MEMO

To: Bill King
CITY OF MERCED

From: Jennifer Venema

Cc: Tammy Seale, Pam Johns, Jeanine Cavalli, Chris Read, and Eli Krispi

Date: June 11, 2014

Re: Merced Climate Action Plan Implementation: CAP Strategies and Concepts

We are pleased to submit the updated Technical Memorandum 2 (TM-2) per Task 3E of PMC's scope of work for the Climate Action Plan implementation program. This describes development policies, code concepts, and actions for Climate Action Plan implementation. We look forward to staff's review and comments.

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Introduction

This Technical Memorandum provides a context for and summary of options available to achieve the City's adopted Climate Action Plan (CAP) targets. This memo introduces potential tools as a first step to develop an implementation effort.

State guidance allows the City to use the CAP to analyze the impacts of new development for greenhouse gas (GHG) emissions. For the CAP to provide these benefits, the City must demonstrate that the CAP is consistent with the guidance of the California Environmental Quality Act (CEQA) for qualified GHG reduction strategies. Specifically, a key outstanding task for the City is to evaluate CAP strategies for impacts on GHG emissions. To provide CEQA streamlining, CAP strategies must provide the following:

- Actionable tasks that reduce greenhouse gas emissions
- Certainty that the City can achieve a collective, community-wide GHG reduction target
- Mechanisms to monitor progress reducing emissions

This memo describes emissions in the community of Merced and options for CAP tools to reduce those emissions.

Greenhouse Gas Reduction Target

Baseline Inventory: Existing Conditions

To understand the effectiveness of CAP actions in reducing GHG emissions, the CAP must first present an estimate of current GHG emissions. This estimate provides a baseline level against which GHG reductions can be measured. For the adopted CAP, the City of Merced prepared an inventory for the baseline year of 2008. In 2014, the 2008 inventory was updated for consistency in scope and method to reflect evolving guidance and new data available since preparation of the CAP.

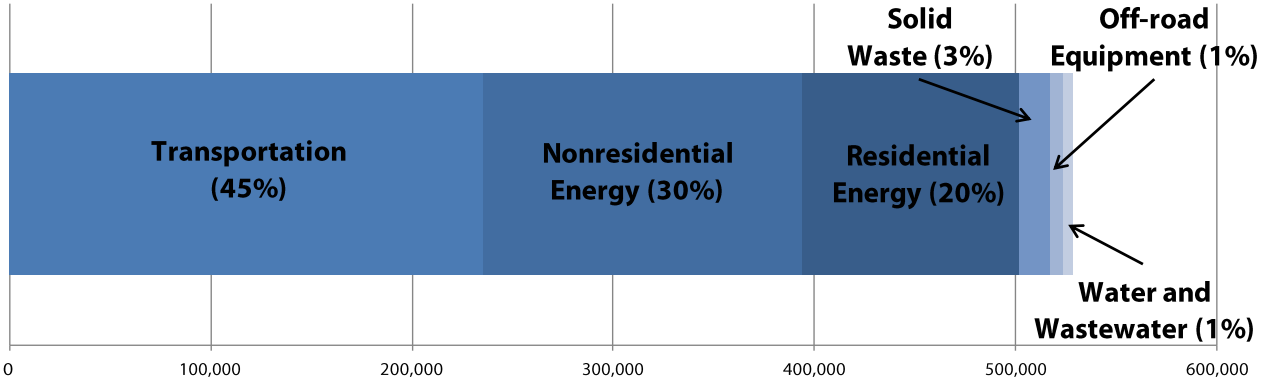
The 2008 inventory calculates GHG emissions resulting from activities that take place within the city. Emissions that do not physically occur in Merced but are directly caused by activities within the community are attributed to Merced and are included in this inventory. For example, electrical appliances in homes and businesses in Merced require energy supplied by power plants located outside of the community, which emit GHG emissions in another location. Activities generating GHG emissions are grouped into types of activities, or sectors, such as energy use and transportation. For each sector, activity data that reflects a measurement of the activity is multiplied by an emission factor to calculate GHG emissions. For instance, the residential energy sector reflects the amount of electricity used by homes in Merced multiplied by an emission factor specific to the utility providing that electricity. Emissions are measured in metric tons of carbon dioxide equivalent ($MTCO_2e$), a common unit of measurement that normalizes different types of GHGs.

In 2008, Merced emitted approximately 527,950 $MTCO_2e$. Of these emissions, 95% resulted from only three sectors: vehicle travel on local roads and state highways within Merced (transportation), energy use in residential buildings, and energy use in nonresidential buildings. Transportation was the single largest sector, contributing approximately 45% of GHG emissions in 2008. Combined, energy use in both the nonresidential and residential sectors contributed 50% of emissions in 2008. Community-wide emissions in 2008 are shown in **Table 1** and **Figure 1.**

Table 1: Merced 2008 Community GHG Emissions

Sector	$MTCO_2e$	Percentage
Transportation	235,570	45%
Nonresidential energy	158,160	30%
Residential energy	107,670	20%
Solid waste	15,850	3%
Off-road equipment	6,310	1%
Water and wastewater	4,390	1%
Total	**527,950**	**100%**

Figure 1: Merced 2008 Community GHG Emissions ($MTCO_2e$)



Energy use in buildings accounts for half of Merced's GHG emissions, details of which are shown in **Text Box 1**. The average city has lower building energy-related emissions. The high level of energy emissions in Merced is likely due to the large nonresidential sector. Text Box 1 provides detail of average energy use in the city.

Text Box 1:

In 2008, the average house in Merced used approximately 7,370 kilowatt-hours (kWh) of electricity and 370 therms of natural gas, with a total annual bill of $1,570.

The average job in Merced used approximately 13,370 kWh of electricity and 290 therms of natural gas, with a total annual bill of $1,880.

Bill totals represent PG&E billing rates as of 2008.

