**CITY OF MERCED**
**Development Services**


TO:    Climate Action Plan Ad-Hoc Advisory Committee
FROM:  Bill King, AICP, Principal Planner
DATE:    April 6, 2011
SUBJECT:  Draft Report Section "GHG Reduction Objectives, Measures, and Steps"

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ACTION REQUIRED:   Review and Comment


DISCUSSION

Staff has prepared this draft section of the Climate Action Plan for your review and comment.  The section will be the primary product of the CAP, laying out the recommended measures and steps that define how the measures will be implemented.   The draft accomplishes two key objectives: (1) to describe the methodology we will use to select measures; and (2) to establish a framework or outline of how the measures will be presented in the CAP.

Regarding the *Assessment Teams*, the workgroups described in the table on page 2, are my best estimate of who should represent each *Opportunity Area.*  The idea is that these workgroups will be together for the next five meetings selecting objectives, measures, and steps.  If you have a strong interest to be shifted to another group, then please contact me prior to the meeting.

Regarding the *Opportunity Objective Tables*, the numbers are only there to confirm that the equations work.   These numbers will change as we identify measures and their GHG emission reduction potentials.

Please read the draft report and come to the meeting prepared to offer comments and ideas on these two objectives.  For example, did Staff miss any important considerations?

**Please remember to bring your "*Background Report of the Climate Action Plan*" to the meeting.**

# PART 3: GHG Reduction Objectives, Measures, and Steps

## Chapter Purpose and Structure

Preparing and adopting the CAP represents an early step toward achieving the City's GHG reduction target. To attain the target, the CAP must guide and facilitate change throughout the community. The purpose of this chapter is to describe the CAP's *objectives*, *measures,* and *steps* in a framework of *Opportunity Areas* that translate the City's GHG reduction target into on-the-ground implementation. Objectives define specific focus areas. Measures define the direction that the City will take to accomplish its GHG reduction goals. Steps, in turn, define specific implementation actions.

## City of Merced Climate Action Plan Structure
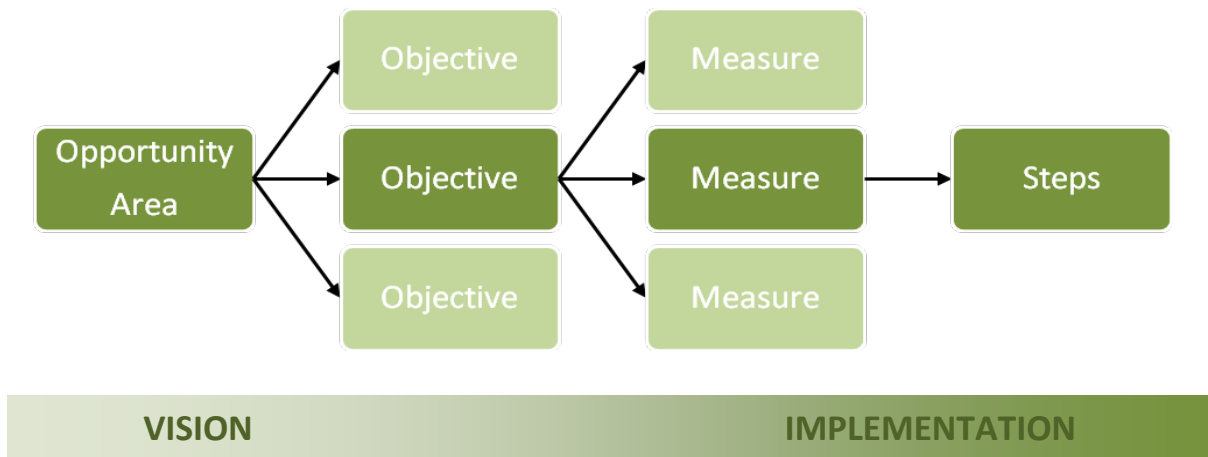


This chapter is divided into ____ sections. The first ____ sections describe the Residential Building and Energy, Commercial Building and Energy, Transportation, Land Use, Waste, Green Infrastructure, and Water Conservation *Opportunity Areas*.   Each *Opportunity Area* section provides an overview of that strategy's role in curbing the community's emissions, as well as a background discussion describing how Merced's built environment relates to the objectives and measures. Following this discussion, objectives, measures, and steps are presented.  The final section describes the Community Challenge and the additional efforts the community will need to make in order to achieve the adopted target.

