits of existing municipal buildings. Set a target to retrofit a certain percentage or total number of municipal buildings (such as 75% or 10 buildings) by 2020. Require these retrofits to improve building-wide energy efficiency by 20%. Retrofits should target lighting, heating and air conditioning units, and overall building energy use. In addition, each jurisdiction will require that newly leased buildings improve energy consumption by 20% over 2012 levels. These retrofits could be accomplished by a variety of actions, including: <ol style="list-style-type: none"> 1. Energy inspections and audits 2. Active Lighting Management System (including LED lighting retrofits, lighting controls, etc.) 3. Major Equipment Procurement Standards: Require all major equipment purchases be more energy-efficient than the equipment it replaces.

Measure Number ¹	Measure Name	Measure Description
		4. Building energy management system (such as requiring all occupied rooms maintain an ambient temperature of 71 degrees during the summer months)
N Energy-5	Install Cool Roofs on Retrofitted Buildings	Require installation of cool roofs on buildings that are retrofitted. This would occur on buildings that are not already installing solar panels. Installation will implement CALGREEN's voluntary cool roofs measure for non-residential development (A5.106.11.2).
N Energy-6	Energy Efficiency Measures for Computers Vending Machines, and Printers.	This measure includes five separate actions to improve energy efficiency at municipal facilities: <ol style="list-style-type: none"> 1. Replace one-third of computers with thin clients, which use 96% less energy than traditional desktops, or other energy-star computers. 2. Require that computers, screens, printers, and copiers be turned off every night before employees go home and before weekends. Explore and/or pilot programs that turn off PCs after hours when not in use. Require all PCs to be set at the highest energy-saving mode for regular use. 3. Retrofit all vending machines with energy monitors 4. Improve printing energy efficiency by installing one shared system per 15 printers throughout all departments 5. Install IT remote access systems for employees that allow them to access the server without leaving their desktops on.
N Energy-7	Install Higher Efficiency Public Area Outdoor Lighting	Adopt outdoor lighting standards to reduce electricity consumption for outdoor public area lighting at municipal properties. Requires 75% of outdoor lighting fixtures to use LED lamps (or other high efficiency technology such as induction bulbs or CFLs) by 2020. Establish an energy reduction goal such that full implementation would reduce municipal outdoor lighting energy use by 50%. Install automatic timers to control the operation of lighting systems. When outdoor lighting is no longer needed, the timers can be programmed to automatically turn off lights.
N Energy-8	Replace Traffic Lights with LED Traffic Lights	Replace 100% of the traffic indications with LEDs by 2020. LEDs consume about 90% less energy than traditional incandescent traffic indications while still providing adequate light when viewed. Also install lighting meters on traffic signals at key distribution points. Lighting meters will enable the jurisdictions to track electricity consumption more accurately and target specific locations for efficiency upgrades
N Energy-9	Shade Tree Planting at Municipal Buildings	Promote the planting of shade trees around municipal facilities. Consider a goal of 200 new trees to be planted each year as part of this goal. Promote California natives or low water trees and include irrigation upgrades to support tree health until established.
N Energy-10	Solar Water Heating	Install solar water heating on municipal facilities with a target of offsetting water heating energy usage by

Measure Number ¹	Measure Name	Measure Description
		25% all municipal facilities by 2020 (for the County this isn't possible with the current CCFP plans. It is a great goal for new facilities at the County. Cities might be able to adopt it though). The goal should be increased over time coincident with updates to the CCAP. Implementation of this measure will require an initial study including at a minimum: an inventory of all facilities that require hot water; annual water usage and electricity usage for each facility; equipment type and age; and available space for solar water heating installation. This measure may lend itself to implementation at the facility or department level
N Energy-11	Solar Panel Carports and Parking Areas	Install solar panels on unused stacked parking roofs, ground space, and over carports and parking areas by 2020. If carports include plug-in-electric stations, PV shall be installed to offset 80% of the electric station's expected energy use. Renewable energy generated by ground-level PV panels can be sold as an offset or used to power adjacent buildings or stand-alone plug-in charging stations.
N Energy-12	Development of Other Renewable Resources	Explore options for small scale wind projects, biofuels, or other types of renewable generation where feasible.
N Energy-13	Employee Outreach and Education	Institute an employee awareness program to educate personnel on energy efficiency steps such as indoor temperature controls, turning off printers, copiers, heaters and other appliances.
N Energy-14	Encourage Paperless Billing	Encourage online paperless billing as an option for such revenues as traffic tickets and other fines. Make a goal of reducing the number of payments by mail by 50% by 2020. This reduces printing energy use as well as energy required to handle physical payments. This measure will also reduce paper waste generated by municipal facilities.
N Energy-15	Energy-Management Software	Utilize energy management software to track and manage energy use. Utilize energy "dashboards" that provide real time energy data for management, building operators, and Facility Operations staff. Determine how certain conservation actions within buildings affect real time energy use
N Energy-16	HVAC Settings	Adjust building temperature set points to the OSHA recommended levels of 76 degrees F in the summer and 68 degrees F in the winter to reduce heating and cooling costs. Request that employees dress appropriately to support comfort and productivity needs
N Energy-17	Energy-Star Equipment	Select Energy Star when acquiring energy or water using equipment. For product groups where Energy Star labels are not yet available the County (or city) shall select products that are in the upper 15 percent of energy efficiency for their respective product categories
N Energy-18	Direct Access Energy Purchases	Pursue Direct Access energy purchases for facilities where utility costs and associated GHG emissions can be reduced

Measure Number ¹	Measure Name	Measure Description
N Energy-19	Benchmark Norms	Establish the regional index for GHG project results: index as a factor of building square footage and energy intensity of building section use to give a per building and a cumulative portfolio index for year over year progress tracking versus absolute number of pounds of emission.
On-Road Transportation		
E Trans-1	Alternative Fuels – Municipal Fleet Vehicles	A few local governments have fleet replacement strategies to reduce fuel use by purchasing hybrids and other alternative fuel vehicles to replace conventional fuel vehicles. Existing countywide programs include the Sonoma County Local Government Electric Vehicle Partnership, the Zero Emission Dedicated Electric Vehicles Program, and the Electric Vehicle Charging Station Program.
N Trans-1	Purchase fuel efficient (e.g., hybrid) and/or smaller fleet vehicles	Replace 25% of municipal-owned vehicles (passenger/light-duty, medium-duty, and heavy-duty) with the most efficient vehicles (hybrid, compressed natural gas, or other alternative fuels) available by the year 2020.
N Trans-2	Guaranteed Ride Home	Provide a free shuttle or taxi ride home to municipal employees in case of an emergency (illness, family crisis, unscheduled overtime). Would apply to any employee who use any alternative to driving alone to work (public transit, carpooling, vanpooling, biking, or walking) on the day of the emergency.
N Trans-3	Transit Reimbursement Program	Allow municipal employees to purchase public transit fares with pre-tax dollars up to IRS limits. Provide employees with low-cost monthly transit passes.
N Trans-4	Electric Vehicles	Require the replacement of 50% of non-emergency gasoline powered sedans with electric vehicles by 2020.
N Trans-5	Vehicle Idling	Limit idling of municipal vehicles to 3 minutes.
N Trans-6	Trip Reduction Target and Monitoring	Implement a program to reduce vehicle trips by employees. Adopt a vehicle trip reduction goal of 20% by 2020. Require the program complete annual employee commute surveys. This measure will be supported by existing City/County measures to increase carpooling and transit use by City/County employees. Expand commute marketing and outreach regarding alternative modes of transportation to employees. Provide weekly monthly email tips and strategies to City/County employees. Emphasize trip reduction strategies and alternative mode options during new employee orientation.
N Trans-7	Employee Vehicle Purchasing Policy	Establish a Vehicle Purchasing Services Program. The program will provide pre-negotiated pricing agreements and discounted rates for City/County employees to purchase green vehicles, such as hybrids. Set a target for this program to achieve an average purchase rate of 5 new green vehicles per year (or similar target).

Measure Number¹	Measure Name	Measure Description
N Trans-8	Municipal Parking Management	Implement a Municipal Parking Management Program to discourage private vehicle use.
N Trans-9	Clean Energy Fuels Program Infrastructure	Provide/encourage construction of refueling infrastructure for alternative-fueled vehicles. This measure will support the measures above.
N Trans-10	Smart Global Positioning Systems	Participate in a pilot program to install smart GPS on municipal vehicles. Smart global positioning systems (GPS) support trip planning actions by mapping optimal routes to reduce VMT. Through this measure, the City/County will continue to seek funding to install additional GPS units. This measure will support the measures above.
N Trans-11	Fuel Tracking System	Provide an up-to-date fuel tracking system of municipal fleet. This measure will support the measures above.
N Trans-12	Vehicle Maintenance Program	Evaluate and enhance the any current vehicle maintenance program to reduce fuel consumption. This measure will support the measures above.
N Trans-13	Bicycle Safety Program	Provide a bicycle safety program and information about safe routes to work.
N Trans-14	Business Travel Planning	This measure will reduce employee work-related travel between various city/county work locations by emphasizing the co-location of compatible and interrelated services. City/County departments will also be encouraged to schedule employee field routes to minimize back and forth travel between the office and field locations.
N Trans-15	Clean Commuting	Support mobile work, telework, and/or compressed work week arrangements for employees at the discretion of management to balance the impacts of cost, delivery of services to the public.
N Trans-16	Smart Campus Design	Explore opportunities to co-locate services on the County campus when developing the Comprehensive County Facilities Plan
Off-Road Transportation		
N Off-Road-1	Electric Equipment	Replace 15% of municipal off-road vehicles, construction equipment, and stationary engines with electric equipment.
N Off-Road-2	Electric Landscaping Equipment	Require 75% of municipally-owned landscaping equipment be alternatively fueled or electric by 2020 and 100% by 2030. Install outdoor electrical outlets on municipal buildings as appropriate

