MEMO

To: Bill King

           CITY OF MERCED

From: Jennifer Venema

Cc: Tammy Seale, Eli Krispi, and Chris Read; PMC

Date: September 3, 2014

Re: Preliminary Content for Technical Memorandum 3

We are pleased to submit the initial draft of Technical Memorandum 3 (TM-3) per Task 3A of PMC's scope of work for the Climate Action Plan implementation program. This memo discusses the initial estimated greenhouse gas reductions from the draft reduction measure, methods used to determine these reductions, and potential evaluation and prioritization criteria for the measures. The purpose of this preliminary version of the memo is to present initial quantification results for discussion. Following feedback from the Focus Group and City staff, we will then proceed with the quantification of costs, benefits, and measure feasibility. Our intent is to analyze cost-benefit criteria using a method that best reflects Merced's community values and meets the objectives of decision-makers. Input from staff and the Focus Group helps us use the most appropriate indicators in our analysis. We will update and finalize this memo with the cost-benefit analysis following the September 10 Focus Group meeting.

We are working toward the following schedule of tasks:

- Friday, August 29: PMC provides draft Focus Group meeting agenda

- By Tuesday, September 2: City staff provides feedback on draft agenda

- Wednesday, September 3: PMC provides draft Focus Group PowerPoint and meeting handout

- Wednesday, September 10: Focus Group meeting

- Mid-October: PMC provides finalized TM-3

We look forward to staff's review and comments.

Introduction

This Technical Memorandum summarizes the initial results from the quantification of greenhouse gas (GHG) reduction measures for the City of Merced. It summarizes 1) reductions from state-level actions, 2) local accomplishments already implemented or planned, and 3) actions to implement the City's adopted Climate Action Plan (CAP). These results will help to prioritize action steps to meet the GHG reduction target of the CAP and to allow for streamlining of development projects under the California Environmental Quality Act (CEQA) Guidelines Section 15183.5(b).

This initial draft of the Technical Memorandum summarizes the GHG reductions from the implementation of these measures. It also proposes potential future criteria to assist in measure evaluation and prioritization, including start dates, costs, and other feasibility considerations. A later draft of the Technical Memorandum will include a summary of the measures using these additional criteria.

These measures do not currently reduce community-wide emissions to the goal of 15% below baseline; reductions of an additional 7% (38,630 metric tons of carbon dioxide equivalent, or $MTCO_2e$) must be achieved to meet this goal. Improvements to the participation rates of the measures will result in further GHG reductions, as will additional measures that have not yet been quantified. We will identify these opportunities at the upcoming Focus Group meeting.

Results

In the baseline year of 2008, community-wide emissions from the City of Merced totaled 530,870 metric tons of carbon dioxide equivalent ($MTCO_2e$). Emissions are forecasted to rise to 696,770 metric tons of carbon dioxide equivalent ($MTCO_2e$) without any actions at the state, regional, or local level. However, California has already taken steps to reduce statewide GHG emissions, which allow for reductions at the local level. In addition to these state actions, Merced has implemented additional GHG reduction measures within the community. These GHG reductions total 206,900 metric tons of carbon dioxide equivalent ($MTCO_2e$) (see Table 1 on Page A-2).

The City's 2020 GHG emission target is 451,240 metric tons of carbon dioxide equivalent ($MTCO_2e$), or otherwise stated, to remove 245,530 metric tons of carbon dioxide equivalent ($MTCO_2e$) from the forecasted business-as-usual emissions.

The new measures in Merced's CAP that are implemented through the Programmatic Climate Action Plan (PCAP) process will allow for the local reductions necessary to achieve the target. These new preliminary local measures achieve a reduction of 59,510 metric tons of carbon dioxide equivalent ($MTCOC_2e$). Together with state actions and existing accomplishments, the City can reduce forecasted 2020 GHG emissions to approximately 8% below baseline emissions levels. These new measures will reduce GHG emissions across all sources of the community's emissions, although the greatest reductions will be achieved in the energy, transportation, and solid waste sectors. **Table 1** identifies GHG reductions from the new measures by topic area.