# Reduction Measure Selection Methodology

## OVERVIEW

City Staff worked with the Committee in a process that ensured that key influence factors and City Council direction were kneaded into the selection of GHG reduction measures.  Section 2 of the CAP provides a detailed description of these influence factors, as well as an overview of City Council direction. Key influence factors include: (a) _____; and the Council direction was to _____.  Based on this overall direction, assessment teams were formed, and CAP Objectives were drafted by staff, and then reviewed, amended and added to by the Committee.

## ASSESSMENT TEAMS

Consistent with City Council direction for reductions to come from both *Local Government* sources as well as the *Community*.  Staff assigned the work of selecting measures for *Local Government* emissions to the City CAP Team, whereas the Committee focused its efforts on selecting emission reduction measures for the Community. Recognizing the challenge of reducing GHG emissions to 20% below 1990 levels by 2020, two actions were taken to add value to the selection process.  First, the capacity for the 18-member Committee was enhanced by creating small workgroups assigned to specific Opportunity Areas, and matched their skills and knowledge to the assigned Opportunity Area. Opportunity Areas are sectors within which GHG emission reductions will be sought and correspond to GHG emission sectors. Second, since the achievement of the emissions target rested, in a large degree, on the ability to reduce emissions from existing buildings and current travel methods, Staff enhanced Committee focus of these Opportunity Areas. Thus, the initial step in the process of selecting measures, established a matrix that matched personnel resources with Opportunity Areas; and is depicted in Figure ____ below:

Opportunity Areas are sectors within which GHG emission reductions will be sought and correspond to GHG emission sectors.

| City CAP Team and Committee Assessment Teams |
| --- |
| **Local Government Opportunity Areas** |
| Commercial Buildings and Energy: *Dan Arnold and Stan Murdock* |
| Residential Buildings and Energy:  *Housing???* |
| Transportation:  *Dan Arnold* |
| Waste Reduction:  *Stan Murdock* |
| Green Initiatives:  *Frank Quintero* |
| Water Conservation:  *Leah Brown* |
| **Community Opportunity Areas** |
| Commercial Buildings and Energy: *Kahri Boykin, Vanessa Lara, and Lane Puckett* |
| Residential Buildings and Energy: *Brett Baker, John Wiersma, and Kevin Rico* |
| Transportation: *Matt Fell, Rod Ghearing, and Lisa Kayser- Grant*. |
| Land Use: *Wayne Eisenhart, Christina Alley, and Jim Marks* |
| Waste Reduction: *Michael Belluomini, Matthew Hirota, and Nellie Muniz Smith.* |
| Green Initiatives: *Jim Genes, Kraig Magnussen, and Lyndsey Baladad* |
| Water Conservation: *Jim Genes, Kraig Magnussen, and Lyndsey Baladad* |

## DETERMINING CAP OBJECTIVES

Drawing from key influence factors and Council directed parameters, targets, and approaches, Staff composed the initial objectives, which were then reviewed, amended and, added to by the Committee and the City's CAP Team.  Objectives were applied to each *Opportunity Area*, assuring that subsequently selected reduction measures were consistent with the overall goals and direction set by the City Council. Key influence factors are listed later in this chapter, and are described in greater detail in Section 2 of the CAP:

## SELECTION OF GHG REDUCTION MEASURES

City Staff and interns assembled sample GHG reduction measures from various sources for use by the Assessment Teams.  The Assessment Teams used a checklist to ensure that measures aligned with CAP objectives, and applicable Council directed parameters, targets and approaches, such as identifying the appropriate phase to implement the selected measure.  The checklist was also used to filter-out measures that were not suited to the City of Merced.  City Staff and student interns computed the values of the first-round of measures selected by the Assessment Teams to determine whether or not they were adequate to reach the GHG reduction targets.  A second meeting with the Assessment Teams was held to adjust the number and scope of the selected measures to reach the target.  Through this iterative process, the final set of GHG reduction measures was established.

## DEFINING IMPLEMENTATION STEPS

The Assessment Team's final task was to define the steps, timing, responsibility, and general costs of implementing the selected measures.