GHG Emissions Forecast: Future Conditions

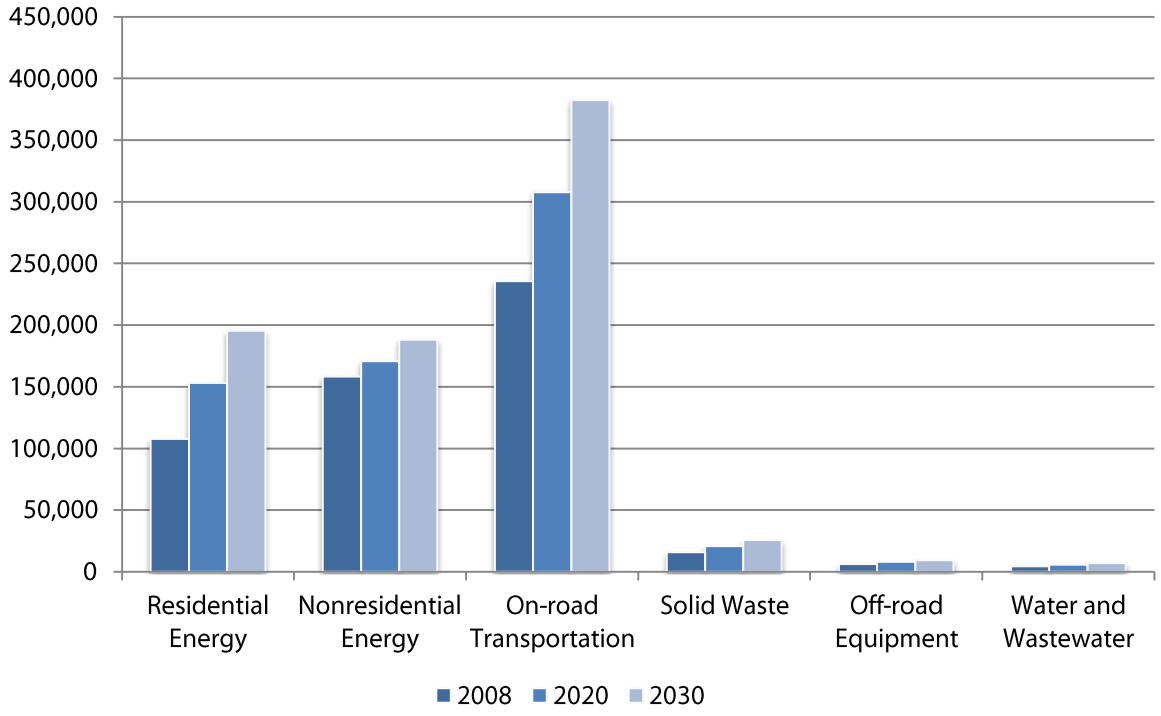
Emissions Forecasts

Once a baseline inventory is established, emissions are forecast for future years as a basis of calculating a reduction target. Like many other communities in the San Joaquin Valley, Merced's population and employment are expected to increase substantially over the next few decades. Without any action taken at the federal, state, or local level to reduce emissions, Merced's GHG emissions are expected to rise significantly as the city experiences growth in the number of new residential and nonresidential buildings, more residents, and more people working and conducting activities in the community.

Emissions are forecast under a business-as-usual (BAU) approach, which excludes intervention at the state or local level. However, California has already implemented a number of programs that reduce GHG emissions locally. The forecast is adjusted to account for GHG reductions from state actions[1]. In 2020, with state actions, the city's GHG emissions will reach 540,350 $MTCO_2e$, a 2% increase above baseline 2008 levels. By 2030, the emissions forecast will increase by 11% from 2008 levels, reaching 585,020 $MTCO_2e$. The transportation sector will remain the largest GHG emissions sector in 2020 and 2030, with total growth of 31,330 $MTCO_2e$ from 2008 to 2030, even after accounting for the impact of state actions. **Figure 2** presents GHG emissions for 2008, 2020, and 2030 by emissions sector. A technical summary of the City's updated GHG inventory and forecast is provided in **Attachment 1**.

[1] The impact of state actions is sometimes referred to as the adjusted business-as-usual forecast, or ABAU approach. The ABAU forecast is adjusted for state actions that require little or no local action to reduce emissions. For this reason, state-mandated actions that give discretion to local governments on specific implementation actions, such as implementation of state recycling requirements or adopting complete street standards, are not included in the ABAU forecast. For more information, refer to Attachment 1.

Figure 2: 2008 Emissions and Forecasted 2020–2030 Emissions by Sector with State Actions ($MTCO_2e$)

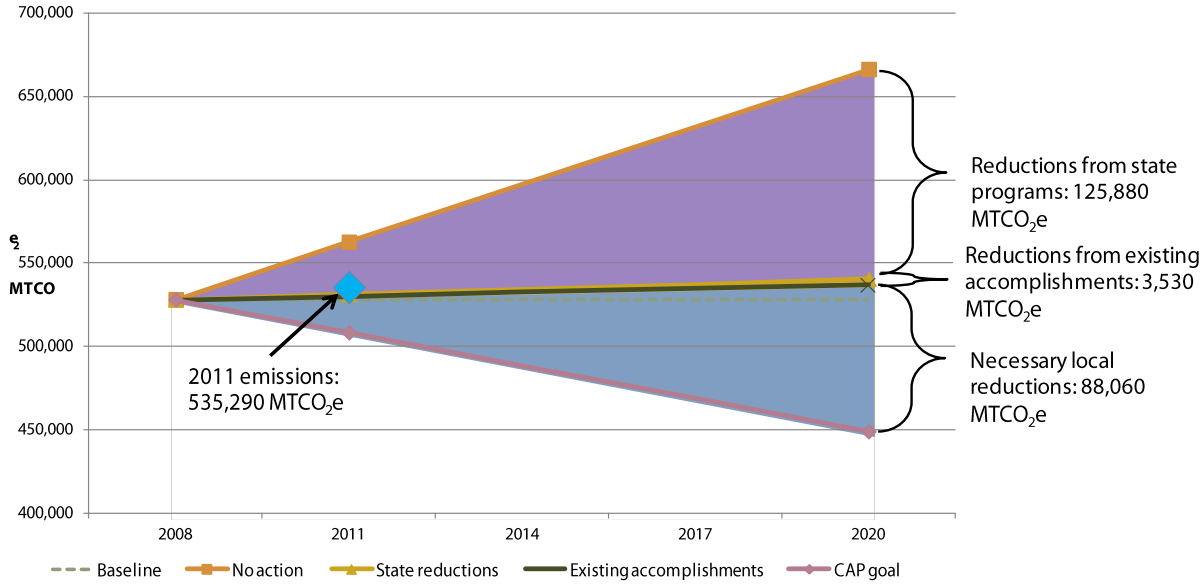


GHG Reduction Targets

In the Merced CAP, the Merced City Council adopted a community-wide GHG reduction target of 1990 levels by 2020. This target is equivalent to a 15% reduction below the baseline year of 2008 by 2020, consistent with the statewide target established by Assembly Bill (AB) 32.

Figure 3 illustrates the adopted 2020 reduction target and 2020 GHG emissions forecast. While actions implemented by the state combined with existing local accomplishments will reduce the majority of emissions needed to reach the 2020 target, the local actions identified in the CAP must still close a gap of approximately 88,060 $MTCO_2e$. The shaded blue area in **Figure 3** represents the GHG emissions that the City must reduce with CAP measures to achieve the adopted CAP target. The City must address the outstanding 88,060 $MTCO_2e$ that remain after state efforts and existing accomplishments with actionable CAP tools and programs. Additional discussion of the City's local accomplishments and progress toward the target is described below.