Table 1: 2020 GHG Reductions by Topic Area

	2020 MTCO$_2$e
Baseline (2008) emissions	530,870
Business-as-usual emissions 2020 forecast emissions forecast	696,770
Existing Accomplishments	
State actions	-144,020
Local accomplishments	-3,370
Subtotal – State Actions and Local Accomplishments	-147,390
CAP Measures	
Land Use and Transportation – Density and Connections	-6,970
Land Use and Transportation – Alternative Transportation	-2,500
Land Use and Transportation – Alternative Fuels	-7,120
Energy Efficiency – New Construction	-400
Energy Efficiency – Existing Buildings	-18,560
Energy – Renewable Energy	-7,240
Water and Wastewater – Water Conservation	-100
Water and Wastewater – Alternative Water Sources	-50
Solid Waste – Increased Diversion	-16,400
Solid Waste – Waste Minimization	0
Off-road equipment	-170
Subtotal – CAP Measures	-59,510
Summary	
Total Reduction	-206,900

	2020 MTCO$_2$e
New Community-wide Emissions Total	489,870
Reduction from Baseline (percentage)	-8%
Emissions Target (15% reduction from Baseline)	451,240
Additional Local Reduction Needed to Achieve Target	-38,630

There are a small number of measures that do not directly result in GHG emissions reductions, or may reduce emissions but in a way that cannot be accurately measured. These measures are known as supportive measures, as they can assist in the implementation of other measures. The supportive measures will be implemented as part of other City programs and initiatives. This approach is consistent with City Council direction that the PCAP will achieve GHG emissions reduction goals without requirements and fees.

Method and Evaluation

Method

The baseline GHG inventory and forecast serve as the foundation for the quantification of the new reduction measures to identify GHG reduction potential. Quantification begins with activity data from the inventory, including community-wide vehicle miles traveled (VMT), kilowatt-hours (kWh) of electricity or therms of natural gas used, and tons of waste disposed, among others. Various data sources, including government agency tools and reports, case studies in similar jurisdictions, and scholarly research, were used to determine the amount of activity data that can reasonably be reduced per individual participant (e.g., a household, an employee) following the actions identified in the reduction measure. These data sources were also used to help determine a reasonable participation rate (the percent of participants in the community who are expected to implement the measure) known as a performance target, which was adjusted to match local conditions based on community values and the presence of any mandates or incentives in the specific action items. The performance targets and reductions per participant were combined to identify the estimated total reduction in activity data from the implementation of a measure. Lastly, activity data reductions were converted to GHG reductions using emissions factors from the forecast. GHG emission reductions, performance targets, and reductions per participant for individual measures are given in **Attachment A.**

Evaluation Criteria

It is important for City staff and officials, members of the Focus Group, and other decision-makers to evaluate each GHG reduction measure in the CAP to identify its effectiveness and allocate resources for implementation. The amount of GHGs reduced by a measure is one important evaluation factor, but additional issues also determine the feasibility of the measure.

Cost is a key criterion for measure evaluation. It allows decision-makers to examine measures by comparing the volume of GHG reductions relative to the required investment. A measure with a smaller GHG reduction may be more cost-effective then a measure with significantly larger GHG reductions but

a much higher financial impact. Costs can be evaluated in a number of different ways, including the cost to the City and the cost to residents and private businesses. Such evaluations can look at the startup costs only, or can also examine recurring costs such as those associated with operations and maintenance. As part of a cost evaluation, it is also helpful to examine annual savings, particularly to residents and private businesses, as the savings from the measure may eventually surpass the cost of participation. For example, a rooftop solar panel array has a significant upfront cost, but saves the building owner money by decreasing the customer's electricity bill. Over time, the amount of money saved by the solar panel can equal or exceed the cost to install it. A future draft of the Technical Memorandum will include a cost and savings evaluation for the measures. A cost scale can provide a reader-friendly summary of the magnitude of costs and savings.