# Opportunity Areas

This Section describes the _____ *Opportunity Areas* that the City of Merced has developed to reduce the Community's GHG emissions.   Areas are sectors within which GHG emission reductions will be sought and correspond to GHG emission sectors.   Combined, these "Opportunity Areas' have the potential to reduce approximately _____ metric tons of carbon dioxide equivalent (MT $CO_2e$) emissions. Climate Action Plan (CAP) "Opportunity Areas" include the following:

## BUILDINGS AND ENERGY

The Buildings and Energy *Opportunity Area* includes energy efficiency retrofits for existing buildings, enhances energy performance requirements for new construction, increases use of renewable energy, and improves community energy management.  Two Assessment Teams, one for residential and another for commercial/industrial buildings, were created to maximize GHG reduction potential and to recognize the differences brought by ownership, operations, legal drivers, and funding sources.

## TRANSPORTATION AND LAND USE

The Transportation Opportunity Area identifies ways to reduce automobile emissions, including improving pedestrian and bicycle infrastructure, enhancing public transit service, discouraging single-

occupancy vehicle use, and improving the City's vehicle fleet. The Land Use Opportunity identifies ways to support pedestrian and transit-oriented development, discourage sprawl, and encourage compact urban forms. Land use is closely linked to transportation because it is the orientation of destinations that require us to travel. For this reason, land use and transportation are included in the same group of recommendations.

## WASTE REDUCTION

The Waste Opportunity Area builds on past City successes by increasing waste diversion rates and participation in recycling and composting throughout the community.

## WATER CONSERVATION AND GREEN INFRASTRUCTURE

Water-Related Opportunities include water conservation measures applicable to both indoor and outdoor water use. The Green Infrastructure Opportunity Area seeks to expand the City's urban forest and other carbon sequestration sites.

## GHG REDUCTION POTENTIAL OF OPPORTUNITY AREAS

The Opportunity Areas contained within the City's Climate Action Plan identify approximately _____ MT CO2e of potential reductions or _____% below 1990 baseline levels by 2020. However, the proposed measures alone do not achieve the City's adopted target of reducing emissions 20% below 1990 levels by 2020. To achieve this target, an additional _____ MT CO2e of reductions will need to be generated.

# Climate Action Plan Objectives

Based on key influence factors and Council directed parameters, targets, and approaches, CAP Objectives were determined and are listed in Tables _____. Objectives broadly describe when and how the Community and Local Government emission sectors will seek to reduce GHG emissions. Objective language includes ideas and concepts from Council directed parameters, targets and approaches, which include:

- State-Mandated Programs
- Current City Activities, Projects and Programs
- Estimated Completion period (short-term, mid-term or long-term).

## RESIDENTIAL BUILDINGS AND ENERGY OBJECTIVES

The Residential Buildings and Energy Opportunity reduces approximately _____ MT CO2e of GHG emissions, representing ___% of the CAP's total reduction capacity. Energy efficiency retrofits provide most of the reductions within this opportunity. Most of the City of Merced's residential buildings were built more than ___ years ago, prior to the adoption of California's energy efficiency standards. Considerable opportunity exists to reduce energy consumption in these structures.

| Table IV-1 Residential Buildings and Energy Opportunity Area | | |
|---|---|---|
| **Community Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| RBE-1: | 706.00 | 14.86 |
| RBE-2: | 609.00 | 12.82 |
| RBE-3: | 413.00 | 8.69 |
| RBE-4: | 79.00 | 1.66 |
| RBE-5: | 589.00 | 12.39 |
| RBE-6: | 371.00 | 7.81 |
| **Sub-total 'Community' Residential Buildings and Energy** | **2767** | **58%** |
| **Local Government Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| RBE_LG-1: | 219.00 | 4.61 |
| RBE_LG-2: | 71.00 | 1.49 |
| RBE_LG-3: | 486.00 | 10.23 |
| RBE_LG-4: | 362.00 | 7.62 |
| RBE_LG-5: | 464.00 | 9.76 |
| RBE_LG-6: | 383.00 | 8.06 |
| **Sub-total 'Local Government' Residential Buildings and Energy** | **1985** | **42%** |
| **TOTAL RESIDENTIAL BULDINGS AND ENERGY** | **4752** | **100%** |