Measure Number ¹	Measure Name	Measure Description
Solid Waste Management		
N Waste-1	Municipal Purchasing Policies	Develop and implement a municipal Environmentally Preferable Purchasing Program. Such policies would require the purchase of materials with the highest post-consumer recovered material available whenever possible, prohibit or limit the purchase of bottled water, consider the ability of the product/packaging to be reused or recycled, and prefer products and packaging that are designed to minimize waste and other toxic by-products in their manufacture, use, and disposal.
N Waste-2	Municipal Waste Diversion Goal	Implement a waste diversion goal for municipal facilities, such as a diverting 85% of all municipal waste by 2020 through reuse, recycling, and composting
N Waste-3	Electronic and Universal Waste Recycling	Require that all electronic and universal waste from municipal buildings and facilities be diverted from landfills and be recycled instead. Support SB 20 and SB 50 by banning electronic/universal waste from land-filling.
N Waste-4	Recycled Paper Purchasing	Require departments to purchase paper with a minimum of 30% recycled content. All paper should be encouraged to be multipurpose, rather than copy paper quality.
Water Conveyance		
N Water-1	Water Conservation for Existing Buildings	Implement a program to renovate existing buildings to require a higher level of water efficiency. At a minimum, require a 30% savings in indoor water use (consistent with CALGREEN Tier 1 standards for Non-Residential development: A5.303.2.3.1) and a 30% savings in outdoor water use. Develop a master plan of municipal facilities to address water efficient landscape, irrigation, and maintenance practices. Replace all fixtures with low-flow fixtures. Install smart landscaping irrigation controls and drip irrigation. Replace existing vegetation with drought-tolerant vegetation where feasible.
N Water-2	Water Conservation for New Buildings	Require new City buildings to achieve a 40% reduction in baseline water use through a higher level of water efficiency. Meet 2010 CALGREEN Tier 1 standards (as listed above), and meet Tier 2 (A5.303.2.3.2) or 3 (A5.303.2.3.3) standards where feasible.
N Water-3	Water-Efficient Landscaping at County Facilities	Promote site appropriate, low-water use, and drought tolerant native plants in public facilities.
N Water-4	Irrigation Monitoring and Management System	Consider installing and or using a water monitoring and management system for all of the city's/county's irrigation needs. This could be accomplished by participation in the California Irrigation Management Information System (CIMIS), such as by installation of a climate station in the city/county or by using CIMIS

Measure Number ¹	Measure Name	Measure Description
		irrigation scheduling tools. Other monitoring and irrigation management tools should be considered, as appropriate, to best meet the city's/county's specific needs. Conduct water audits on municipal facilities and expedite repairs.
N Water-5	Collect Rainwater	Install rainwater collection systems at municipal facilities and parks to collect rainwater for appropriate non-potable water uses.
N Water-6	Reduce Energy use in Irrigation Pumping for Agriculture	Encourage farmers to install solar irrigation return pumps, which replace and supplement diesel/natural gas/electric pumps, and perform repairs to pump bowl components to make sure pumps are operating as efficiently as possible. Partner with agricultural organizations to incentivize and encourage solar irrigation pumps and pump repairs.
Wastewater Treatment		
N Wastewater-1	Recycled Water at Municipal Facilities and Properties	Consider requiring all new parks and schools or other public facilities to use 100% recycled or on-site rainwater harvesting water for non-potable outdoor uses as feasible depending on existing and planned recycled water infrastructure. Adopt a municipal goal to use recycled water for 100% of non-potable uses (such as landscaping and fire suppression). Implementation will likely require coordination with regional WWT and recycled water providers.
N Wastewater-2	Reduce Wastewater Generation in Municipal Facilities	Implement a goal to reduce wastewater generation in municipal facilities by a certain percentage by 2020, such as 30%. This would be supported by water conservation measures that seek to reduce indoor water use in buildings. This can also be accomplished by cities that have combined wastewater and storm sewer systems. Municipalities (such as Petaluma) and agencies with combined systems shall implement water retention strategies and best practices to reduce the quantity of water entering the storm drainage system. Best practices such as bioswales, retention ponds, and pervious pavement can reduce stormwater flow and therefore impacts to waste water treatment plants.
Agriculture		
N Agriculture-1	Local Food Purchasing	Support local farmers by purchasing local food for municipal events, cafes, and other sites where employees will be eating. Support local organic farmers when seasonally appropriate and available.

Notes:

¹ "E" represents existing measures; "N" represents new measures.

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Appendix F

Comments Received through Public Outreach and the Stakeholder Advisory Group

Comments received at community open houses and from the Stakeholder Advisory Group appointed by the Regional Climate Protection Authority (RCPA) Board are documented in this appendix. Comments were recorded verbatim and are presented here as originally provided by the commenters.

Many of the comments received support greenhouse gas (GHG) reduction measures that are now included in this Climate Action Plan (CAP). For example, enhanced transit service, expanded bike and pedestrian networks, and promotion of electric vehicles were strongly supported as part of the Climate Action 2020 (CA2020) strategy to reduce transportation emissions. Likewise, many comments supported building energy retrofits, distributed renewable energy generation, and sustainable agricultural practices. The full range of GHG reduction approaches suggested in public comments is, not surprisingly, extremely varied and generally very forward looking. For example, commenters suggested requiring point-of-sale energy audits, zero net new water use in new developments, local government divestiture from fossil fuel investments, and greater focus on schools and youth. The measures included in this CAP represent a subset of the ideas heard from the community. As noted throughout this plan, CA2020 is one step on a long-term path to dramatically reduced GHG emissions. Some of the suggestions gathered as part of the community outreach effort that are not included in this CAP may very well find a place in future climate action planning in Sonoma County.

Lastly, it is important to acknowledge that a small but vocal segment of the community disagrees with the scientific consensus about the threat posed by global climate change and opposes governmental action to reduce emissions.

Climate Action 2020 Public Open House Workshops— December 2, 2013–January 14, 2014 Countywide Public Comments by Sector

Climate Action 2020 is a collaborative effort among all nine cities and the County of Sonoma to take further actions in reducing GHG emissions communitywide and respond to the threats of climate change. Working with all Sonoma County communities, RCPA will develop a comprehensive and detailed plan for each community that will identify measures to reduce GHGs from sources including building energy (electricity and natural gas), transportation, water use and transport, waste, wastewater, and agriculture. This detailed plan is called CA2020.

Public open house workshops were held in the following cities.

Town of Windsor, December 2, 2013
6 p.m.–8 p.m., Town Hall, Council Chambers

City of Sonoma, December 10, 2013
6 p.m.–8 p.m., Sonoma Community Center

City of Rohnert Park, December 3, 2013
5 p.m.–7 p.m., City Hall, Council Chambers

City of Sebastopol, December 11, 2013
6 p.m.–8 p.m., Sebastopol Veterans
Building/Center for the Arts

City of Healdsburg, December 4, 2013
6 p.m.–8 p.m., City Hall, Council Chambers

City of Petaluma, January 7, 2014
6 p.m.–8 p.m., Petaluma Community Center,
Conference Room 2

City of Cotati, December 9, 2013
6 p.m.–8 p.m., City Hall, Council Chambers
201 West Sierra Avenue, Cotati, CA 94931

County of Sonoma, January 8, 2014
6 p.m.–8 p.m., PRMD meeting room

City of Cloverdale, January 14, 2014
6 p.m.–8 p.m., Cloverdale Regional Library

City of Santa Rosa

There were no public meetings for the City of Santa Rosa. Santa Rosa adopted a Community CAP in 2012. CA2020 will not alter Santa Rosa's adopted plan.

Purpose

The purpose of the workshops was to provide the public with general information about the CA2020 project, reveal the draft versions of the GHG inventory, and solicit feedback and input on possible GHG reduction measures. Prior to the meetings, RCPA issued a press release to all news and media outlets listed in the Communications and Media Plan. The dates and information were published in the Press Democrat editorial page, Community Voice, Windsor Times, Healdsburg Tribune, Cloverdale Reveille, Sonoma Index Tribune, The Bohemian, and on many city websites and Facebook pages.

Workshops were held open house style, with various stations around the room so that individuals could view information, provide comments, and talk to staff. The first set of boards contained pie charts and graphs with the draft GHG emission inventory by sector and city. The other remaining boards were divided by emissions sector: agriculture, water use, solid waste, building energy, transportation, and other (stationary sources, wastewater treatment, and off-road transportation). Attendees were asked to read the sample list of possible GHG reduction strategies for each sector and provide their comments related to three prompt questions.

- What are you already doing to reduce greenhouse gases?
- What do you suggest we do to further reduce GHG?
- What are your existing barriers to reducing GHG?

Attendees had access to Post-it notes and pens to attach their comments to the boards. RCPA staff were available for one-on-one conversations while attendees worked around the room.

Results

An estimated 115 members of the public attended the workshops in total and provided over 600 comments. Attached is all of the public comments that were received by sector and by question. Comments with a “plus [#]” notation are those that were agreed upon by more than one attendee. Comments that were difficult to read are marked with a (?).

Agriculture—What are you doing to reduce GHG?

- Supporting Farmers Markets. Talking about food security and reducing food transport.
- Provide open debate for Sonoma county climate action plans before any adoption of plans. Real public meetings with all sides represented.
- Grow organic gardens. Buy organic. [plus 3]
- We buy as much as possible meat and produce from local sources. This includes 2 different farm boxes and, soon, a meat CSA. We compost as well with the green bin that the county provides.
- Composting [plus 3]
- Limit monoculture
- Buying local food, organic food, less wine, more cider. [plus 4]
- We have organic gardens and an orchard [plus 2]
- Buying local and organic. Growing food.

Agriculture—What do you suggest we do to reduce GHG?

- Eliminate fossil fuel equipment. Capture all methane.
- I am working at reducing my personal waste to one quart. I still need to pay same amount for garbage. Some reduction would be great.