Table 2: Potential Cost Ranges

Range	Cost/Savings
Unknown	-
Minimal	$0 - $999
Low	$1,000 - $24,999
Medium-low	$25,000 - $99,999
Medium	$100,000 - $199,999
Medium-high	$200,000 - $499,999
High	$500,000 and above

Costs and benefits of measure implementation will be analyzed with several indicators. Although available data may vary by measure, costs and benefits can generally be presented with the following metrics:

- Cost to the City by action
- Cost per participant by action
- Total costs and cost per metric ton reduced
- Total and average cost savings for participants
- Adjusted cost per metric ton reduced and payback period

An example of a cost-benefit analysis for a measure is provided in **Tables 3** and **4** below. This example is for illustrative purposes, to confirm the appropriate level of analysis and factors for the City of Merced.

Table 3: Example of Costs for Requiring Solar Water Heaters in New Development

Cost Type	Amount
Total Estimated City Costs	$12,000
Total Estimated Community Costs	$16,560,000
Annualized Costs – City	$2,000
Annualized Costs – Per Participant	$2,760,000
Annualized Costs – Per Number of Participants	$2,762,000
Metric Ton Savings by 2020	1,290
Cost per Metric Ton	$2,140

Table 4: Example of Community Savings Estimates for Requiring Solar Water Heaters in New Development

Metric	Amount
Annual Electricity Savings (kWh)	0
Annual Electricity Savings ($)	$0
Annual Natural Gas Savings (Therms)	250,000
Annual Natural Gas Savings ($)	$315,000
Annual Community Savings ($)	$315,000
Payback Period (Years)	52.6
Adjusted Cost per Metric Ton	$1,900

For purposes of the PCAP, cost savings could also include potential reductions in fees paid to the San Joaquin Valley Air Pollution Control District (APCD) for new development. Certain types of new development that exceed emissions thresholds of the APCD must either pay a fee to the APCD or mitigate emissions through project design.

A second useful metric for reduction measure evaluation is the time period to initiate or complete the measure. This start date reflects the amount of work required before reductions can be achieved. Early tasks to initiate a measure may include securing the necessary funding from public or private sources, drafting and adopting government documents such as plans and City ordinances, and hiring or contracting with the people who are able to implement the tasks. In some cases, the start date for a measure may be immediate if the City already has resources that are free to work on the issue. In other instances, securing the necessary resources, approvals, and other required components can require several years. **Table 5** presents recommended start dates and the date range associated with each label. Note that this range does not include any start date after 2020. Measures that are not in effect by 2020 will not result in any GHG reductions for that year, and therefore will not contribute toward achieving the City's adopted GHG reduction goal. Additionally, measures require ongoing implementation to achieve sustained reductions beyond 2020. Achieving longer-term statewide objectives for 2030 and beyond would also require expanded implementation after 2020.

Table 5: Potential Start Date Ranges

Range	Start Date
Immediate	Ongoing, or implemented by the end of 2015
Short-term	Implemented by the end of 2016
Medium-term	Implemented by the end of 2018
Long-term	Implemented by the end of 2020

Identifying the responsible City department and community partners (Merced County Association of Governments, local school districts, etc.) helps identify the level of effort and confirm available City resources. While most GHG reduction measures may involve several City organizations, there is generally one or two who are directly responsible. Including the responsible agency as an evaluation criterion can assist in budgeting and work planning efforts for the City. Specific responsible departments have yet to be identified for individual reduction measures, although **Table 6** lists the City departments or local agencies that are likely to be in charge of implementation for at least one reduction measure.