Figure 3: 2020 GHG Emissions Forecasts and Reduction Target ($MTCO_2e$)



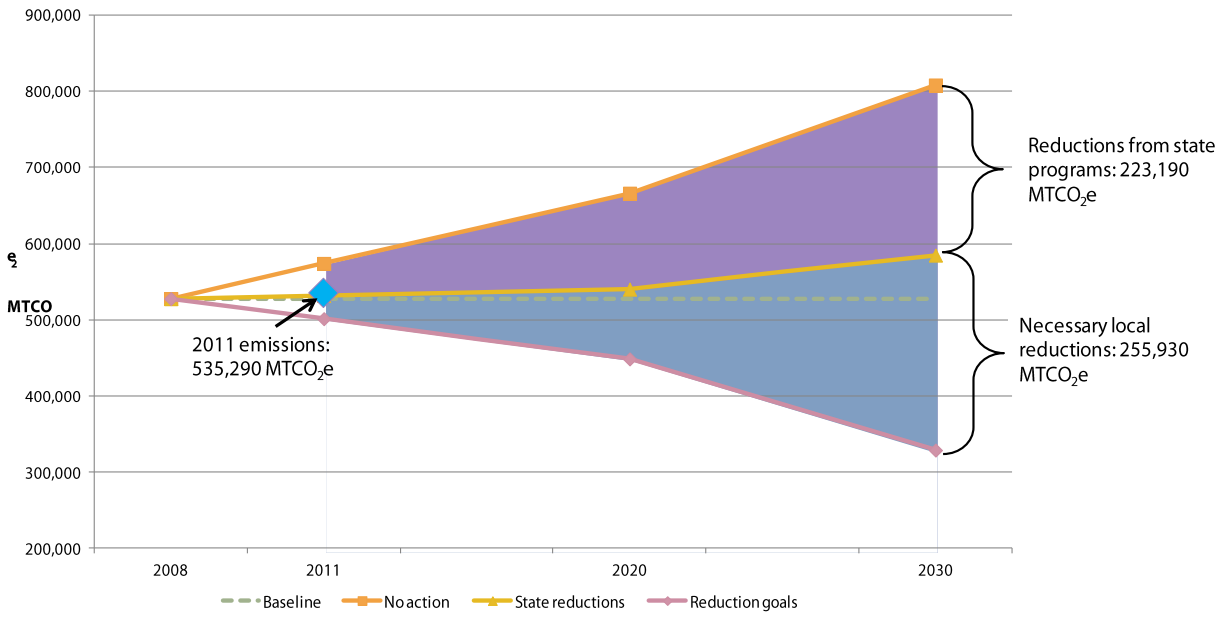
The CAP does not provide a target beyond 2020, but state guidance in the recently updated AB 32 Scoping Plan emphasizes the importance of establishing a post-2020 goal but does not recommend a specific target.[2] Executive Order (EO) S-3-05, signed in 2005, set a 2050 reduction goal of 80% below 1990 levels for the state, but this target has not been formally adopted. The trajectory toward the 2050 target is equivalent to a 2030 target of 38% below baseline levels. The provisional 2030 target, a 38% reduction below baseline 2008 levels, is provided here to illustrate the commitment that would be needed to be on a trajectory to achieve the 2050 reduction target identified in EO S-3-05. A provisional 2030 target also shows emissions associated with the Merced General Plan horizon year. To achieve a reduction of 38% below baseline 2008 levels, the City would need to increase the pace of reductions post-2020. **Figure 4** illustrates the provisional 2030 reduction target of 38% below baseline levels by 2008. The City would need to achieve an additional reduction of 255,930 $MTCO_2e$ by 2030 to achieve a 38% reduction below baseline levels to maintain a trajectory toward California's long-term 2050 GHG reduction goals.

Text Box 2:

The shaded blue area in **Figure 3** represents the GHG emissions that the City must reduce with CAP measures to achieve the adopted CAP target. Accounting for state action and local accomplishments, the City must address the outstanding 88,060 $MTCO_2e$ by 2020 to achieve the CAP target.

[2] California Air Resources Board. 2014. Scoping Plan Update.

Figure 4: 2030 GHG Emissions Forecasts and Reduction Target ($MTCO_2e$)



Local Accomplishments

In addition to the implemented state actions, the City of Merced is also implementing local actions to reduce GHG emissions that have provided early progress toward the reduction target. The City initiated these early accomplishments after the baseline year of 2008. Actions that result in direct reductions in GHG emissions include solar panel installations on community and governmental buildings, energy efficiency retrofits at government facilities, and the Commute Connections Program. **Table 2** provides an estimate of 2020 and 2030 GHG reduction attributable to existing accomplishments.

Table 2: GHG Reductions from Existing Accomplishments

Accomplishment Since 2008	Accomplishment Explanation	GHG Reduction ($MTCO_2e$)	
		2020	2030
Solar Panel Installations	Since 2008, Merced has approved nearly 200 permits for solar panel systems, generating up to more than 4 megawatts (MW) of power.	-1,830	-1,560
Green Facilities Project	The Merced Green Facilities Program, completed in 2012, is an extensive energy retrofit program for City-owned properties and infrastructure.	-1,040	-890
Digester Gas Capture	The Merced Wastewater Treatment Facility captures methane produced during the treatment process and burns it to produce electricity.	-410	-510
Commute Connection	Merced County and the Merced County Association of Governments operate the Commute Connection program to provide ride match and emergency ride home assistance for participants. There are 352 registered commuters in the City of Merced participating in the program.	-250	-260
Total		-3,530	-3,220

Note: Emissions reductions from electricity-related actions may be smaller in 2030 than in 2020 due to state requirements for utilities to provide electricity from cleaner sources. These reductions result from the Renewables Portfolio Standards, described in ***Attachment 1****.*

The existing accomplishments illustrate community and governmental investment in GHG reductions. Although the investment required substantial time and effort, the reductions from the actions are small relative to reductions necessary to achieve the 2020 reduction target. The 3,530 $MTCO_2e$ reduction in 2020 represent less than a 1% reduction below the 2020 forecast; the 3,220 reduction is 2030 is also less than a 1% reduction below the 2030 forecast. While these existing activities are insufficient to achieve the 2020 target without any additional actions, they provide substantial early progress and serve as a foundation for developing future reduction strategies.

Note that the City is supporting other activities that are likely to produce GHG reductions, but there is currently insufficient data to identify the specific reduction. The City can receive credit for these actions if the necessary data is obtained. Actions without specific GHG reductions are supportive of GHG reduction programs and could help to improve their overall effectiveness, such as the 2013 Bicycle

Master Plan. These actions may also improve community-wide sustainability in other ways—for example, by improving the local quality of life and promoting healthy activities.

Summary of Early Progress toward the Reduction Target

As shown in **Table 3**, after accounting for state actions and local accomplishments, the City must achieve a reduction of approximately 88,060 $MTCO_2e$ to achieve the 2020 reduction target. The 88,060 $MTCO_2e$ is also referred to as the emissions "gap" that must be eliminated to achieve the target. This is equivalent to a 16% reduction below the adjusted emissions forecast for 2020. For illustrative purposes, if the 2020 emissions gap were averaged annually from 2008 to 2020, the annualized reduction equivalent would be approximately 7,340 $MTCO_2e$ in addition to the reductions achieved from state actions and local reductions presented here. While this annualized reduction amount does not reflect the ramp-up time often needed for reductions or phasing of state programs, it serves to provide an early benchmark of progress. To achieve the informational 2030 target, the City would need to reduce GHGs by over 11,000 $MTCO_2e$ per year (from 2008 to 2030) above the reductions already counted by state actions and local accomplishments. By 2020, state actions and local accomplishments are expected to achieve annual reductions equivalent to 129,410 $MTCO_2e$, or at a rate of 10,780 additional $MTCO_2e$ per year from 2008–2020.