- Help the public K-12 schools to have classroom level recycling programs. This is not happening in the schools. Issue is classroom infrastructure to make this easy on the teacher.
- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive.
- Incentivize the use of local manures and composts. Tax petrochemical based fertilizers, herbicides and pesticides. Incentivize no till agriculture.
- Leave it up to each individual what fuel they will choose to use
- Create a financing or grant program to help local dairies/livestock operations/ag implement these changes while remaining competitive.
- Does our Ag industry produce enough raw material for bio-gas generation?
- Get vineyards to use compost for fertilizer rather than calcium nitrate. This could improve the vineyards as well as reduce harmful runoff.
- Agriculture is a sacred part of the fabric of life. It is currently under assault, all part of U.N. Agenda 21 implementation.
- Create Sustainable Ag zoning with no till and other low carbon farming
- Incentivize non-petroleum-based fertilizer use in vineyards and ban pesticide use in same
- Encourage use of vermicomposting to reduce use of pesticides
- Locavore ag is not affordable to the working class, they have to drive to Santa Rosa to buy food. The wine economy is elite, a bubble that's going to pop. Need diversity.
- Generate accurate methane inventory (not just ag).
- Plan vineyard maintenance with mules vs. tractors.
- Encourage composting. Encourage cover crops. Discourage soil tilling.
- Make sure Sonoma County does not adopt the policies of UN Agenda 21/Future Earth.
- How does extorting money by GHG Credits change carbon emissions?
- Use acorns as food source
- A mandate that all wineries be 100% Organic or biodynamic by 2015!!
- Solar installations on wineries and dairies.
- Methane digesters. Biochar soil treatment.
- A moratorium for no more wineries in Sonoma County and convert 50% of wineries to forests and wildlife.
- Put a cork in your cow's butt.
- What a joke! Going after cow fart now? I suppose we should all stop drinking milk or eating meat. Food Nazi's at it again!

- Home scale ag, permaculture food forest, aquaponics.
- Set a goal of 80% organic farming countywide
- Continue with cost of garbage regardless of reduction
- Shift from increasing livestock facilities to promote plant-based agriculture for diets. Go vegan.
- Work towards sustainable grape growing (talk with Altieri lab at ULB). Intercropping with flowers, water filtering, dry farming, grey water, educate farmers and provide incentives for them to apply alternative practices.
- Small scale biodigesters to energy as part of a methane management program.
- Incentivize reduced water use. Implement drought measures for conservation?
- We also dump waste at Novato Dump. Was it expanded? Is it doing methane digest 'cause I see the gas going into our air. It is in the Petaluma wetlands.
- Eat with friends more rather than cooking for just our partners or ourselves.
- Incentivize those with lawns to switch with cash/local store gift cards.
- Methane: when animal and food waste is digested to produce methane, the more valuable "product" may be the digestate: biologically stable soup of micronutrients that are known for ability to restore the tilth and drainage and health of soil (as opposed to relatively strong industrial chemicals). This is important for restoring cycled, local systems; closing many now open nutrient (keys?).
- Methane digesters for manure and financial incentives for farmers doing this.
- Install grey water systems that irrigate landscaping/local farms (water use). Install urban ag infrastructure with community gardens and urban planting in medians/other public spaces.
- Gas/methane to energy production should be done within a methane control and reduction program. Be careful to not incentivize things that could result in more methane producing activities.
- R & D for local perennial food crops in combination with animals. Silvapasture Permaculture
- Would like to see some commercial possibly urban aquaponic installations. Get Dept. of Fish and Game to approve tilapia for home aquaponic use.
- Make Sonoma County an organic county—ban pesticides/herbicides.
- Mandatory solar new construction in county (unincorporated)
- Compost: Promote/encourage/incentivize vineyards and farms to compost on-site. Increase current compost facility's daily load. Provide opportunities for carbon-offsets.
- Oh no! Food Nazis at it again—going after cow farts now? No meat, no milk for you!

- Small scale biodigesters gas to energy as part of a methane control program to reduce methane. Make sure incentives don't increase methane-producing activities.
- To go organic there needs to be financial incentives for farmers (large and small) and vintners
- Pay farmers to do measures that reduce GHG's: hedgerows, pump retrofits, water conservation, etc.
- Petrochemical agriculture on large scales is not sustainable.
- Organic milk production has been devastating for cows. The vets cannot give antibiotics for dairy cows that get mastitis, so the cows suffer immensely and many get sent to slaughter. They could have been saved if antibiotics had been used.
- Can waste from local lumber yard be used with other waste vegetation to provide material for biofuels—possibly bring that industry here to create jobs?
- Reward sustainable practices—dry farm
- Put caps on agricultural industries (i.e., wine) that consume inordinate amounts of water to realize product (?) raising of processing
- Require mulching instead of weed control. Instead of burn days at vineyards, implement program to collect and chip.

Agriculture—What are your existing barriers to reduce GHG?

- Eliminate the cattle horses (?) and a few people.
- You are basing everything on a false premise (man caused gw) and pseudo “science.”
- People composting horse and goat waste are being cited.
- Electric vehicle and re-charging stations—we had to encourage those development.
- Require smart meters on all homes for remote turn on and turned off by our carbon foot print a false science.
- Learn who they lead consultant really is ICF Jones and Stokes Intl. Consulting with IRS to improve the image.
- China, India, Russia “denialists”
- Limit use of pesticides
- Generally (?) concerned ‘solutions’ that address too small a piece to gain the big efficiencies needed to make a significant difference. Among (?) remind us that a good solution is one that solves all problems at once! Something to reach for! Need game-changing, dramatic, courageous, grounded approaches to try!
- Big ag companies shaping agriculture policy. Farmers need support and general education/ a place to share ideas. Encourage small/new farms with land grants.
- Conservation burns of Ag waste to produce Biochar see for Biochar Web Site

- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights....Not!
- Incentives to use compost instead of calcium nitrate
- Lack of regulation controlling field burns. Lack of service to vineyards to help chip and haul waste. Lack of groundwater regs.

Building Energy—What are you doing to reduce GHG?

- Title 24 already requires energy code minimum standards for major renovations.
- You are basing everything on a false premise (man caused gw) and pseudo “science.”
- Use of energy efficient bulbs, LED lights.
- Lamp use when necessary.
- We have a solar array and are adding more panels for a future electric car.
- Provide open debate for Sonoma county climate action plans before any adoption of plans. Real public meetings with all sides represented.
- Good insulation, Active building temperature management, solar dryer for washing.
- Define “major renovation”
- C.A.P. Controlling All People
- Have solar panels and love it.
- Double paned windows, insulation, sweaters.
- Drip irrigate. Photo voltaic panels. Energy audit. Replaced old windows.
- Reducing Electricity and Natural gas use
- Air drying laundry as much as possible. Compost/have chickens to feed some scraps to and provide food for us. Reduce thermostat and wear a lot of layers at home.
- Turned off pilot lights on gas stove to use a sparker (it only sparks and uses no fuel) to light the burners. (saves 50% of gas use each year)
- Remodeling old inefficient house to near passive house standards. 3.0 kw PV system. Solar water. Passive solar. Cool roof.
- We can reduce energy use by 50% to 70%. My 1950 built home has reduced energy use by 90% and meets Thousand Home Challenge. See aimgreen.com (Talk to George Beeler).
- I live in a small house. Use LEDs. Keep temperatures moderate. Use passive heat sources (windows).
- Solar water, solar electric, electric vehicle, bicycle, avoid plastics, shop for local products, etc.
- Don't buy stuff from China. Don't shop at Costco, Target, Walmart, etc. Don't buy cars with highly toxic batteries.

- We have solar hot water and solar panels for electricity. We monitor our electrical use.
- Using a clothesline. Everybody should be able to!
- Clothes line, solar powered attic fans

Building Energy—What do you suggest we do to reduce GHG?

- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive.
- Leave it up to each individual whether to install a smart meter or make any other “energy efficient” plans. It’s not your place to regulate our choices.
- Building stock inventory to determine energy use profiles by sector, building type, etc. Develop do-it-yourself weatherization educational materials. Create a financial incentives program for building owners to undertake energy efficiency measures. Incentivize specific energy efficiency measures that yield the greatest benefit by building sector and type. Create a behavior modification program to save energy. Promote passive heating and cooling techniques for both new construction and retrofit construction. Conduct a countywide microclimate assessment for prescriptive energy efficiency measures.
- Contests with reward/prize at schools for students who can document influencing their families towards new energy efficiencies.
- Provide renewable energy green job training at RP high schools. [plus 1]
- Encourage Rohnert Park to join Sonoma Clean Power. Provide incentives for RP residents to retrofit their homes.
- Encourage Rohnert Park to join Sonoma Clean Power
- Let’s have some large scale solar projects for Healdsburg. Solar is a very small part of the energy mix now. Including every flat roof in Sonoma Co (with enough sun).
- Install neighborhood solar gardens.
- Do not require the use of smart meters and force people to buy new appliances. CO2 is .04% of the total atmospheric gases and replacing appliances will have zero effective changes to this number.
- Community Solar projects
- Encourage/incentivize a reduction of bld energy use of 15% by 2016. if target is not met, new construction and major remodels to exceed Title 24 by 20% by 2020.
- Make available tools for estimating building energy usage based on different insulation scenarios.
- A mandate that all cars be 100% electric and solar powered.
- Home sales should require energy efficiency audit before occupancy.