Table 6: Potentially Responsible City Departments/Agency for Reduction Measures

Department
City Manager
Planning
Inspection Services
Housing
Economic Development
Engineering
Merced City School District
Merced County Association of Governments
Personnel
Public Works
University of California, Merced

Feasibility Criteria

The evaluation criteria described above will be used to rank and identify the feasibility of reduction measures. Additional factors can be considered in this analysis. The feasibility process will use an evaluation framework that includes three categories (benefits, costs, and feasibility of implementation) with distinct evaluation criteria for each category. The process allows for equal weighting of the three categories or adjusted weighting, as appropriate. The City can choose to provide a scoring preference to measures that achieve specific co-benefits. Each category accommodates several evaluation criteria. The criteria will be translated to a score on a scale of 1 to 5, with 1 being the lowest possible score and 5 being the highest. Although the scale of 1 to 5 will be used for all criteria, the scoring will be unique to each measure. A preliminary feasibility evaluation framework is shown below in **Table 7**.

Table 7: Potential Feasibility Framework

Benefits	Costs	Implementation
Annual GHG Reduction ($MTCO_2e$ by 2020)	Government (City) Upfront or Capital Costs	Implementation Start Time Frame
Annual Resource Savings	Additional Annual Government Operating Costs	Requires Additional Public Outreach or Education
Annual Government Monetary Savings	Program Duration	Requires Code Revisions or New Regulations
Annual Community Monetary Savings	Additional Staff Time to Implement	Support Needed from Local or Regional Agencies
Potential Co-Benefits or Community Values Implemented	Funding Opportunities for Government Implementation	Implements Local Government Policies, Goals, or Objectives
Implements Adopted Council Commitments in the General Plan EIR	Additional Costs to the Community	Implements Regional or State Policies, Goals, or Objectives
Implements SJVAPCD Requirements for New Development	Rebates, Grants or Incentives Available to Community	Technology Needed to Implement is Available and Cost Competitive

This framework will aid City staff, officials, and other decision-makers in identification of priority actions for limited City resources. The City should also consider whether all prioritization criteria should be treated equally, or whether one or some criteria should have a larger weight. For example, if the City chooses to select five prioritization criteria, the City could allocate the relative contribution of each criteria based on priority. As one example, GHG reductions could be weighted as 40% of the feasibility scoring, with all other criteria receiving a weight of just 15%. This would designate the size of a measure's GHG reduction as more important than other criteria, giving measures with the largest reductions generally a higher priority.

Attachment A: Initial Quantification Results of Draft GHG Reduction Measures

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Land Use and Transportation - Density and Connections	1 Develop higher-density and mixed-use development to support alternative travel in downtown Merced and appropriate neighborhood centers, including around the planned high-speed rail station.	5,370	- Percent of future housing that is multifamily: 40%	Number of housing units per acre: 3.1	Number of jobs per acre: 4.0	Number of new multifamily housing units: 4,260 (reduction of 1,770 kWh and 80 therms per house)	Minimum intersections per square mile in new development: 45	
Land Use and Transportation - Density and Connections	2 Increase per-person intra-city and inter-city transit use 30% by 2020 by building 25% of new development near transit stops.	280	- Percent increase in transit ridership per person: 30% - Percent of developments within ¼ mile of transit: 25%	Number of Merced County Transit trips taken by Merced residents: 1,365,080				
Land Use and Transportation - Density and Connections	3 Improve the efficiency of personal vehicle trips by promoting carpool and car share systems.	610	- Number of shared cars: 20 Percent of Merced employees eligible for car pooling: 20%	Number of shared cars: 20 (reduction of 1,610 VMT per car-share member)	Number of employees eligible for car sharing: 5,870 (reduction of 100 VMT per eligible employee)			

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Land Use and Transportation - Density and Connections 4	Increase the feasibility and use of bicycles in Merced for commute and recreation through new bicycle infrastructure and education.	280	- New bike miles (post-2013): 35	Number of bike commuters: 650 (reduction of 860 VMT per bike commuter)				
Land Use and Transportation - Density and Connections 5	Establish telecommuting as a viable commute alternative for 3% of Merced employees an average of 1.5 days per week by 2020.	190	- Percent of employed residents telecommuting: 3%	Number of employees telecommuting an average of 1.5 days per week: 880 (reduction of 460 VMT per telecommuting employee)				
Land Use and Transportation - Density and Connections 6	Work with UC Merced to establish a Transit Demand Management (TDM) program for new student housing located within the City.	1,140	- Percent of UC Merced students living off-campus: 50% - Percent trip reduction from off-campus students: 25%	Number of students living off-campus: 4,170 (reduction of 540 VMT per student)				