Table 3: Future GHG Emissions and Reduction Targets, 2020 and 2030 ($MTCO_2e$)

	2020	2030
Baseline (2008) emissions ($MTCO_2e$) = 527,950		
Emissions forecast ($MTCO_2e$)	666,230	808,210
State actions ($MTCO_2e$)	-125,880	-223,200
Local accomplishments ($MTCO_2e$)	-3,530	-3,220
Emissions forecast with state actions and local accomplishments ($MTCO_2e$)	536,820	581,790
Emission target ($MTCO_2e$)	448,760*	329,090**
Local reduction needed to achieve target ($MTCO_2e$)	-88,060	-252,700
Local reduction needed to achieve target (percentage)	-16%	-43%

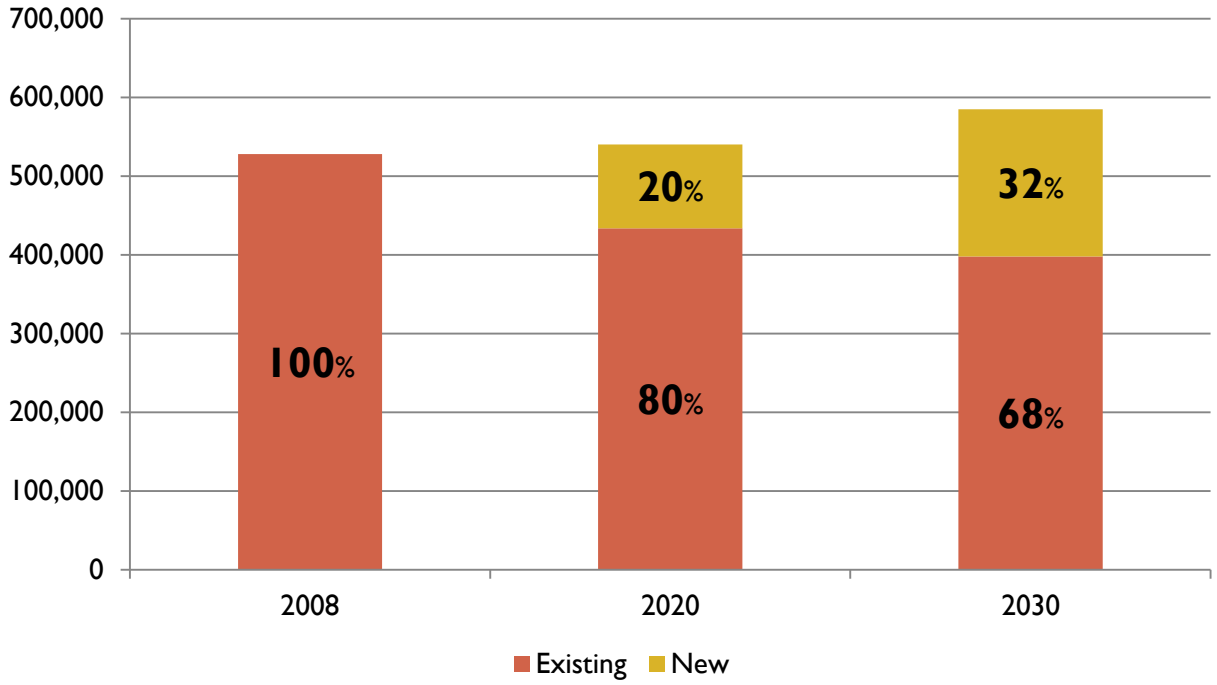
Notes:
**15% below baseline emissions*
***38% below baseline emissions*

Achieving the Reduction Target

To achieve the reduction target, the City must consider emissions from existing sources and from new development and activities. **Figure 5** reports that with state actions and local accomplishments,

approximately 20% of 2020 GHG emissions are expected to come from new homes and jobs established after 2008. All GHG emissions included in the City's 2008 baseline inventory and forecast are presented in the existing and new GHG emissions categories in **Figure 5**. Although new development and actions are anticipated to contribute 20% of 2020 emissions, the vast majority of emissions, 80%, will result from jobs, development, and activities already in place. **Figure 5** demonstrates that an important opportunity and challenge to achieve the 2020 reduction target is addressing the emissions caused by existing development.

Figure 5: GHG Emissions from Existing and New Activities, 2008–2030 ($MTCO_2e$)



Note: Emission levels shown here include reductions from state actions, but not local existing accomplishments

Text Box 3:

Figure 5 demonstrates that an important opportunity and challenge to achieve the 2020 reduction target is addressing the emissions caused by existing development.

Addressing the emissions from existing development generally requires more creative programs. Since the majority of existing homes and businesses do not require land use permits or other regular approvals from the City, the City has more limited opportunity to facilitate reductions in existing GHG emissions. Achieving reductions in existing development often requires the creative use of educational programs, incentives, or partnerships with other agencies to support or encourage reductions. For instance, the Commuter Benefits Program exemplifies an incentive-based program designed to encourage participation in commuting programs and reduce vehicle trips. Other options to reduce emissions in existing development include encouraging the use of efficient appliances with incentives or rebates.

The City has a more direct opportunity to influence emissions in new development through the permit process and code requirements. One of the most effective ways to address emissions from new development is to integrate design-related GHG reduction actions and policies into Merced's development code, which contains the standards for all new construction, including non-building construction such as parking lots and landscaped areas. For instance, the Unified Design Manual (UDM), which will address GHG emissions by incorporating standards for new development and renewable energy siting for new and existing development, will clarify existing and new codes and equip new development to meet City objectives easily and cost-effectively. The UDM will be a comprehensive framework, integrating relevant actions from established City planning documents such as the General Plan and the existing development code, along with new code, where appropriate. The key issues to be addressed in the UDM include subdivision design, site planning and access for alternative transportation (including public transit, pedestrian, and bicycle), standards and incentives for infill development, parking and landscaping standards, and design and siting for renewable energy systems.

Purpose of the CAP Implementation Effort

The City needs to reduce community emissions by 88,060 $MTCO_2e$ in 2020 to reach the target adopted by the Merced City Council in 2012 with adoption of the CAP. The CAP represents the targets and strategies the community is comfortable with. Implementation of the adopted CAP is intended to achieve the reduction target with the following considerations:

- Consistency with the spirit and intent of the 2012 CAP.
- Implementation of City Council's adopted community-design goals and policies.
- Implementation of environmental commitments City Council adopted in the environmental impact report for the Merced Vision 2030 General Plan, including mitigations to improve air quality and protect environmental resources.
- Permit streamlining that supports the type and quality of development envisioned by the Merced General Plan.
- Alignment of development codes with existing air pollution control district requirements.

Available Tools for CAP Implementation

Successful implementation of the CAP requires the coordination of Merced residents, business owners, and City government. A primary benefit of the CAP implementation effort will be to provide new tools that streamline development review. This approach enables the community to meet existing requirements more easily, while also demonstrating the City's ability to achieve its adopted target. CAP actions have the potential to support other community goals, such as improving the quality of existing homes. Additionally, by reducing the amount of electricity and natural gas used in the community through energy efficiency and renewable energy actions, CAP implementation can lower utility bills, saving money for Merced residents and business owners and in turn increasing local disposable income

available for investment in the local economy. An example of potential economic benefits of energy conservation are shown in **Text Box 4**, with an example from the City of Fresno.