- Sebastopol Carbon Neutral Town
- Require all buildings, dwellings, apartments be 75% solar and wind powered by 2015.
- Who is going to pay for all (of the above)? This will make new homes more expensive to buy and hurts those trying to achieve the “American Dream” of owning a new home!
- Passive solar building codes.
- Benchmark all public (city and county) buildings using Energy Star Portfolio Manager. Track energy usage, costs and GHG over time using Portfolio Manager. Encourage all commercial buildings to benchmark using Portfolio Manager.
- Feed in Tariff. Go with Sonoma Clean Power. Incentivize roof top and parking lot PV installations.
- Dark Skies Ordinance/Reduce outdoor lighting. Big side benefit for reducing light pollution (seeing the Milky Way again!).
- More publicity on win/win retrofits. Incentivize low-cost residential improvements like whole-house fans (attic), window tints, etc. to reduce need for A/C.
- Education on how energy efficiency isn’t conservation and sacrifice, it’s the triple bottom line.
- LEED is a joke. You can build a 10,000 square foot LEED certified house. i.e. build smaller houses. Put up more PV panels, and use feed in tariff to (?) given by Sonoma Clean Power. Promote energy efficiency programs to reduce use.
- Suggest that HOA, plants, (office parks), factories require energy efficient outdoor lighting.
- Have a public big splash project with a recognized building and do an energy audit, publicize it, then fix it! (awareness raising).
- 50% or more reduction in overall energy use is possible. Talk to George Beeler.
- Partnerships with local for-profit solar installation companies. Subsidize part!
- Create zoning that allows for smaller lots and smaller homes, penalties for new homes over 2500 square feet
- Provide solar in all homes and get the money from the military industrial complex.
- Tell the true story of what happens on the other end (i.e. power plant) when one turns on the light switch (i.e. when one uses power).
- Mandate solar installations on new buildings (see Sebastopol solar mandate).
- It took only 4 hours for the city to approve my solar permit—keep that up! Education campaign on passive, LED lighting.
- Show the benefit to the economy of energy-efficient building, and retrofits.
- Upgrade Petaluma street lights

- Have all rentals disclose energy use and HERS rating. Require sales of buildings to show HERS rating
- Conservation incentives, incentives for school building efficiency, mandate all govt buildings to have high energy efficiency.
- Shared and multi-use spaces. Smart energy efficient buildings and starting by planning how multiple buildings work together more efficiently—not just individual buildings.
- Mandate “Living Buildings Challenge” for new buildings
- Meet national 2030 challenge by 2020 for zero net energy buildings
- Need solar thermal hot tubs to be offered to augment or retire all the electric powered hot tubs
- Help consumers do the energy efficiency thing by educating them and providing incentives. I want to do the right things but I can’t afford it.
- Require new construction to be self-sustaining LEED certified. Incentivize alternate energy programs.
- Require energy audits for all properties when they are sold.
- Find a model house and put it on the web with icons showing all its energy saving, green tech and water saving tech. “Model Home” same with commercial.
- Incentivize insulation efficient windows, higher standards for new buildings.
- Exempt small businesses who have less than 200 on payroll
- Incentivize alternate energy in homes and schools
- Solar panels on all municipal buildings
- Expand the Sebastopol solar ordinance to be countywide (require solar on new buildings)
- Prioritize implementation of community-behavioral changes requiring little material investments (e.g., having smaller initial “steps backwards” with GHG emissions) For example: ride sharing over vehicle-replacement; bus services over building TOD; buses on existing road network over new rail systems.
- Green affordable housing development
- Create some kind of “happy competition” program where residents and businesses can compare and compete on energy use reduction.
- Green Building (Cal Green Requirements) have created an environment of building only for the wealthy. Regular people can not afford the cost of compliance.
- Requiring solar on all buildings does not make sense. Some are not oriented appropriately for solar.
- Support on bill repayment for energy efficiency and renewable power installations.

- Incentives matter for results!
- Educate that an energy tight house is a must before you install solar.
- Try to put a moratorium on fracking so it doesn't use our limited water resources downstream.
- Incentives for energy efficiency retrofits. Energy audits as step #1
- Incentivize the permitting process for residents to do it right. Get the energy testing needed.

Building Energy—What are your existing barriers to reduce GHG?

- Carbon dioxide is what we breathe out/what plants use to make oxygen. So, without it we cease to exist. How is this consistent with a harmful substance? Your proposal includes diminishing the population?
- Is this a component of Agenda 21, Plan Bay Area?
- Knowledge: People don't have enough info on incentives.
- China, India, Russia
- Put solar on every flat roof in the county—use geysers since they are here
- Provide economic incentives for green building design/retrofit & don't make them "requirements"
- China
- Permitting for solar. Financing options for solar.
- Old house is cost prohibitive to insulate walls
- Disconnect on commercial Buildings—owner vs. tenant—need to align incentives
- Get a competition going between/among the cities and county to see who can set higher goals and meet them fastest.
- Solar not practical due to trees around the house. Energy audits should be free.
- Solar System not cost effective without feed in tariff and/or electric car.
- Need: more educational incentives to upgrade major energy losses (ex. Windows). I own a small home and know the windows need to be replaced to save energy, yet I have a hard time finding any financial incentives, aids to make the big investment.
- Need: A website with city-centric information, resources, incentives.
- Mindset of entitlement to earth's resources without sharing with future generations.
- We live in a rental. We can't afford to do much more than switch to LEDs, hang clothes on line during summer to dry. Not owning the home means we can't change our home to be more energy-efficient.

- Why are we pretending our input matters here? Cal Green Standards are already law and have astronomically driven up the cost of construction.
- Real costs must be reflected in cost of construction including invisible energy use costs.
- Biggest barrier: availability of viable alternatives, bus frequency and evening services, local delivery services, groceries...
- Some of us fought really hard to get an opt out of the Smart Meters so we could have the freedom to have one or not. It was a 2-year battle. Under the Climate Action Plan, they will be mandated.
- We will also be mandated to change all of our appliances so the smart meter can speak to the RF chip in the appliances and turn it off. Is that fair? Is that freedom?
- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights...Not!
- Money for funding the projects
- Time and money to do upgrades. Fear of regulations and fees.
- Ignorance

Other Sectors (Off-road equipment, stationary sources, wastewater treatment)—What are you doing to reduce GHG?

- I have solar panels
- Waste water wetland designs: plants have been used globally to treat greywater and blackwater. Pervious surface to allow rainwater drainage and restore water levels and aquifers. Removing home lawns, reducing mower use, increasing edible and native tree planting. Retrofitting City recreational parks to receive storm water runoff.
- Educate! Join Green Groups, talk to the public, hit the street
- Drive less
- Plant fruit trees and vegetables in yard instead of grass
- I use drip system voluntarily. Do not need to be forced!
- Electric mower, chainsaw, weedeater.
- I use drip irrigation and grey water.
- Plant trees, mostly natives and shrubs. We do not grow lawns.
- Use rakes. Get rid of leaf blowers.
- No lawn. Mulch in place. Front loading washer. Low water use.
- Use electric landscaping and hand mower.
- We use an electric weed trimmer

- Implemented a 5min idling policy
- You are basing everything on a false premise (man caused gw) and pseudo “science.”
- Discuss why geoengineering is not being discussed since Harvard and Kennedy School are creating international policies for large scale manipulation of the weather.
- Solar, drive less, turn off appliances/energy using item (lights), tree planting.
- Support open space and habitat restoration

Other Sectors (Off-road equipment, stationary sources, wastewater treatment)—What do you suggest we do to reduce GHG?

- Plant a bunch of trees with waterboxes like in demo project off Overlook Trail—bond (?) the boxes to ensure a higher survival rate
- Ban two cycle leaf blowers and other two cycle engines where handwork could do the same job—two cycle engines = worst greenhouse gas emissions per use of any
- Advertise Climate Action 2020 Website on Utility Bills
- Sponsor a leaf blower exchange contract to get gasoline powered blowers off the streets and electric on for noise, dust, and pollution reduction.
- Include youth in outreach
- Require electrical outlets outside. Plant trees and include signage near trees about species and info about trees
- Idling ordinance for all cars etc. and busses
- Outlaw new turf lawn
- Education starting early (pre-K) but continuing through grade 12. Incorporate into the curriculum.
- Upcycle education. Community “Assets” that you can borrow (e.g., mower, power washer, etc.). Promote community education. Try summer films in park (e.g., Cradle to Cradle).
- Outlaw gas powered leaf blowers or limit to a few specific hours per week.
- Increase wetlands
- Gas leaf-blower bans
- Electricity is not a reduction to GHG. Solar is essential.
- Gray water
- Community gardens, more local food, new developments built around farms/gardens, promote CSAs.
- Get manufacturers of electric equipment to provide demonstrations at fairs or public events.
- Push mowers! Remove/reduce lawns (food not lawns)

- Get local climate groups to help educate about green house gas reduction and ways individuals can make a difference. Maybe this is their contact or collaboration between agency and non-profits.
- Improved urban storm water treatment plan: utilizing LID techniques home scale, incentivizing programs for “greenscaping” and other LID techniques, down spout disconnect with rain gardens, curb cuts, rainwater harvesting. Mandatory business compliance of improved techniques, greywater.
- Support local business and the development of local communities to reduce commuting, keep money in the community, enable more economic diversity and turn bedroom communities/suburbs into sustainable hubs of business, food production, cultural events, etc.
- Open space protection and enhancement. Conservation easement
- Strengthen information about how to plant native species and drought-tolerant species
- Plant more trees. Conserve, protect, and restore the trees/forests we have, as well as do free farms and urban forestry.
- Protect creeks from toxic material from drains. Restore riparian borders.
- Lawn mower/power tool exchange
- Stronger immigration policy
- Start a tree planting program in schools for children to plant a tree as part of their education/citizenship.
- Grass (?) is water consumer rather than trade lawn mowers—encourage native plantings without grass.
- graywater for residential and commercial water efficiency programs.
- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive.
- Leave it up to each individual what they will do and not do. It’s not your job to regulate my choices when it comes to a lawn mower or anything else.
- Establish a goal that Windsor becomes carbon neutral within a certain time period.
- Can lawn mowers, etc. be retrofitted to be electric so that old gas-powered ones aren’t scrapped completely when only one aspect needs to be replaced?
- Encourage water saving and practices that reduce amount of toxins that go into the water.
- Creative an incentive program to save water. Tree planting as organized by city group. Bike paths, encourage cycling.
- Diesel generator last many years, but we should require all new generators to be much cleaner. Almost all 2-stroke engines can be replaced with electric tools. Tree planting is always a good idea.

- Carbon dioxide is 0.04% of the total greenhouse gases. Therefore, this sector says the emission is 0.0016% of GHG. I would not worry about this and leave people alone.
- Distraction of economy “the means justify the end”
- Stop running our vehicles on gasoline. Switch to locally produced, ecologically sourced feedstock, appropriate scale ethanol production and use E50 and E85.
- All electricity become solar and wind generated by 2015.
- Locally owned and controlled power plants owned by the public and solar powered.
- Electric power is not “cleaner” than natural gas appliances—the majority comes from coal!

Other Sectors (Off-road equipment, stationary sources, wastewater treatment)—What are your existing barriers to reduce GHG?