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Land Use and Transportation – Density and Connections 7	Synchronize traffic signals along 10 miles of major roads to improve fuel efficiency.	1,540	- Road miles with traffic synchronization: 10	Road miles with traffic synchronization: 10 (reduction of 155,820 gallons of fuel)				
Land Use and Transportation - Alternative Fuels 8	Increase the use of neighborhood electric vehicles (NEVs, such as lower-speed, street-safe golf carts) to 3% of households by 2020.	790	- Percent of households with a NEV: 3%	Number of households with a NEV: 1,080 (1,650 VMT per NEV, each using 370 kWh)				
Land Use and Transportation - Alternative Fuels 9	Increase the household adoption of passenger electric vehicles (EV) and other alternative fuels to 5% by 2020.	6,330	- Percent of households with an EV: 5% - Number of publicly accessible EV chargers: 15	Number of households with a full EV: 1,790 (8,510 VMT per EV, each using 2,890 kWh)	Number of publicly accessible EV chargers: 15 (4,700 VMT and 1,600 kWh per charging station)			

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Energy Efficiency - New Construction	10	Improve energy efficiency in new and significantly retrofitted buildings subject to state CALGreen standards.	260	- Performance code improvement above CALGreen: 5% - Percent of new houses meeting performance code: 10% - Percent of new nonresidential buildings meeting performance code: 5% - Percent of new houses meeting CALGreen Tier 1: 5% - Percent of new nonresidential buildings meeting CALGreen Tier 1: 2%	Number of houses complying with performance code: 730 (reduction of 220 kWh and 20 therms per house)	Number of jobs in buildings complying with performance code: 210 (reduction of 600 kWh and 10 therms per job)	Number of houses built to CALGreen Tier 1 standards: 370 (reduction of 130 kWh and 40 therms per house)	Number of jobs in buildings built to CALGreen Tier 1 standards: 80 (reduction of 470 kWh and 20 therms per job)

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Energy Efficiency - New Construction	11 Site new buildings to take advantage of natural solar resources for heating and cooling.	140	- Percent of new single-family houses to include passive solar features: 25% - Percent of new multifamily buildings to include passive solar features: 10% - Percent of new nonresidential buildings to include passive solar features: 10%	Number of new houses built with passive solar design features: 1,200 single-family houses and 240 multifamily units (reductions of 230 kWh per house)	Number of jobs in new nonresidential buildings built with passive solar design features: 420 (reductions of 450 kWh per job)			

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Energy Efficiency - Existing Buildings	12	Support improved energy efficiency in existing multifamily units, rental units, and affordable households through voluntary retrofits.	1,570	- Low-income/renter-occupied single-family homes participating in basic retrofits and behavioral changes: 10% - Low-income/renter-occupied single-family homes participating in advanced retrofits: 2% - Multifamily homes participating in retrofits: 5% - Home appliance infiltration rate: 50% - Units participating in appliance upgrades: 20%	Number of existing low-income/renter-occupied single-family homes undergoing basic energy retrofits: 810 (reduction of 1,120 kWh and 60 therms per house)	Number of existing low-income/renter-occupied single-family homes undergoing advanced energy retrofits: 160 (reduction of 2,980 kWh and 150 therms per house)	Number of existing multifamily homes participating in retrofits: 400 (reduction of 1,250 kWh and 80 therms per house)	Number of existing multifamily and low-income/renter-occupied single-family homes upgrading appliances: 3,240 (reduction of 570 kWh per house)