## COMMERCIAL BUILDINGS AND ENERGY OBJECTIVES

The Commercial Buildings and Energy Opportunity reduces approximately ____ MT CO2e of GHG emissions, representing ____% of the CAP's total reduction capacity. Energy efficiency retrofits and renewable energy generation provide most of the reductions within this opportunity. Most of Merced's commercial buildings were built more than ___ years ago, prior to the adoption of California's energy efficiency standards. Considerable opportunity exists to reduce energy consumption in these structures.

| Table IV-2 Commercial Buildings and Energy Opportunity Area | | |
|---|---|---|
| **Community Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| CBE-1: | 224.00 | 0.53 |
| CBE-2: | 102.00 | 0.24 |
| CBE-3: | 1474.00 | 3.48 |
| CBE-4: | 218.00 | 0.52 |
| CBE-5: | 748.00 | 1.77 |
| CBE-6: | 36014.00 | 85.10 |
| **Sub-total 'Community' Commercial Buildings and Energy** | **38780** | **92%** |
| **Local Government Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| CBE_LG-1: | 759.00 | 1.79 |
| CBE_LG-2: | 655.00 | 1.55 |
| CBE_LG-3: | 113.00 | 0.27 |
| CBE_LG-4: | 775.00 | 1.83 |
| CBE_LG-5: | 20.00 | 0.05 |
| CBE_LG-6: | 1218.00 | 2.88 |
| **Sub-total 'Local Government' Commercial Buildings and Energy** | **3540** | **8%** |
| **TOTAL COMMERCIAL BULDINGS AND ENERGY** | **42320** | **100%** |

**TRANSPORATION AND LAND USE OBJECTIVES**

By 2020, this opportunity will reduce approximately _____ MT CO2e of GHG emissions, providing about __% of the community's total emission reductions. Two separate Assessment Teams were formed in recognition of the numerous potential measures to assess, as well as the independent variables of transportation and land use. The City of Merced's compact form, centrally located commercial districts, existing public transit system, and bike system, provide a strong foundation for this opportunity.

| Table IV-3 Transportation and Land Use Opportunity Area | | |
|---|---|---|
| **Community Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| TL-1: | 1055.00 | 6.19 |
| TL-2: | 529.00 | 3.11 |
| TL-3: | 374.00 | 2.20 |
| TL-4: | 134.00 | 0.79 |
| TL-5: | 130.00 | 0.76 |
| TL-6: | 576.00 | 3.38 |
| **Sub-total 'Community' Transportation and Land Use** | **2798** | **16%** |
| **Local Government Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| TL_LG-1: | 9227.00 | 54.16 |
| TL_LG-2: | 899.00 | 5.28 |
| TL_LG-3: | 282.00 | 1.66 |
| TL_LG-4: | 148.00 | 0.87 |
| TL_LG-5: | 3336.00 | 19.58 |
| TL_LG-6: | 347.00 | 2.04 |
| **Sub-total 'Local Government' Transportation and Land Use** | **14239** | **84%** |
| **TOTAL TRANSPORTATION AND LAND USE** | **17037** | **100%** |

## WASTE REDUCTION OBJECTIVES

The Waste Reduction Opportunity provides approximately _____ MT CO2e of GHG reductions, or about ____% of the overall CAP reductions.

| Table IV-4 Waste Reduction Opportunity Area | | |
|---|---|---|
| **Community Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| WR-1: | 178.00 | 4.84 |
| WR-2: | 485.00 | 13.18 |
| WR-3: | 632.00 | 17.17 |
| WR-4: | 501.00 | 13.61 |
| WR-5: | 65.00 | 1.77 |
| WR-6: | 615.00 | 16.71 |
| **Sub-total 'Community' Waste Reduction** | **2476** | **67%** |
| **Local Government Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| WR_LG-1: | 22.00 | 0.60 |
| WR_LG-2: | 959.00 | 26.06 |
| WR_LG-3: | 40.00 | 1.09 |
| WR_LG-4: | 41.00 | 1.11 |
| WR_LG-5: | 114.00 | 3.10 |
| WR_LG-6: | 28.00 | 0.76 |
| **Sub-total 'Local Government' Waste Reduction** | **1204** | **33%** |
| **TOTAL WASTE REDUCTION** | **3680** | **100%** |

**GREEN INFRASTRUCTURE OBJECTIVES**

Merced's green infrastructure includes many natural features that provide valuable habitat and recreational services to the community. The Green Infrastructure Opportunity provides approximately ___ MT CO2e of GHG reductions, or about ___% of the overall CAP reductions. An enhanced urban forest would decrease building energy consumption and sequester carbon within trees.