The City's adopted Climate Action Plan includes a number of strategies and actions to achieve the reduction target in partnership with community leaders and partners. Appendix I of the CAP breaks out the CAP's action items into permit tools, infrastructure, and public services/programs. These categories underscore the fact that the CAP relies primarily on voluntary measures and programs and on General Plan goals. Other than state mandates, no new community mandatory actions are presented in the CAP, nor does it include proposals for any new fees or charges.

Text Box 4:

Through the Sustainable Fresno Climate Action effort, the City of Fresno analyzed potential cost savings associated with a 30% percent reduction in community-wide energy use below 2009 levels. A 30% energy reduction would increase local disposable income by $260 million, expanding the amount of money available for local goods and services.

Estimated savings for a 30% reduction in both electricity and natural gas. Source: Joseph Oldham, Statewide Local Government Energy Efficiency Best Practices Coordinator

To achieve the target in the CAP, the City will seek to achieve GHG reductions with three overarching strategies:

1. Implement community actions such as educational or incentive programs with as high a certainty to reduce emissions from existing emissions sources as possible, and City actions that reduce emissions through infrastructure and public services updates. Some of these community actions may be in the existing CAP and additional strategies that are consistent with the spirit of the CAP may be identified. City actions may include state mandates, infrastructure, and public service updates identified in the CAP, and the implementation of General Plan policies and General Plan EIR mitigation actions.
2. Adopt code amendments that reduce emissions through various means, such as energy efficiency and alternative transportation. The CAP implementation effort is intended to be consistent with the General Plan EIR; code amendments will ensure that new development is consistent with the mitigations identified in the City's General Plan EIR. **Attachment 2** provides a list of applicable adopted mitigation measures. Through implementation of the CAP, the City will also be implementing General Plan actions adopted by City Council. California Government Code Section 65400(b) requires that local planning agencies provide annual reports on the status of the General Plan and implementation progress. With the deployment of CAP programs consistent with General Plan EIR mitigations, the City will be demonstrating local efforts to implement the General Plan.

Additionally, while the City does not currently impose requirements that exceed state regulations, new development in the Central Valley must comply with additional regulations of the San Joaquin Valley Air Pollution Control District (SJVAPCD) Rule 9410. Merced is within the jurisdiction of the SJVAPCD. Air districts such as the SJVAPCD have regulatory authority over sources of air pollution and GHGs in their territory. New development subject to the SJVAPCD's Indirect Source Review (ISR) must mitigate project impacts or pay fees to the SJVAPCD based on the project emissions. These fees are in addition to and separate from any entitlements or development fees required by the City of Merced. Staff and the consultant recommend that developments within the City incorporate ISR design elements as opposed to fees being paid to the SJVAPCD for benefit and use by other jurisdictions and projects. This

approach does not add fees or requirements to development, and supports the City's efforts to streamline its development review process. Refer to **Attachment 3** for a summary of ISR mitigations.

3. Prepare user-friendly, graphic design guidelines of codes and policies with emissions reduction potential in a Unified Design Manual.

The GHG reduction impact for each of these topics will vary, depending on the level of priority and the scope of the program. For example, mandatory actions have a higher potential to achieve greater GHG reductions and achieve higher levels of participation, while voluntary or educational programs generally provide lower levels of GHG reductions and achieve lower levels of participation.

Figure 6 shows the range of GHG reduction certainty across different approaches. For example, actions that impose new requirements enforceable through regulations or policies, such as mandatory energy efficiency in new buildings, generally provide the greatest level of certainty to achieve the reduction target. For certain actions, City efforts to impose requirements on new development may be less costly for the City to implement than an ongoing, voluntary educational campaign. Refer to Appendix I of the 2012 CAP for a listing of potential actions by type of implementation approach. The current effort to implement the CAP will include a cost-benefit analysis of key CAP strategies to help identify worthwhile projects based on factors such as cost ($); staff capacity; GHG reduction potential; and value to co-benefits such as improved air quality, recreation, and the increased disposal income of citizens.

Figure 6: GHG Reduction Certainty by Action Type

Note that incentive programs traditionally offered by local jurisdictions include reduced permit fees and/or faster permitting The City's ability to incentivize is somewhat limited due to internal budgetary and staffing constraints, however. Absent adjustments to the City budget, an innovative set of incentives should be utilized for implementing the City's CAP.

Reduction Framework

Table 4 organizes the City's options to reduce GHG emissions. Potential actions are grouped into two categories: (1) programs that the City must undertake through incentives, partnerships, or education efforts, and (2) those that will be accomplished through code updates or the UDM. All actions

presented in **Table 4** provide opportunities to achieve GHG reductions and meet CEQA guidance for the CAP. Actions are also reflective of community values identified in the CAP, but the degree to which actions meet these values will vary based on implementation approaches. Additional information on the code updates and UDM is included in **Attachment 4** and **Attachment 5**. **Attachment 4** presents a draft outline for the unified design manual, while **Attachment 5** provides additional information on priority code concepts that are introduced in **Table 4**.

The level of reductions to be achieved through each action will vary depending on the range of methods available for implementation. All actions are presented with the spectrum of potential options to encourage, incentivize, or require reductions for the applicable sector. Examples are provided to contextualize the range of reduction potential. These options build on strategies in the CAP. The table identifies new actions, potential participants, and the benefits of implementation. In addition to GHG reductions, these benefits can also include items such as financial savings for community members, increased compliance with SJVAPCD standards, and promotion of climate adaptation.

Table 4: Options to Achieve GHG Reductions

Actions	Scope of Applicable Emissions Sector (2020)	Participants	Spectrum of Actions: Encourage (Adopted CAP Strategies)	Spectrum of Actions: Incentivize (Adopted CAP Strategies)	Spectrum of Actions: Require	Other Benefits
CODE AMENDMENTS AND UNIFIED DESIGN MANUAL						
Land use and design	Potential to target 54,470 $MTCO_2e$ for new development	New development and remodels that require a land use permit	Up to 1% reduction in transportation emissions for new projects Provide guidance to encourage compact subdivision design, alternative transit, and mixed uses	1%–2% reduction in transportation emissions for new projects Provide development and permitting bonuses for preferred land use patterns Provide expedited permit review for preferred land use patterns Provide a density bonus for infill development that is interconnected to community-serving uses	3%–6% reduction in transportation emissions for new projects Codify requirements in the Zoning Code Require compact and connected subdivisions Restrict most development to existing urban or village core areas	Meets SJVAPCD requirements Supports climate adaptation
Renewable energy and energy efficiency	Potential to target 39,180 $MTCO_2e$ for new development	New development and remodels that require a land use permit	Range of reduction potential Guidance for installation of renewable energy facilities	Range of reduction potential, low participation Reduced permitting fees for projects with renewable energy facilities	Reduction potential of 100% reduction in energy use per project, high participation Require new development to meet CALGreen Tier 1 standards Require new development to offset all electricity use with on-site renewables	Energy conservation Supports climate adaptation Meets SJVAPCD requirements