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Energy Efficiency - Existing Buildings	13	Facilitate energy efficiency through voluntary retrofits in 15% of single-family homes, and promote low-cost opportunities to reduce energy use in single-family households.	1,670	- Homes participating in VFD pool pump upgrades: 8% - Homes participating in basic retrofits: 10% - Homes participating in advanced retrofits: 5% - Home appliance infiltration rate: 50% - Units participating in appliance upgrades: 25%	Owner-occupied existing single-family homes with VFD pool pumps: 120 (reduction of 1,630 kWh per home)	Owner-occupied existing single-family homes undergoing basic energy retrofits: 900 (reduction of 1,120 kWh and 60 therms per home)	Owner-occupied existing single-family homes undergoing advanced energy retrofits: 450 (reduction of 2,980 kWh and 150 therms per home)	Number of owner-occupied existing single-family homes upgrading appliances: 2,260 (reduction of 580 kWh per home)
Energy Efficiency - Existing Buildings	14	Improve energy efficiency through voluntary retrofits in 16% of businesses and other energy efficiency strategies in existing commercial and industrial facilities.	14,800	- Businesses participating in retrocomissioning: 15% - Standard retrofit participation rate: 10% - Deep retrofit participation rate: 6% - Commercial appliance infiltration rate: 40% - Appliance upgrade participation rate: 15%	Number of jobs in existing retrocommissioned buildings: 4,400 (reductions of 2,940 kWh and 60 therms per job)	Number of jobs in existing buildings with basic energy retrofits: 2,440 (reductions of 5,350 kWh and 120 therms per job)	Number of jobs in existing buildings with deep energy retrofits: 1,470 (reductions of 6,950 kWh and 150 therms per job)	Number of jobs in existing buildings with energy-efficient appliances: 3,660 (reductions of 580 kWh and 10 therms per job)

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Energy Efficiency - Existing Buildings	15	Use cool roofs and shade trees to reduce the urban heat island effect in Merced.	110	- Percent of existing houses with a cool roof: 3% - Percent of existing nonresidential buildings with a cool roof: 0.5% - Number of new shade trees planted: 500	Number of existing houses with cool roofs: 860 (reduction of 310 kWh per household)	Number of jobs in existing buildings with cool roofs: 120 (reduction of 400 kWh per job)	Number of new mature shade trees: 500 (reduction of 200 kWh per tree)	
Energy Efficiency - Existing Buildings	16	Retrofit public lighting in Merced to reduce energy use.	410	- Percent of existing nonresidential buildings with energy-efficient outdoor lighting: 30%	Number of jobs in existing buildings with energy-efficient outdoor lighting: 7,330 (reduction of 210 kWh per job)			
Energy - Renewable Energy	17	Increase the amount of renewable electricity generation for on-site residential use.	2,920	- Percent of new (post-2014) households with on-site solar panels: 5% - Percent of existing (2014 and earlier) households with on-site solar panels: 2%	Number of households with on-site solar PV systems: 570 existing households and 370 new households (8 kW PV array per house, with an average production of 11,470 kWh)			

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Energy - Renewable Energy	18 Facilitate renewable energy for on-site commercial and industrial uses.	2,530	- Percent of new (post-2014) commercial buildings with solar PV arrays: 3% - Percent of existing (2014 and earlier) commercial buildings with solar PV arrays: 2%	Number of jobs in buildings with solar PV arrays: 500 existing jobs and 130 new jobs (average PV array size of 52 kW, with an average production of 74,090 kWh)				
Energy - Renewable Energy	19 Support the use of solar energy to meet on-site water heating needs for domestic and nonresidential uses and swimming pools.	1,010	- New houses with domestic solar water heaters: 5% - Existing houses with domestic solar water heaters: 2% - New nonresidential buildings with solar water heaters: 3% - Existing nonresidential buildings with solar water heaters: 1% - New residential swimming pools with solar water heaters: 90%	Number of homes with domestic solar water heaters: 370 new homes and 570 existing homes (average reduction of 170 kWh and 110 therms per new house, and 280 kWh and 130 therms per existing house)	Number of jobs in buildings with solar water heaters: 13 jobs in new buildings and 250 jobs in existing buildings (average reduction of 30 kWh and 40 therms per job in new buildings, and 40 kWh and 50 therms per job in existing buildings)	Number of new houses with solar-heated swimming pools: 330 (average reduction of 150 therms per house)		