| Table IV-5 Green Infrastructure Opportunity Area | | |
|---|---|---|
| **Community Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| GI-1: | 471.00 | 15.44 |
| GI-2: | 926.00 | 30.36 |
| GI-3: | 301.00 | 9.87 |
| GI-4: | 36.00 | 1.18 |
| GI-5: | 74.00 | 2.43 |
| GI-6: | 110.00 | 3.61 |
| **Sub-total "Community" Green Infrastructure** | **1918** | **63%** |
| **Local Government Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| GI_LG-1: | 16.00 | 0.52 |
| GI_LG-2: | 34.00 | 1.11 |
| GI_LG-3: | 101.00 | 3.31 |
| GI_LG-4: | 823.00 | 26.98 |
| GI_LG-5: | 82.00 | 2.69 |
| GI_LG-6: | 76.00 | 2.49 |
| **Sub-total 'Local Government' Green Infrastructure** | **1132** | **37%** |
| **GREEN INFRASTRUCTURE REDUCTION** | **3050** | **100%** |

## WATER CONSERVATION OBJECTIVES

The Water Conservation Opportunity provides approximately __ MT CO2e of GHG reductions, or about ___% of the overall CAP reductions. Increasing water conservation provides multiple benefits to the community beyond GHG reductions.

| Table IV-6 Water Conservation Opportunity Area | | |
|---|---|---|
| **Community Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| WC-1: | 128.00 | 0.02 |
| WC-2: | 1234.00 | 0.22 |
| WC-3: | 8202.00 | 1.44 |
| WC-4: | 1303.00 | 0.23 |
| WC-5: | 525.00 | 0.09 |
| WC-6: | 502378.00 | 88.03 |
| **Sub-total 'Community' Water Conservation Strategy** | **513770** | **90%** |
| **Local Government Objectives** | **GHG Reduction Potential (MT CO2e)** | **Percentage of Opportunity Area** |
| WC_LG-1: | 40.00 | 0.01 |
| WC_LG-2: | 35.00 | 0.01 |
| WC_LG-3: | 26.00 | 0.00 |
| WC_LG-4: | 56809.00 | 9.95 |
| WC_LG-5: | 20.00 | 0.00 |
| WC_LG-6: | 15.00 | 0.00 |
| **Sub-total 'Local Government' Water Conservation** | **56945** | **10%** |
| **WATER CONSERVATION REDUCTION** | **570715** | **100%** |

# Climate Action Plan Measures and Steps

**DEFINITION, IDENTIFICATION, AND SELECTION OF GHG REDUCTION MEASURES**

GHG reduction measures broadly describe rules, regulations, standards, laws and programs that are needed to achieve CAP objectives.  City Staff and interns assembled sample GHG reduction measures from various sources for use by the Assessment Teams.  Measures were collected from adopted Climate Action Plans from other California counties and cities, ICLEI's Climate and Air Pollution Planning Assistant (CAPPA) software program, review of best practices from leading cities and organizations, suggestions from the local community, representatives of the Committee, and 'Implementation Actions' from the *Merced Vision 2015 General Plan*. This warehouse of ideas is provided in Appendix _____. In selecting the City's GHG reduction measures, the Committee and City CAP Team took care not to duplicate state-related efforts, which would otherwise result in double-counting potential emission reductions.

The selection process involved two steps:

First, each candidate measure's alignment with CAP objectives needed to be determined.  In order to ensure that measures align with CAP objectives and existing City policies, the 'Assessment Teams' utilized a checklist (Appendix _____).  The checklist included such questions as:

- Does the measure align with CAP objectives?  If so, which one?;

- Is the measure consistent with City policy?

- Within what phase should the measure be implemented?

A second screen of the measures was performed, using a checklist to rate the 'suitability' value of each candidate measure by asking such questions as:

- Does the measure align with Community demographics or other characteristics?

- How much will it cost?

- Is it feasible?

- Does it bring co-benefits and therefore align with other City goals?

Measures with small GHG emission reduction potentials were not rejected, because all actions to reduce GHG emissions will be necessary to achieve the City's target.  Implementers of the plan should be aware of the GHG emission reduction potentials in balancing program objectives and resources.