- There needs to be a local (and national) discussion about growth. The talk is always about “projected growth.” How about a smaller population? How about preserving all open space as it exists now? Many aspects of the ecosystem are already maximized/at capacity. Fewer humans, not more. Focus on sustainability, not consumption and growth and GDP and more jobs, greater tax base, etc. It has a limit. Why not stop well short of the limit?
- Government involvement, laws that prohibit large scale, access to funding, building codes.
- Petaluma will be Sonoma County’s hardest hit city for sea level rise. We will lose our downtown!
- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights
- Send code energy enforcement out to all properties to fine if not CAP compliant
- Rules against gray water use.
- Actually, Laundry 2 Landscape is legal as of 2009, only need a permit for cutting into existing plumbing.
- Knowing more effective strategies
- Time and resources to install greywater system.
- Landlord requires an irrigation system in backyard. Replanting more energy efficient plants would be preferable.
- Provide open debate for Sonoma county climate action plans before any adoption of plans. Real public meetings with all sides represented.
- Global warming caused by man is the biggest snake oil hoax invented by man. Oil is abiotic, and a renewable resource, a fact established by scientific research.
- Stop addictions to fossil fuels and convert to a peace based, ecologically sustainable economy and lifestyle!

- Our addiction to fossil fuels

Solid Waste—What are you doing to reduce GHG?

- You are basing everything on a false premise (man caused gw) and pseudo “science.”
- CAP Plan = Controlling All People
- Buying bulk food, using glass container we reuse, and food not packaged in plastic. Working on zero waste.
- We do not buy much processed foods; we carry bags (cloth) for purchasing goods.
- Buy used/minimally packaged goods, compost, grow my own food (as much as possible), buy meat from butcher with minimal packaging, reuse and recycle, rechargeable batteries.
- City Composting green bin [plus 1]
- Compost
- Recycle. Compost. Reuse.
- Recycle. Consider waste in all purchases. Never use plastic bags.
- Read the Santa Rosa CAP and understand what impacts on all local business will cost owners.
- Recycle
- Composting. Reduced purchase of “stuff.” Reduced use of processed/packaged foods.
- In our family, we try to buy in bulk as much as possible, reuse plastic bags till they fall apart, reduce purchasing of high waste products, grow veggies and some fruit at home, always use reusable bags, make food as much as possible for meals on the go, use reusable containers more than most.
- I print nothing and encourage others to print less.
- Require consumers to pay packaging deposits and stores and manufacturers to take back their packaging waste. Make stores and manufacturers accountable for their waste and incentivize reductions.
- Compost, home green bins, don’t buy many clothes/reuse materials.
- I run the school compost and recycling program at Apple Blossom and Orchard View schools in Sebastopol: compost on site at school (fruits and vegetables) and yard waste bin for paper and other food products.
- Composting, thrift store shopping ABC PEF (Alphabet Thrift Store, PEF funded)
- Compost, buy little to no plastics, recycle (though I don’t believe it really is an answer), use cloth bags, cook from Whole Foods, not processed, packaged foods.

Solid Waste—What do you suggest we do to reduce GHG?

- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive.
- Increase cost to dispose of garbage. Educate that compost can go to yard waste bin. Provide recycling cans to all homes (not just those who pay for garbage). Provide compost yard waste to all homes.
- More clearly label recycling cans on plaza.
- In the City of Sonoma, the garbage company contract needs to be revised to require separation of compostable, kitchen and food waste, from commercial and (illegible writing), so that it can be handled properly. All County pick up via Ratto has that, Sonoma (city) does not. Needs to be changed.
- Can you provide materials to post over wastebaskets, etc. to show people what is recyclable and what isn't.
- Zero waste as a goal. Education needed.
- Solar generation at landfill sites. Capturing of methane.
- Ban plastic bags. Ban individual use water bottles.
- Provide composting toilet services (education, maintenance, and pickup services) to centralized hi-temperature composting facility (to reduce water use).
- Develop neighborhood-level composting to reduce “long-distance” hauling of compostables.
- Establishment of widespread plant waste to biogas conversion. (Straus dairies are a good example).
- Incentives for community/individual reduction measures for businesses. Fewer regulations on businesses to allow for ease implementation.
- Goal = nonwaste society. Repair not replace.
- Reverse cycle of less expensive to replace than repair
- Incentivize repair not replace, incentivize low maintenance, low water landscape, reduce city grass to ballfields only.
- Create a county-wide composting program.
- Educate people about how to compost in their own yards.
- Have all schools and businesses over a certain size be required to compost. Montgomery high is an example that has greatly reduced landfill waste.
- Have an education program with incentives for residents re: waste. Have students participate.

- Climate has never been static in the entire history of the globe. We have had ice ages, times when the north pole was tropical, etc. Now “we” are saying climate change must not happen. What data point for static climate are we aiming for?
- Provide open debate for Sonoma County Climate Action Plans before any adoption of plans. Real public debate meetings with all sides represented.
- Recycling is good but don’t make the kids sort through garbage at school. My kids have been regularly sorting through garbage at school to pick out the recyclables. They should be learning math instead.
- Reduce garbage bin sizes so more people will need to recycle since the garbage cans will fill faster.
- More incentives/education to compost
- Pay people for other recyclable materials like what we do with glass.
- Encourage/incentivize methane capture, and clean burning for electrical generation.
- Recycle waste for Ag use
- Zero waste philosophy. Upstream redesign.
- Waste reduction—eliminate an ever expanding Federal government: FCC, FDA, EPA, etc.
- No wineries. Composting toilets.
- Yes composting toilets everywhere. But that’s a water/energy saving measure, not solid waste.
- Food waste reduction before it goes to compost or anything else. At farms, at processing plants, at restaurants and grocery stores, etc. Make it so the food can be eaten, not composted.
- Make it more difficult to sell products in packaging that is not recyclable...like illegal.
- large-scale vermicomposting (worms)
- Municipal composting for meat and grease waste
- Methane production from food waste at municipal level
- School system to be a big source of single use plastic trash. This requires parent education. Focus on schools to reduce their waste. Grant programs or support for schools to transition away from single use plastics.
- Require businesses to recycle. Set up mandatory food waste recycling citywide. Penalize households for not sorting.
- Outlaw plastic bags and carry out and one-use plastic water bottles.
- Free compost pick up days for county residents (look at Berkeley for a model). Require food businesses to compost.

- Establish a program that reduces waste of edible food by making it available to people who want it, not composting it. Eating it! Especially at restaurants and grocery stores.
- Financial incentives for business, schools, residences to compost food and yard waste.

Solid Waste—What are your existing barriers to reduce GHG?

- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights...Not!
- The rules about Blue Can eligible items are too hard to understand.
- Political will to ban single use plastic bags/bottles
- More items need to be efficiently recycled. Ban plastic bags!
- It would be helpful to have composting at work.
- Solar is not reliable and must not be required. People need to know with the large scale weather manipulation program—climate is solved. www.toxicity.org
- Ignorance. Lack of interest.
- Dealing with people in denial
- I question its relationship, if any, to climate change.
- In schools, over-worked teachers, political barriers (it's too much we can't change HS students). Funding to implement waste reduction programs
- Schools need paid positions for running compost and recycling programs and education (b/c no funds available currently)

Transportation—What are you doing to reduce GHG?

- Carpool to work
- Bike to work
- You are basing everything on a false premise (man caused gw) and pseudo “science.”
- Driving a Hybrid Car [plus 1]
- I biked to work this summer.
- Require RFID chips on all children for NSA Tracking—that will work along with the RFID chipped smart meter appliances.
- Provide open debate for Sonoma county climate action plans before any adoption of plans. Real public meetings with all sides represented.
- Drive a Prius
- Electric/Hybrid vehicles, walk when in town.

- Create a program to incentivize making and keeping commitment to becoming 3% more sustainable with an emphasis on VMT.
- I live near my grocery store/walk and ride to the bars in Sebastopol.
- walk places
- Now bicycle about 80% of my local trips (work, shop, etc.) since 2009
- Use webinars for about 70% of my business meetings.
- Considering using Carma for remaining share of business trips to S.F.
- I recently experienced a 2 1/2-hour trip to downtown SF during morning rush hour. There needs to be a recognition that current business practice is unsustainable, including the tourist economy. The Smart Train will help, but we need more local sharing businesses, IT commenting (?)/ Transit oriented development.
- Walking and Cycling for errands in town [plus 1]
- Have office 4 blocks from home. Recreation 1/2 block from home, café 1/2 block from home by Design! Get to walk everywhere (or bike), get to know my neighbors. It's great!
- Have an EV charger with roof solar, and installed heat pump water heater, and use an "instant pot" to cook, and installed mini split heat pump-zone heating and cooling.
- Car sharing, walking, biking, working from home.
- Ride Sharing, driving electric vehicles (we have solar panels), trying to use less trips to town so that less miles are travelled.
- Riding a bike to work (in town). Walking.
- Living where it is easy to walk or bike.
- Tax heavily SUVs and other gas-guzzling vehicles. If people want to drive them make them assume the associated costs to the environment.
- Hybrid car. Minimizing driving.
- Driving electric vehicles—I don't own a gas vehicle.
- I drive a Prius—walk as frequently as possible.
- I compost but it creates greenhouse gas.
- Ride and bus and walk
- Leasing a Nissan Leaf
- I have purchased a Volt and much of my driving in the county is zero emission. I charge my car with PV solar panels.
- Vehicle tuned and tires inflated. Reduce meat intake.

- Home-based business. One car. Garden. Trip linking. Carpool when possible. Occasionally take bus. Only heat rooms we're using. Walk.
- Riding a bike
- Trying harder to commute with people

Transportation—What do you suggest we do to reduce GHG?

- Enhance transit. Better public transit.
- EV for transit.
- Create a program to increase the production of local food thereby offsetting transport and distribution related pollution.
- Make city and county more horse friendly.
- Require employers to hire locally.
- Provide lanes of travel for horses that cars and bikes can't go in.
- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive.
- More bike lanes.
- Provide more bus routes, and live bus times, aka real time. More incentives for carpooling. More bike lanes in RP.
- Public transportation—more routes.
- Doesn't electric power cause gas emissions?
- Remove the carpool lanes. I work part time and can't carpool, and I have to sit in traffic which causes gas emissions.
- Roundabouts at intersections like Snyder and RPX, Snyder and Southwest
- Use smaller buses when passenger loads are low.
- Hybrid car, electric motorcycle, more charging stations, free parking for electric vehicles, install real time intelligent grid.
- Increase safety in neighborhoods around schools so parents don't worry about letting children walk or bike to school.
- how does mixed use construction reduce greenhouse gases? The upstairs apartments require constant conditioned air, elevators, energy required to bring water in and waste out. And no one ever works in the downstairs units and still drive to work in other locations.
- Safe bike paths all the way from the north to south end of town.
- Look at the data for EV and hybrids per 1,000 of population in Sonoma County and compare to rest of state for GHG credit under AB32.