Actions	Scope of Applicable Emissions Sector (2020)	Participants	Spectrum of Actions			Other Benefits
			Encourage (Adopted CAP Strategies)	Incentivize (Adopted CAP Strategies)	Require	
Landscape design	Supportive – potential to target 540 $MTCO_2e$ for water use in new development	New development and remodels that require a land use permit	Support the use of native and drought-tolerant plants	Provide density bonuses or other incentives for projects with minimal turf area	Require the use of native and drought-tolerant plants for new landscapes	Water conservation
Recycling facilities	Supportive – 4,860 $MTCO_2e$ from waste generated by new development	New development and remodels that require a land use permit	Guidance for recycling and trash enclosures	Incentivize or composting on-site	Require on-site facilities for composting and recycling	
OTHER PROGRAMS AND ACTIONS TO IMPLEMENT THE CAP						
Residential energy efficiency	98,300 $MTCO_2e$ for existing development 28,910 $MTCO_2e$ for new development	New and existing homes	1%–2% reduction per participant, low participation Provide residential energy audits	10%–15% reduction per participant, low participation Reduce permitting fees for green building	15%–40% reduction per participant, high participation Require new development and major remodels to exceed Title 24 energy efficiency standards	Meets SJVAPCD requirements Supports climate adaptation Energy conservation Supports community values

Actions	Scope of Applicable Emissions Sector (2020)	Participants	Spectrum of Actions			Other Benefits
			Encourage (Adopted CAP Strategies)	Incentivize (Adopted CAP Strategies)	Require	
Nonresidential energy efficiency	137,230 $MTCO_2e$ for existing development 10,270 $MTCO_2e$ for new development	New and existing businesses, government facilities, warehouses, and other nonresidential structures	1%–2% reduction per participant Educate business owners about energy-efficient behaviors	5%–15% reduction per participant Provide rebates for energy-efficient office equipment Participate in a program that provides low-cost financing for energy efficiency improvements	15%–25% reduction per participant Require new development and major remodels to exceed Title 24 energy efficiency standards	Meets SJVAPCD requirements Supports climate adaptation Energy conservation Supports community values
Renewable energy	148,000 $MTCO_2e$ for existing development 18,890 $MTCO_2e$ for new development		Potentially up to 100% reduction in electricity use per participant, with lower participation Provide education about installing renewable energy facilities Support a green building program	Potentially up to 100% reduction in electricity use per participant Provide financing for renewable energy facilities	Potentially up to 100% reduction in electricity use per participant with higher participation Require renewable energy facilities for some or all new developments and/or major remodels	Meets SJVAPCD requirements Supports climate adaptation Energy conservation Supports community values

Actions	Scope of Applicable Emissions Sector (2020)	Participants	Spectrum of Actions			Other Benefits
			Encourage (Adopted CAP Strategies)	Incentivize (Adopted CAP Strategies)	Require	
Transportation	177,570 $MTCO_2e$ for existing development 54,470 $MTCO_2e$ for new development	Residents, businesses, and employees in Merced	Up to 1% reduction in transportation emissions per participant, with lower participation Provide bicycle safety education	1%–2% reduction in transportation emissions per participant, with lower participation Support increased transit routes and provide commuter passes	3%–6% reduction in transportation emissions per participant with higher participation Develop a mandatory Transportation Demand Management Program that requires local employers to provide commuter passes or incentives	Meets SJVAPCD requirements Supports community values
Water and wastewater	3,700 $MTCO_2e$ for existing development 1,130 $MTCO_2e$ for new development	Water customers in Merced	1%–2% reduction in water and wastewater emissions per participant Provide education about water-efficient plumbing fixtures	5%–10% reduction in water and wastewater emissions per participant Offer incentives for turf replacement	Up to 20% reduction in water and wastewater emissions per participant Require water efficiency upgrades prior to home sales Provide or require use of recycled water for non-potable water demand, such as landscaping	Meets SJVAPCD requirements Supports community values

Actions	Scope of Applicable Emissions Sector (2020)	Participants	Spectrum of Actions			Other Benefits
			Encourage (Adopted CAP Strategies)	Incentivize (Adopted CAP Strategies)	Require	
Solid waste	15,850 $MTCO_2e$ for existing development 4,860 $MTCO_2e$ for new development	Residents, employees, and businesses	2%–4% reduction in solid waste emissions per participant Offer classes on backyard composting	4%–6 % reduction in solid waste emissions per participant Adjust waste fee structure to incentivize increased recycling Provide curbside composting Pilot a food-to-waste program with local businesses	5%–15% reduction in solid waste emissions per participant Enforce state recycling requirements for businesses Enter into a new contract with waste providers that requires higher community-wide waste diversion rates	Supports community values

Attachment 1: Technical Appendix for Greenhouse Gas Emissions Inventory and Forecast Updates

Summary of 2008 Inventory and Forecast Updates

The City of Merced prepared the 2008 inventory, which analyzed greenhouse gas (GHG) emissions for electricity and natural gas use in residential and nonresidential buildings, on-road transportation, and solid waste deposited in a landfill (not included alternative daily cover, or ADC). Inventory revisions reflect methods in a new inventory prepared by the Great Valley Center (GVC) for the baseline year of 2011.[3] Updates also ensure that the inventory follows the most recent guidance in the US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, the first protocol developed for community-wide GHG inventories that provides the most widely-accepted methods for preparing inventories.[4]

Updates also sought to ensure that the inventory was a reasonably complete summary of the source of GHG emissions attributable to the City of Merced consistent with state guidance. The California Environmental Quality Act Guidelines also indicates the scope of activities to be included in the inventory for purposes of streamlining. Under the California Environmental Quality Act (CEQA) Guidelines Section 15183.5(b), a CAP providing should must quantify GHG emissions, both existing and forecasted for activities within a defined geographic area.

GHG emissions from the residential and nonresidential energy sectors were recalculated using more recent emission factors. Activity data and GHG emissions from the on-road transportation, solid waste, and water and wastewater sectors were recalculated, following the methods used in the 2011 Great Valley Center inventory and the US Community Protocol. The off-road equipment sector was not included in the 2011 Great Valley Center inventory and so was added for consistency with the US Community Protocol. Data sources for activity data and emission factors varied by sector, but generally included utility companies, state agencies, local and regional governments, and the US Community Protocol. **Table A1-1** identifies the sectors in the 2008 inventory and their relation to the sectors in the US Community Protocol, data sources, and a description of the updates. **Table A1-2** summarizes activity data and GHG emissions for each sector and subsector for the updated 2008 inventory. Emission factors for the updated 2008 inventory and their sources are given in **Table A1-3.**

[3] Great Valley Center. 2014. City of Merced 2011 Inventory of Community and Government Operations Greenhouse Gas Emissions.

[4] ICLEI – Local Governments for Sustainability USA. 2013. U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions.