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Energy - Renewable Energy	Create a community-shared solar program to produce renewable energy for off-site use in Merced.	20	780	- kW of community-shared solar: 2,000	kW of community-shared solar: 2,000 (average production of 2,866,000 kWh, equivalent to the annual electricity use of 440 homes)				
Water and Wastewater - Water Conservation	Promote indoor water conservation through retrofits to existing buildings.	21	60	- Percent of existing houses conducting water-efficiency retrofits: 40%	Number of existing houses with water-efficiency retrofits: 10,090 (reduction of 8,420 gallons per house)				
Water and Wastewater - Water Conservation	Improve indoor water efficiency in new buildings.	22	20	- Percent of new buildings with toilets, faucets, and showers beyond CALGreen minimum: 90%	Number of people in new buildings with beyond-code water fixtures: 17,170 residents and 3,810 employees (average reduction of 1,320 gallons per person)				

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Water and Wastewater - Water Conservation	23 Reduce the amount of water used for landscaping.	20	- Percent of existing (2014 and earlier) landscapes with smart irrigation systems: 20% - Percent of new (post-2014) landscapes with smart irrigation systems: 90%	Number of people in buildings with landscapes watered by smart irrigation systems: 17,710 residents in existing homes and 17,170 residents in new homes; 5,020 jobs in existing buildings; and 3,810 jobs in new buildings (average reduction of 2,810 gallons per person)				
Water and Wastewater - Alternative Water Sources	24 Promote individual greywater and rainwater catchment systems to reduce potable water demand.	50	- Percent of houses with greywater systems: 5% Amount of greywater used: 90%	Number of residents in homes with greywater systems: 5,380 (average reduction of 13,150 gallons of potable water per year)				

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Solid Waste - Increased Diversion	25	Expand composting of organic waste produced by the community.	3,860	- Nonresidential composting participation rate: 30% Single-family composting participation rate: 75% Multifamily composting participation rate: 50% Compost capture rate: 90%	Number of households composting: 23,300 (reduction of 350 pounds of waste per household)	Number of people composting at work: 8,800 (reduction of 460 pounds of waste per job)		
Solid Waste - Increased Diversion	26	Increase recycling in Merced with a goal of improving diversion of recyclables by 25%.	8,040	- Target pounds of waste per person per day, excluding construction and demolition (C&D) and organics: 11	Amount of waste reduced: 9,560 tons (19,114,660 pounds) of waste recycled (reduction of 140 pounds per person)			
Solid Waste - Increased Diversion	27	Divert 50% of construction and demolition (C&D) waste from new construction projects and renovations.	4,500	- C&D recycling rate: 50%	Amount of waste reduced: 14,060 tons (28,114,170 pounds) of C&D waste recycled (reduction of 210 pounds of C&D waste per person)			

Issue Area	Measure Language	2020 GHG Reduction	2020 Assumptions	2020 Performance Metric 1	2020 Performance Metric 2 (if applicable)	2020 Performance Metric 3 (if applicable)	2020 Performance Metric 4 (if applicable)	2020 Performance Metric 5 (if applicable)
Off-road Equipment	28	Reduce emissions from lawnmowers and leaf blowers by 10%.	20	- Percent of lawnmowers replaced: 10% Percent of leaf blowers replaced: 10%	Number of lawnmowers replaced: 1,090 (reducing 100 pounds of direct GHG emissions and using 60 kWh per lawnmower)	Number of leaf blowers replaced: 280 (reducing 50 pounds of direct GHG emissions and using 220 kWh per leaf blower)		
Off-road Equipment	29	Use alternative-fuel and fuel-efficient construction equipment, and reduce construction equipment idling time.	150	- Percent of development projects using 25% alternative fuel or hybrid construction equipment: 25% - Maximum minutes of idling time for construction equipment: 4	Percent of development projects using 25% alternative fuel or hybrid construction equipment: 25%	Maximum minutes of idling time for construction equipment: 4		