- Connect the GHG reduction incentives and penalties through SCTA to EV being charged by SCP local clean power assets.
- Electric vehicles need to be more affordable before they can make an impact
- A public transportation system of buses and rails that are solar powered and controlled by the citizens and voters.
- 55 mph limit require cars dealers display most efficient speed
- Reconsider mass transit! Making an electric/biofuel affordable and frequent bus/train system. Increase safe bike trails
- Open all lanes to traffic instead of making people idle in two lanes. We all paid for the roads.
- Figure a way to alert motorists to turn off ignition during long periods of stopped traffic.
- “C-Control, A-All, P-People”
- Integration of Sonoma Clean Power with the electrification of transportation
- Need bike able routes: Cotati-Sebastopol. Sebastopol-coast.
- Subsidize/incentivize a local trolley running along HWY 12
- Incentivize more EV charging stations (shopping center lots, hotels)
- Could a nice community pool reduce the number of private (residential) pools? Encourage higher density, more walkable, infill development—with shared/common open spaces.
- Create attractive, one story, low-income housing.
- Traffic control—traffic on Napa Street is solid, even in the middle of the day—are some abatement plans in the works?
- Give stipend on incentive for people to build bamboo bicycle carts—> go shopping with a bike cart and not drive.
- Emphasize and expand bike lanes and bike infrastructure — plans to park bikes, incentivize bamboo carts so people shop with bikes vs carts.
- County buses should be diesel hybrids. More electric car charging stations.
- Smaller shuttle buses to meet transportation needs for shopping—try to use some mass transit principles to get individual driver’s trips down.
- Institute a carbon tax. Carbon trading will become another Wall Street scam.
- County of Sonoma needs to address infrastructure. Areas off highway 101 have poor public transportation and poor road quality. Best intentions can’t be implemented. Poor biking conditions, poor walking conditions. Useless bus schedules.
- Require Bicycle lights @ night. Require helmets. More people will ride bikes if it is safer.

- Bikeway planning needed that goes beyond recreation biking. If bicycle paths related more to (?) places or residence to employment destinations (and schools) more people would use them instead of vehicles.
- Close the plaza to autos one Sunday a month. Let folks see how wonderful it could be!
- Electric Smart Train locomotive or at least biogas fueled fuel cell hybrid engine for heaven's sake! To demonstrate our intention.
- City Bike Share. Connect east side and west side! Bike path updates! Connecting east and west under 101!
- Convenient energy efficient transit!
- Get solar cars, as electric cars use the same carbon footprints
- Web and cell phone based carpooling/sharing.
- Let's start a once a month bike ride, with kids on bikes, during daylight hours, to raise awareness of bike options in Petaluma.
- Pass a No Idling law like they have in Vermont. Outside St. Vincent's elementary school every day parents run their SUVs (AC, heat, etc.) for up to 20 minutes waiting for their kids!
- Get local non-profits to educate general public in "how, what, where, when" we can lower our personal GHG use.
- Drastically increase EV chargers at all county institution parking lots and offer reduced charging rates.
- Complete streets to accommodate all forms of active transportation starting in City coves (?)
- Get public schools to offer better transportation for students so that there is less Am/PM traffic to and from schools
- Education about electric bikes. Increase parking fees to discourage car driving and use money to build bike paths.
- Develop story-based, consciousness-raising positive images of successful alternative modes of transportation.
- Business provide more work from home opportunities
- Is it possible to bypass the diesel parked Smart Train and go for lower emission...hydrogen fuel cell? At least diesel fuel cell, electric motor. Something to make a statement that we're serious about this!
- Support progressive technology in Sonoma County with business incentives for small businesses that create say fuel cells or green water systems.
- Walkable, attractive, vibrant neighborhoods with services seems like the key over the long haul!
- Safe bike ways throughout town. Children should be safe to bike to school!

- Bike path infrastructure linking cities along 101, i.e., Petaluma to San Rafael.
- Integrate E.V. infrastructure development and E.V. promotion with Sonoma Clean Power. SCP incentivizes E.V.s with special rate. RCPA coordinate charging station department with Solar PV, in coordination with SCP.
- Require new land-uses to be sustainable, walkable, not vehicle dependent. Improve public transit infrastructure.
- Pay for street parking to pay for GHG programs.
- Green streets narrow with green curb strips slow, spread, sink water, plant trees!
- Walkable development, upgrade bike infrastructure especially east of the river, encourage/incentivize driverless cars
- Safer bike paths throughout Petaluma, more secure places to lock up a bike, more enforcement of zero tolerance for cell phone use while driving.
- Increase public transit hours into the evenings.
- Consider compatibility with autonomous vehicles. How will they affect parking needs, commuting patterns, etc.?
- More commute options to rural county/cross county. Ex. Petaluma to Point Reyes. Mass transit/commuter bus for these lesser used routes with a few options (times). This is my #1 carbon emission: going to work.
- More east-west Public Transportation in Sonoma County.
- More streets with permeable paving.
- Prefer “GHG-based” taxes (such as existing gas taxes) over “VMT-based” new revenue-raising schemes (which would be more difficult to administer and risk “gaming” abuse).
- Incentivize ownership of clean energy vehicles
- Bike lanes need to be coordinated throughout the county.
- More frequent bus service and more room for bikes on buses
- Require larger set back from rural roads so there is room to safely walk alongside the roads and to later have sidewalks. Livable communities.
- Adopt legislative and financial incentives to encourage using EVs. GHGs could be reduced by 20% if 50% of the miles driven in Sonoma County were in an EV.
- Transportation options: bike sharing, streetscape plans that help encourage walking.
- Oil and gas are abiotic, therefore are already a renewable resource!
- Shuttle service from SMART stations to employment/shopping centers and other destinations
- True transit-oriented developments of housing and mixed use near rail stops.
- Just like Agenda 21

- Consider eliminating parallel parking on certain thoroughfares to make room for safe bicycling. Clearly paint bike lanes and “left turn” lane positions for bicyclists on multi-lane streets. Good example exists on Rohnert Park Expressway/101 off-ramp.
- Some of these stickers seem to be “pranks” posted by the “tea-party” visitors.
- “Generalize” dial-a-ride services for use by “everyone” in each neighborhood for use as “feeders” to larger bus system. (To allow people to leave cars at home—avoid short car trips to “local” bus terminal or Park & rides). These services could be “Neighborhood-managed.”
- Dynamic rideshare program could encourage installation of bike racks on private vehicles participating in ride share system to allow bicyclists to utilize R.S. system. Secure bike parking at major neighborhood bus stops plus bike share/rental/repair services at “downtown”
- “Community built” bus shelters: each shelter displaying unique character. Creative re-use of materials. “Adopt-A-Bus Stop.” Added value via “welcoming” neighborhood; added feeling of “safety.” Neighborhood might provide lounge-chairs, Wi-Fi, use of bathroom....
- Extend Bus route hours to 10/11pm (most now end around 7pm). This would allow people to use public transit to evening events such as JC classes, musical performances, etc. Good for local economy.
- EV charging stations opportunities for hybrids. Alternate mode incentives, including money. Eliminate drive-thrus.
- More tax incentives for ownership of electric and fuel economy vehicles.
- Nuance public transportation
- There is a new app for car sharing gaining numbers.
- Do not allow city employees to keep vehicles idling while stationary, including police.
- Interconnected public transportation bus/train/zip car connectivity.
- Get the Smart Train to Cloverdale ASAP
- People who believe in one-world government conspiracy and talk your head off about chem trails
- Promote cleaner transportation
- Incentivize/encourage EV charging in all new residential construction. Require conduct for future installation. For all new D.U.S. Require new multifamily and commercial to install EV charging stations and link to renewable power.
- More sidewalks, bike lanes, more bike parking/racks in town.
- Development of transit for commuters (e.g. Smart Train) should reduce emissions for Sonoma/Marin.
- More “cold in place” asphalt recycling—Major GHG reduction in road maintenance.
- Get better bike lanes!

Transportation—What are your existing barriers to reduce GHG?

- People with their own agendas that will never believe people can harm our earth.
- Why is there no talk about the international global policies for the large scale weather program now affecting our climate change?
- Mexico, Africa, South America.
- Electric cars are a scam—they plug into “dirty” power (coal). Batteries are more of a carbon footprint than reg batteries and more toxic (nickel).
- Lack of robust transit system frequency. Range anxiety for alternative cars.
- The anti-Agenda 21 people/tea party.
- Get SSU and the Casino on board as new “cities” since their jurisdictions are outside traditional political structures.
- China, India, Russia
- Car-sharing. Better/more bicycle routes.
- Narrow bridge makes walking from Springs dangerous
- Parents fear kids’ safety if bike to school—also heavy backpacks etc.
- My shop is 7 1/2 miles via hwy. I need my truck for work.
- Exorbitant taxes
- Distances in county—requires more charging stations.
- Increase local economy; co-working/mixed-use/community office space.
- Batteries are arguably worse than a car that uses gasoline. Do we really want everyone in an electric car? What are we going to do with all the wasted batteries? Our infrastructure is already built—
- More fast changers needed
- Money—I can’t afford an electric car. Lack of municipal infrastructure. No bike paths.
- Bike safety issues. Lack of bike infrastructure.
- I would love to purchase a hybrid or electric car. After barely recovering from the 2008 recession, we can’t afford to buy a more energy-efficient car. These are our biggest energy guzzlers: home and car. Husband commutes to SF. Would love to make commute use less gas.
- Open up all the lanes for traffic, then you won’t have two lanes of idling cars with a completely empty commute lane.
- Underfunded Bus Service. Redesign and improve the service
- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights....Not!