Table A1-1: 2008 Inventory Scope and Updates

Sector	Data Source	Notes	US Community Protocol Corresponding Sector
Residential energy	PG&E, MID, Community Protocol	Emissions were recalculated, using updated emission factors from PG&E and the Community Protocol, for consistency with the Protocol and the 2011 GVC inventory	Built environment
Nonresidential energy	PG&E, MID, Community Protocol	Emissions were recalculated, using updated emission factors from PG&E and the Community Protocol, for consistency with the Protocol and the 2011 GVC inventory	Built environment
On-road transportation	CARB, Caltrans	Activity data and emissions were recalculated using CARB and Caltrans data, for consistency with the 2011 GVC inventory	Transportation and other mobile
Solid waste	MCRWMA, CalRecycle	Activity data and emissions were recalculated with MCRWMA and CalRecycle data, for consistency with the Protocol and the 2011 GVC inventory	Solid waste
Off-road equipment	CARB	This sector was added, using CARB data, for consistency with the Protocol	Transportation and other mobile
Water and wastewater	City of Merced, PG&E, Community Protocol	Activity data and emissions were recalculated for consistency with the Protocol and the 2011 GVC inventory	Wastewater and water

CARB: California Air Resources Board
MCRWMA: Merced County Regional Waste Management Authority
MID: Merced Irrigation District
PG&E: Pacific Gas and Electric
CalRecycle: California Department of Resources Recycling and Recovery

Table A1-2: 2008 Activity Data and GHG Emissions

Sector	Subsector	Activity Data		$MTCO_2e$
Residential energy	Residential electricity use	185,883,530	kWh	57,570
	Residential natural gas	9,418,610	therms	50,100
Nonresidential energy	Nonresidential electricity use	326,357,620	kWh	120,740
	Nonresidential natural gas	7,034,990	therms	37,420
On-road transportation	On-road passenger vehicles	349,593,380	VMT	235,570
Solid waste	Solid waste disposal	50,570	tons of waste	15,850
Off-road equipment	Lawn & garden	140,270	gallons of fuel	1,190
	Construction	425,999	gallons of fuel	5,120
Water and wastewater	Indirect water emissions	5,880,300	kWh	2,110
	Direct emissions	—	—	320
	Indirect electricity	4,699,340	kWh	1,970
Total*		—	—	**527,950**

*Due to rounding, the total may not equal the sum of component parts.

Table A1-3: 2008 GHG Emission Factors

Sector	Subsector	2008 Emission Factor		Source
Residential energy	Residential electricity use	0.000310	$MTCO_2e$/kWh	PG&E, US Community Protocol
	Residential natural gas	0.005320	$MTCO_2e$/therm	PG&E
Nonresidential energy	Nonresidential electricity use	0.000370	$MTCO_2e$/kWh	PG&E, US Community Protocol
	Nonresidential natural gas	0.005320	$MTCO_2e$/therm	PG&E
On-road transportation	On-road passenger vehicles	0.000674	$MTCO_2e$/VMT	CARB (EMFAC 2011 model)
Solid waste	Solid waste disposal	0.313329	$MTCO_2e$/ton	CARB (landfill model)
Off-road equipment	Lawn & garden	0.008462	$MTCO_2e$/gallon	CARB (Offroad 2007)
	Construction	0.012024	$MTCO_2e$/gallon	CARB (Offroad 2007)
Water and wastewater	Indirect water emissions	0.000359	$MTCO_2e$/kWh	PG&E, US Community Protocol
	Direct emissions	—	—	N/A
	Indirect electricity	0.000419	$MTCO_2e$/kWh	US Community Protocol

Emissions are forecasted to 2020 and 2030. 2020 is the year for achieving GHG reduction targets established by the Merced City Council; a 2020 forecast will indicate the size of the GHG reduction Merced must achieve to meet this goal. 2030 is the completion (buildout) year for the Merced General Plan; a 2030 forecast allows an estimate of emissions upon full implementation of the General Plan. Forecasts are made using indicators: demographic data that suggests how emissions in a particular sector will change. For example, the projected increase in the number of households in Merced is used as an indicator for residential energy and off-road equipment. Indicators are provided by the City of Merced, supplemented with data from the Merced County Association of Governments (MCAG) or state agencies as needed. Forecast indicators and their sources are given in **Table A1-4**.

Table A1-4: Forecast Indicators, 2008–2030

Indicator	Applicable Sectors	2008	2020	2030	Source	Percentage Change, 2008–2030
Number of households	Residential energy, off-road equipment (lawn & garden)	25,230	35,870	45,800	CA Department of Finance, MCAG	82%
Number of new households	Off-road equipment (construction)	250	890	990	CA Department of Finance, MCAG	296%
Number of jobs	Nonresidential energy	24,420	26,370	29,040	US Census	19%
Service population	On-road transportation, solid waste, water and wastewater (all subsectors)	102,520	133,970	166,440	CA Department of Finance, MCAG, US Census	62%

Emissions are forecasted under a business-as-usual (BAU) scenario that assumes no GHG reductions from federal, state, or local/regional activities. Forecast emissions are shown in **Table A1-5**.

Table A1-5: GHG Emissions, 2008–2030 (BAU Scenario)

Sector	2008 $MTCO_2e$	2020 $MTCO_2e$	2030 $MTCO_2e$	Percentage Change, 2008–2030
Residential energy	107,670	153,070	195,460	**82%**
Nonresidential energy	158,160	170,820	188,140	**19%**
On-road transportation	235,570	307,830	382,450	**62%**
Solid waste	15,850	20,710	25,730	**62%**
Off-road equipment	6,310	8,060	9,290	**47%**
Water and wastewater	4,390	5,740	7,140	**63%**
Total	**527,950**	**666,230**	**808,210**	**53%**
Percentage change from baseline		**26%**	**53%**	—

The BAU scenario is useful for illustrating a high-emissions forecast, but it fails to account for actions to reduce GHG emissions that are planned or already underway. There are a number of actions taken by

California to reduce statewide GHG emissions, which help to reduce emissions from the City of Merced. The state efforts are described below.

Assembly Bill 1493 and the Local Carbon Fuel Standard

Assembly Bill 1493 (the Pavley Standards) establishes GHG emission standards for passenger cars, light-duty trucks (up to 5,750 pounds), and medium-duty trucks (up to 8,500 pounds) from 2009 to 2016. The Low Carbon Fuel Standard (LCFS) calls for a 10% reduction in carbon intensity in California's transportation fuels by 2020 and is expected to reduce GHG emissions for all vehicles, including those not covered by the Pavley Standards.

GHG reductions from the Pavley Standards and the LCFS were calculated using the publicly available EMFAC model provided by the California Air Resources Board (CARB) for Merced County, which estimates vehicle miles traveled (VMT) and GHG emissions for various classes of cars. The EMFAC model estimates that these standards are expected to reduce Merced's on-road transportation GHG emissions by 25% in 2020 and by 30% in 2030. In addition, the fuel efficiency benefits of the Pavley Standards may reduce fuel costs for drivers.