**GHG REDUCTION MEASURE DATASHEETS**

Coupled with each selected measure is a variety of data to be used during the implementation stage of the Climate Action Plan.  These five data categories are described below:

***Policy Language*:** This is a narrative description of the measure to better describe its approach.

***GHG Reduction Potentials*:** Values within the *GHG Reduction Potential* column of the summary refer to the estimated annual emission reductions in 2020 in MT CO2e.

**Costs:** This includes generalized costs to the City, estimated cost per metric ton of GHG reduction, and identification of whether or not the measure would result in costs to Merced home or business owners. The *Cost to City* column uses a ranking of low, medium, and high. Low cost measures have an estimated annual cost that is less than 1% of the City's Capital Improvement Projects (CIP) budget. Medium cost measures would require between 1% and 5% of the CIP budget per year and high cost measures would require more than 5%. *Cost per Metric Ton* represents the estimated annual cost divided by the estimated annual GHG reduction potential (for quantified measures only). The *Private Cost* column identifies whether or not the measure is expected to result in direct costs to property or business owners. Supporting information describing how GHG reduction estimates were calculated is provided in Appendix ___. Supporting information describing economic costs of each measure is contained in Appendix ____.

**Action Steps:** Action steps are essential to translate the City's GHG reduction target into on-the-ground implementation.  Action Steps describe who does what, and when, to implement each measure.

**Progress Indicators**: Progress indicators will be used to evaluate the performance of each measure during implementation over the next decade.

| Measure #: ….. | | | |
|---|---|---|---|
| *Narrative description of the measure to better describe its approach.* | | | |
| **GHG Reduction Potential (MT CO2e)** | **Cost to City** | **Cost Per Metric Ton** | **Private Cost** |
| # | $ | $ | (yes/no) |
| **Actions** | | **Timetables** | **Responsibility** |
| A | | Before…DATE | |
| B | | Before…DATE | |
| C | | Before…DATE | |
| D | | Before…DATE | |
| **Progress Indicators** | | **Target** | |
| 1 | Percentage of …. Number of …. | ___% by YEAR | |
| 2 | Percentage of …. Number of …. | ___% by YEAR | |

## GHG REDUCTION POTENTIALS

*Quantified Measures*
The CAP contains ___ GHG reduction measures. The City has quantified the GHG reduction potential of ___ of these measures. Quantified measures fall into two sub-categories; primary measures and supporting measures. Primary measures provide direct GHG reductions that have been calculated and are identified within the table. In addition to GHG reduction values, estimated cost per metric ton of GHG reduction is estimated for each primary measure. Supporting measures facilitate the reduction potential of the related primary measure. The reduction potential of the supporting measure is contained within the potential of the primary measure.

***Non-Quantified Measures***

Non-quantified measures consist of measures whose GHG reduction potential could not be estimated at the time of plan preparation or measures that would not reduce emissions contained within the 2004 baseline inventory. The City's high standard for quantification methodologies may have resulted in the exclusion of some emissions reductions, but the standard reflects the City's desire to not over estimate the reduction potential of the CAP measures. In the future, reliable quantification methods may be created and the City will include such reductions. Measures capable of reducing emissions that are not included in the baseline inventory do not help the City achieve its 2020 emissions reduction target. These measures remain within the CAP because the City and the community recognize that these actions will reduce global GHG emissions and help protect the climate, and in recognition that future emission inventories will likely be expanded to include other emission sources.

# Community Challenge

Merced's adopted target calls for the Community to reduce its emissions to 20% below 1990 levels by 2020 or a reduction of approximately _____ MT CO2e. The strategies described above achieve _____ MT CO2e or ____% below 1990 baseline levels by 2020. The City of Merced was purposefully conservative when estimating the reduction capacity of measures that require resident and business participation in order to not over-estimate potential reductions. The Community Challenge calls upon residents, businesses, employees, and City staff to mobilize and achieve the remaining _____ MT CO2e of GHG reductions. This can be achieved through high levels of Community participation in the proposed measures or other individual reduction actions. Citizen involvement and leadership will be required to achieve these remaining reductions. The Community Challenge is described in more detail near the end of the chapter. If Community participation in GHG-reducing activities exceeds the City's estimates, then GHG reductions could be higher than predicted and the target may be attained. The challenge facing the Community is to mobilize high levels of voluntary participation in GHG reduction efforts.