- My limited ability and capacity to affect energy policy.
- Lack of safe bike lanes and sidewalks.
- “Free” parking
- I am discouraged from using bicycling due to parallel parking door hazard and lack of secure bike parking and uncertainty of having available bus-bike rack space.
- Incentivize businesses to put electric chargers into business parking lots and to install more solar for electricity and hot water.
- There are not enough jobs in Cloverdale and those of us who still work must travel by car to larger cities to work
- There should be a variety of stores to provide everyday needs so we don’t have to travel to cities where lower prices are available.
- Jobs and high speed internet infrastructure will reduce daily car trips to jobs outside of Cloverdale.
- Ban drive thru businesses where cars can sit and idle while waiting.

Water Use—What are you doing to reduce GHG?

- Low-Flow Fixtures-Shower in a pan and reuse the greywater. Use washing machine water as greywater. Grow a garden instead of grass and use greywater more than not. Did not replace 3rd vehicle, use Sonoma County Transit one time per week on average. Attempt to drive between 55 & 60 mph rather than 65 to 70. Turn off ignition when waiting for long red lights. Use cold water for dishes and no dishwasher. Carpool with wife as much as possible. Reuse building materials and buy used/previously owned things.
- Our entire county should be better informed on all this so we can decide if we want it.
- I bike to work. I’m in the process of removing my front lawn to get a waterwise landscape.
- Developing a lawn removal plan.
- Why is there no talk about the international global policies for the large scale weather program now affecting our climate change?
- Taking shorter showers
- Low flow fixtures. Drip irrigation. Grey water.
- I do not want a smart meter on my water or power!
- The smarter the better.
- Shower less often.
- Drip irrigation

- Improve/change water system to be more efficient; and return used water sooner in natural environment. Educate people about better water-use (less shower/bath=healthier). Use more efficient equipment (laundry machine).
- Founding Member Slow Money. Activism., Climate issues inventory in global Fortune 100 Company. Incubating/Mentoring small green biz.
- Installing grey water to landscape system. Installing 2000 gallon rainwater catch. Installing perennial landscape. Low flow, low flush etc.
- Own hybrid vehicle. Limit heating in home. Sign petitions. Member many climate groups.
- Building own farm. Eating/sharing what we grow. Drip irrigation. Building our resilient grange.
- Drip irrigation, drought planting
- Replacing appliances and heater, water heater energy Star
- Conserving water, grey water system
- Water efficient washing machine, dishwasher, toilets, showers. Drip irrigation, low water landscape.

Water Use—What do you suggest we do to reduce GHG?

- Divest city and county portfolios from fossil fuel companies. Trying to reduce GHGs while supporting the biggest CO2 polluters is counter-productive. We need to stigmatize the FF industries.
- Keep GHG emissions reduction always on one’s mind. Think before acting.
- Incentivize building soil organic matter content to reduce water use and incentivize vegetable gardens, permaculture crops.
- You are basing everything on a false premise (man caused gw) and pseudo “science.”
- Cut unnecessary lawns in Rohnert Park and support permaculture and more native plants.
- These measures won’t fix the problem. You can’t regulate behavior.
- Mandate no lawn landscaping on all new house construction.
- Educational events on catching rainwater and graywater.
- Healdsburg should have a water conservation public program with incentives for low-flow toilets, front load washers and the materials for folks to check the flow.
- Require all schools and large businesses to install rainwater harvesting and greywater systems.
- Better, harsher penalties for wasting water
- Evaluate and incentivize ‘net zero increase’ in water use for large projects.

- Convert 10% of all Sonoma County land and agriculture to Wildlife Sanctuaries and native plant preserves.
- Re-use waste-water for Ag and human consumption
- If it's yellow let it mellow, if it's brown flush it down.
- Agriculture crops that are perennial, native to the area and drought tolerant.
- Curb illegal immigration! Just teach immigrants about birth control.
- Need compostable toilet.
- Drip & grey water systems. Conscious water use maybe contract Daily Acts or Permaculture Centers to teach how to capture water, do greywater systems, plant water efficient plants.
- Rebates for toilets and washing machines
- Provide rebates on high efficiency toilets, landscaping that saves water and commercial food service equipment
- Outlaw new turf lawns. Market faucet governors that shut off after ten seconds.
- Not all water comes from a centralized system. Wells and new well developments need to be better planned and regulated. Preventative action is too timid in this rapid acceleration
- Have Sonoma annex all of the valley from Boyes Hot Springs south to the Bay—gain efficiencies plus have better representation for 1000s of voters and citizens.
- Have a water bottle refilling station on the plaza (for public education to our visitors)
- Make the water bill easier to understand and have a year by year-month by month comparison.
- Give away/rebate water wise faucets. Install smart meters. Rebate drip irrigation.
- Transform lawns with sheet mulching! Provide more incentive programs to support landowners in converting to more waterwise landscapes.
- GHG is not the only consideration! “Water, water everywhere, but not a drop to drink.” Energy is stored as pumped water. Water treatment is energy intensive, water is next to air as a necessity!
- Encourage drought tolerant landscaping and native plants. Discourage lawns.
- Incentivize graywater/rainwater reuse. Incentivize perennial landscape. Education campaign on both of the above.
- Water rationing now!
- Playgrounds and public parks w/ native plant/drought resistant landscaping. Rework water rates (residential and commercial) to encourage conservation.
- New Development require greywater systems. Fee to have “non drought tolerant” landscape/yards. Clean up the Petaluma River.

- Provide county-wide incentive programs for greywater reuse (provide homeowners with free parts for systems)
- Promote on-bill repayment for financing improvements
- Penalize those who use excess in comparison to the average
- Realistically determine to fund marginal cost of water/ wastewater/energy; consider investing instead when less expensive in converting turf to biologically helpful native landscapes as a way to grow reliable water capacity.
- Incentivize rainwater collection systems for public schools and buildings as well as homes.
- Efficient waste water treatment and usage for agriculture in particular
- Create workshops on graywater systems—installation, health, maintenance
- Low impact development i.e. bio sources, rain gardens, cisterns, etc.
- Yes require large new developments to perform a water demand analysis before getting permit approvals—and deny permits for developments with unacceptable impacts
- Conservation and education about water issues. Groundwater, stormwater retention basins and measures.
- The grape business is water intensive. Reeducating the vintners to go to dry farming is crucial.
- Focus on pump testing and retrofits. Addresses water and energy.
- Allow/Encourage/Educate use of composting toilets including developing of maintenance service and hi-temp composting facilities to safely recycle.
- More water storage!
- Tax rain like they do in MD (Not!)
- Stop selling water to Marin County!
- Shut down all government and municipal buildings during water shortages
- Incentives for solar hot water on demand
- Provide educational means to raise consciousness of public of water usage.
- Incentivize in-line hot water, greywater installation
- Tertiary use of water on ag lands. Campaign to educate applicability of tertiary water.
- Give help and incentives to get rid of lawns and plant native.
- Provide water audits for residents to find the leaks throughout their water lines (home, irrigation).
- Educate to let people know the energy/water nexus.
- Have more greywater workshops and provide CAKE! Everyone loves cake. Food brings people together, as well as music.

Water Use—What are your barriers to reduce GHG?

- Knowing where I (we) stand relative to other people.
- People with their own agendas violating people's ability to work.
- Mother Nature always corrects itself. GHG is a man-made expression.
- Provide open debate for Sonoma county climate action plans before any adoption of plans. Real public meetings with all sides represented.
- There is still an image of plenty thru spraying reclaimed water (?)
- Adaptation issue: Sebastopol needs to care for recharge areas in the west.
- Cost—are rebates available for star washing machines
- The cost of a new washing machine
- Mentality that yards without lawns are unattractive
- Ignorance, denial, true education needed.
- Industry/contractor expertise and familiarity with graywater/rainwater permaculture.
- Institutional challenge in understanding/comparing the cost and risk of traditional sources of water vs reducing demand.
- Smart meters are a threat to our liberties. The last thing the government needs to be tracking is my water usage. Requiring all new buildings to have water smart meters will create more electromagnetic radiation, further killing off the bee population.
- The city continues to water a patch of grass on Callfield between McDowell and Ely. This patch has been there for over 40 years. Let's turn this patch into an educational corner, sheet mulch the grass, landscape with drought-tolerant plants, and educate homeowners in this area about moving away from hydrangeas and juniper. Buy a rainwater tank to catch (currently non-existent rain) and put some raised garden beds there, and put Petaluma Bounty in charge of the beds. This could raise awareness about 1) water conservation, 2) locally-grown food, 3) the awesomeness that is Sonoma Compost, 4) the power of education! Go City of Petaluma!
- Biggest barrier to reducing GHG? Constitution, Bill of Rights, Freedom & Liberty, Private Property Rights...Not!
- Cost
- Deciding most efficient use of water in garden.
- Regulate water consumption of industries of high water usage: wine, breweries, use lots of water to produce product.

Climate Action 2020 Stakeholder Advisory Group Meeting— January 22, 2014

The Stakeholder Advisory Group (SAG) is a group of volunteer community members selected by the RCPA board based on their understanding of, interest in, and commitment to community leadership and the goals and objectives of RCPA in developing CA2020.

The first group meeting was held at the City of Santa Rosa Utilities Department, 35 Stony Point Road, Santa Rosa, CA 95401, on January 22, 2014 from 4 p.m.–7 p.m. The purpose of the first meeting was to introduce the project and present an overview and expectations of the plan and of the SAG, to hold a session for questions and answers, and to discuss potential GHG reduction strategies in smaller break-out groups.

The group was divided into four groups of 9–10 and each group rotated talking about the different sectors related to agriculture, water and waste, building energy, and transportation. Staff prompted and recorded comments on each sector following four discussion points:

- Are there any measures not on the list that you think we should consider? [NEW IDEAS]
- What information about these measures is more important for you to know? [INFORMATION]
- Do you have any concerns about these measures? [CONCERNS]
- What measures do you think are most important/least important to consider? [PRIORITIES]

Below is a list of all the comments received from SAG members.

(* = more than one group said this)

BUILDING ENERGY–Ideas

- Energy Efficiency upgrades required for residential at Point of sale-**
- Using online energy usage behavioral tracking programs to tell me how much energy I am using compared to neighbors (e.g. OPOWER)
- Use of real time energy monitors with specific recommendations on how to reduce energy consumption
- Smart appliances
- Rebate programs or financing for Energy Efficiency
- Require tree/landscaping of new development as an energy strategy*
- Cool paving/roof
- Financing –fixes to PACE issue, lower rates: creative solutions
- Use Sonoma Clean Power as a vehicle for variety of programs: energy efficiency, distributed energy, microgrid, feed-in tariff, small investor program **
- Incentives to build smaller homes on smaller lots
- Ease down a path towards tighter requirements for residential energy efficiency by: 1. Disclosure/labeling for Energy Efficiency of home at time of sale 2. More detailed disclosure (i.e. component efficiency ratings) 3. Voluntary retrofits towards a certain goal with incentives and funding 4. Mandatory retrofit towards a certain goal
- Passive solar, passive design*
- Expanding benchmarking/disclosure (AS1103) to res.
- “MPG” of a house—HERS, Green Point Rated
- Solar thermal
- Incentives
- Focus in more on HVAC strategies
- Strategies for new development should also look at existing strategies
- Explore combined heat and power using fuel cells
- Encourage Net Zero Energy: i.e. fuel switching
- Propane incentives
- Revisit sidewalk replacement policy (tree protection)

BUILDING ENERGY–Information Needed

- Cost/benefit overall if tightening standards
- Relative benefits of LCE (levelized cost of energy)
- Selection methodology
- Co-benefits and impact scores
- Total long term GHG
- Opportunities within SCP (RESCO)
- Cal Green standards and existing buildings
- Look at MLS data on high home value for rated
- Previous examples: success or failures
- Costs, CBA
- Different businesses models
- Any current regulatory barriers
- Solar panels—what happens at end of life?
- Existing barriers
- Better clarity around SCP decisions
- How to prioritize?
- What is causing growth in GHG?

BUILDING ENERGY–Concerns

- Code is getting too restrictive so people are not getting permitted, pushing impacts elsewhere
- Messaging around energy efficiency is banal, hard to be a signal that stands out given how much information people have to consume
- Existing buildings are a big source of GHG
- Many measures (voluntary measures) lack teeth*
- Perfect is the enemy of the good
- Ability to include consumption based measures
- Spanish language outreach
- Not penalizing early actors
- Need to avoid unintended consequences, e.g. requiring solar even on shaded sites
- Follow through on tree programs, i.e. Keep them alive
- Not enough incentives
- Leakage of impacts—if it's too difficult to build here, owners and developers will go elsewhere
- True impact of county energy ordinance
- Tension between landscape conversion and shade trees. Misinformation.
- How to prioritize?
- Regional consistency is essential

BUILDING ENERGY–Priorities

- Public health
- GHG, cost savings, energy savings
- Air quality
- Adaptation benefits
- Marketing/info
- Performance based programs
- Incentivizing GHG reduction*
- Carrot and stick approaches
- All cities and departments get on board with tree program

TRANSPORTATION–Ideas

- Localizing low-income housing/all ages in downtowns/work places
- Require new development to put in EV chargers
- Provide EV charging at work places and multifamily units
- EV Carshare-EV car trading between EV owner and regular car owner for long distances
- Public-private partnerships
- Marketing including Social marketing*
- Zoning codes—no drive thru*
- Government lead by example
- Housing located near transit
- Maintain Urban Growth Boundaries
- Incentivizing measures
- SMART connectivity (last mile especially), bring SMART all the way to Cloverdale*
- Lowering parking requirements (incentivize) for flexibility
- Subsidies for adult bus passes
- Road pricing
- Roundabouts
- Stop light sensors – change light—less idling
- Incentivize Ridesharing—locations, Casual Commute/Carpool **
- Telecommute*
- Transit Integration/coordination with bus*
- Bus Rapid Transit—run buses like trains
- There needs to be better (more frequent) connections between the rural areas of the county and the cities (transit).
- Increase service—local buses, Golden Gate Transit, evening service, increase service along major arteries, i.e. BART line*
- Should have a countywide goal for EV (# of people who own EV) – this comment also could have been related to EV charging stations (or both).
- Work with Sonoma Clean Power to secure a lower electricity rate for charging an EV.
- Provide countywide incentives to residents who want to buy an EV.
- Transfer development rights—create density where you want it
- Bike Sharing
- Bike/ped safety on city roads*
- School district involvement—School @ home day *
- Tax incentives for businesses who use EVs in fleet
- Make EV infrastructure a Condition of approval, similar to the ADA requirements
- Showers/lockers for bikers
- Parking: Pricing, centralized parking, walk paths into the center of eateries
- Free bus passes from employer
- Allow all EVs/Hybrids access to carpool lanes

TRANSPORTATION–Information Needed

- Impact per measure
- More specificity in measures
- Polling/crowd sourcing = getting info from people
- Current system/gaps

TRANSPORTATION–Concerns

- We tend to think of new measures arbitrarily rather than in terms of one’s daily life
- This is the largest sector, yet measures not strong/aggressive enough

TRANSPORTATION–Priorities

- EV (keeping funding here) get more charge stations**
- More requirements, less “encourage”
- Telecommuting
- Carrots and sticks = finding the right balance (connect to land use)
- Car-share

- Funding drives our decisions
- Cross-check CPC’s plan for inclusion in this plan
- More info on bike/ped measures

- Make sure to cross-inform to measures in related areas
- Proper accounting
- Carpool timing

- Short-term vs. long-term
- Schools—districts
- Parking—pricing
- Marketing: Press Democrat
- SMART bike path

WATER–Ideas

- Work with Water Control Board to allow storage for greywater
- Integration of waste water use plan
- Require Smart irrigation on new development
- Incentives for Turf conversion-”Cash to grass”*
- Outlaw turf on new development
- Rainwater harvesting-incentives/demonstration projects
- Water audits for residential/commercials
- Have Board of Supervisors implement NSCIRWP EIR. Hindering county from getting funding.
- Expand PAYS program in Windsor to other communities throughout Sonoma County
- Encourage “chilipepper” type device to bring hotwater to the faucet
- Smart technology for water tracking at time of use
- Education—more education on water conservation: water, lawns, educate on greywater, it doesn’t have to be complicated
- Greywater—Simple/same policy across entire county**
- Greywater—Incentives for installing greywater systems: discount on water bill?
- Greywater—Shower to toilet opportunities

WATER–Concerns

- Regulatory barriers for greywater
- Water conservation programs—penalties for early adopters
- Greywater-permitting hindering adoption
- Well water—uniform standards
- Water conservation—no slack in system. Low hanging fruit has been done.
- Greywater—Regulations for greywater force permit avoidance, Hard to do the right thing. *
- Storage issues with water
- Water billing by 1,000 gal increments. Need to allow for conservation to be seen, so should move to 1gallon increments

WATER–Priorities

- On bill financing for turf conversion
- Turf conversion
- Policies/incentives for water conservation incentives and measures for existing buildings
- Greywater incentives = permitting, streamlining incentives make it easier to permit.
- Education on greywater

WASTE–Ideas

- Stop burning waste
- Biochar
- Decentralized MURFs (multi-reuse facilities)
- Waste to energy with MURFs and methane capture**
- Educate people that food waste can go into green bin
- Require Compost at multi-family properties
- Worm composting on large scale
- Explore the Marin carbon project, and its accessibility to Sonoma County
- Polystyrene ban*
- Mandates for recycling/composting
- Composting toilets: permits, barriers?
- Ability to have greywater: simple and recycled water
- Greywater: Rate payer wins! Municipality wins!
- Consider adaptation as much as mitigation
- Break down the barriers
- Talk about co-benefits, not just GHG reduction
- Restaurant composting options—how can we use worms?
*
- Ban plastic bags
- Construction waste, recycling, Tier 2—increase regulations
- Zero waste
- Choice of smaller recycling bin, would people purchase less products? Incentives for not picking up?
- Behavior change for waste
- Targeted marketing to specific groups—more meaningful marketing, even though it is to a smaller number of people. Could create Champions – awards, show, appreciate those that reduce waste have green bins?

WASTE–Concerns

- Single-stream recycle = increased waste
- More composting could increase GHG emissions

WASTE–Priorities

- Green bins for composting for commercial
- Incentivize restaurants to compost
- Find other uses for organic waste—don't burn
- Behavior change = rebate programs? Incentives?
- Waste to energy exploration

WATER & WASTE–Information Needed

- Provide Policy Gap spreadsheet to SAG
- Emissions data broken out by sector

AGRICULTURE–Ideas

- Incentives – equipment BAAQMD/USDA*
- Community gardens—AB551 (2014) chickens and bees
- Improving Ag processes not eliminating
- Cost opportunity for Logen (?)
- Improve the Soil, Look at as a system (not “reducing fertility” but fossil fuel, nitrogen)**
- “Credit” for organic dairies.
- Feed option (dairy poultry)

- Zero waste is costly

- Compost: make it easy. Permits to take care of it locally.
- Additional education for waste. Support SC Waste Authority.
- Educate—targeted information maybe to fewer people

- What happens to compost in green bin? Does it stay in or go out of county?
- Many waste measures already happening

- Biochar*
- Integration between forest, fire and ag
- Incentives for alternative fuel (Red Dye Diesel)
- Sustainable farming/viticulture
- Alternatives to burning mulch, compost, etc.
- Composting (efficient)

AGRICULTURE–Information Needed

- Forecast dairies accurately
- Feedback structure (less than 5 years)
- What is meaningful?
- Listen to people in the industry
- Uncertainty on sequestration
- Cross-feed cattle and GHG (pumice) (reuse)
- Land value—concerns about conversion
- Make measures ready for sectors
- Good waste
- Alternative fertilizer (use compost/ food waste)

AGRICULTURE–Concerns

- Permanence of sequestration (Ag soil, biochar)
- Cost of digesters for small dairies
- Small margins/Small dairies*
- Challenges to quantify sequestration
- Be cautious of a fixed goal
- SCACF x goal (methane)
- Lack of incentives for no till/ etc.
- Water availability—increase? Feed?

AGRICULTURE–Priorities

- Comparison of scale
- Breakdown inventory
- Methane capture—mixed ideas
- Alternatives to fertilizer
- Sequestration opportunities
- Adaptation as much as mitigation

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