Renewables Portfolio Standard

California's Renewables Portfolio Standard (RPS) mandates that utility providers obtain 33% of their electricity from qualified renewable sources by 2020. Both PG&E and the Merced Irrigation District must meet this requirement. In 2008, approximately 11.9% of PG&E's electricity came from qualified renewable sources; this percentage is not known for the Merced Irrigation District but is assumed to be equal to the statewide average (approximately 10.6%). While utility companies have made significant strides to achieve the 2020 goal, the California Public Utilities Commission (CPUC) has indicated that electricity provides may not meet the 33% target due to transmission and permitting issues that have proven significant barriers to the development of renewable energy.

In order to account for this uncertainty and to take a more cautious approach, the GHG reductions for the Renewables Portfolio Standard rely on the scenario modeled by the CPUC in its June 2009 RPS Implementation Analysis Report, assuming that 28% of electricity will come from renewable sources in 2020. The forecast assumes that in 2030, utility companies will receive 35% of their electricity from renewable sources. The RPS is expected to reduce GHG emissions from electricity use by 17% in 2020 and by 29% in 2030.

California Building Code, Title 24

Title 24 of the California Code of Regulations provides standards for new buildings and (in the 2013 update) substantial renovations/additions to existing buildings. It includes requirements for structural, plumbing, electrical, and mechanical systems, as well as for fire and life safety, energy conservation and sustainable design, and accessibility. The 2010 update to Title 24 is the current version and applies to all new structures that applied for a building permit on or after January 1, 2011. The 2013 update to Title 24 is set to go into effect on July 1, 2014. This forecast focuses on two sections of Title 24: Part 6 (California Energy Code) and Part 11 (California Green Building Standards Code, also known as CALGreen). These sections require reductions in energy use for all applicable structures. Title 24 is a statewide standard implemented by local agencies through project review.

This forecast incorporated the net energy benefits of each new Title 24 update that did not exist in the baseline year (2008), based on California Energy Commission (CEC) studies that compare each new update of Title 24 to its former version. Past updates to Title 24 have resulted in efficiency increases equal to or higher to those forecast in the CEC studies, but such studies have been used in this forecast as a more cautious approach. Future standards are assumed to result in reductions equal to 70% of the reductions achieved in the 2013 update. Reductions from renovations and additions have not been

modeled due to uncertainty. Title 24 is expected to reduce GHG emissions from total building energy use by 4% in 2020 and by 9% in 2030.

Table A1-6 shows forecasted GHG emissions when reductions from state actions are taken into account. **Table A1-7** shows specific reductions from statewide activities. Emission factors with the statewide actions are given in **Table A1-8**.

Table A1-6: GHG Emissions, 2008–2030 (State Actions)

Sector	2008 $MTCO_2e$	2020 $MTCO_2e$	2030 $MTCO_2e$	Percentage Change, 2008–2030
Residential energy	107,670	127,210	138,790	**29%**
Nonresidential energy	158,160	147,510	139,330	**-12%**
On-road transportation	235,570	232,040	266,900	**13%**
Solid waste	15,850	20,710	25,730	**62%**
Off-road equipment	6,310	8,060	9,290	**47%**
Water and wastewater	4,390	4,820	4,980	**13%**
Total	**527,950**	**540,350**	**585,020**	**11%**
Percentage change from baseline		**2%**	**11%**	—

Table A1-7: GHG Reductions from State Actions, 2020–2030

	2008 $MTCO_2e$	2020 $MTCO_2e$	2030 $MTCO_2e$
BAU Emissions	527,960	666,230	808,210
Pavley and LCFS	—	-75,790	-115,550
Renewables Portfolio Standard	—	-36,450	-73,600
Title 24	—	-13,640	-34,050
Total State Reductions	—	**-125,880**	**-223,200**
Emissions with State Reductions	527,960	540,350	585,010
Percentage Change from 2008	—	2%	11%

Table A1-8: GHG Emission Factors, 2008–2030

Sector	Subsector	2008 and BAU	State Actions (2020)	State Actions (2030)	Unit	Source
Residential energy	Residential electricity use	0.000310	0.000259	0.000231	$MTCO_2e/kWh$	PG&E, US Community Protocol
	Residential natural gas	0.005320	0.005320	0.005320	$MTCO_2e/therm$	PG&E
Nonresidential energy	Nonresidential electricity use	0.000370	0.000306	0.000253	$MTCO_2e/kWh$	PG&E, US Community Protocol
	Nonresidential natural gas	0.005320	0.005320	0.005320	$MTCO_2e/therm$	PG&E
On-road transportation	On-road passenger vehicles	0.000674	0.000508	0.000470	$MTCO_2e/VMT$	CARB (EMFAC 2011 model)
Solid waste	Solid waste disposal	0.313384	0.313384	0.313383	$MTCO_2e/ton$	CARB (landfill model)
Off-road equipment	Lawn & garden	0.008462 —	0.008462 —	0.008462 —	0.008462—	CARB (Offroad 2007)
	Construction	0.012024 —	0.012024 —	0.012024 —	0.012024—	CARB (Offroad 2007)
Water and wastewater	Indirect water emissions	0.000359	0.000298	0.000250	$MTCO_2e/kWh$	PG&E, US Community Protocol
	Direct emissions	—	—	—	N/A	GVC
	Indirect electricity	0.000419	0.000346	0.000272	$MTCO_2e/kWh$	US Community Protocol

Attachment 2: Summary of Policies and Environmental Impact Report Mitigations from the Merced Vision 2030 General Plan Policy Supported by the Climate Action Plan

Topical Environmental Categories for General Plan Policies

The environmental review checklist contains 17 topical categories that are examined in the CEQA review. Potential environmental impacts of projects (whether private development or public improvements) are assessed using these 17 categories, which are listed below.

Topical Environmental Categories

1. Aesthetics
2. Agricultural Resources
3. Air Quality
4. Biological Resources
5. Cultural Resources (not applicable)
6. Geology/Soils (not applicable)
7. Hazards and Hazardous Materials
8. Hydrology and Water Quality
9. Land Use and Planning
10. Mineral Resources (not applicable)
11. Noise (not applicable)
12. Population and Housing
13. Recreation (not applicable)
14. Public Services
15. Transportation
16. Utilities and Services
17. Global Climate Change

For each category, there are a number of impact thresholds that are assessed, ranging from two to seven. An environmental review addresses a total of 75 different thresholds. A project's environmental impact can be reduced by applying various mitigation or adopted city policies. As described below, approximately one-quarter of these thresholds are addressed by mitigation or policies that also reduce greenhouse gas (GHG) emissions.

A primary objective of the PCAP project is to streamline CEQA review, as it pertains to climate change. This is accomplished by adopting a plan that assures a certain level of GHG emission reductions. The City's Climate Action Plan recognizes that there are numerous opportunities to reduce emissions. For example, an urban forest can reduce the ambient temperatures in a city, which in turn can reduce the amount of air conditioning, which equates to a reduction in energy used. This in turn reduces the burning of fossil fuels (GHGs). As with many actions that reduce emissions, tangible positive benefits also occur. In our example of an urban forest, these include reduced utility bills and an attractive community.

Frequency of Policies in Topical Categories

Given that GHG reduction-related policies could be found in more than just the Global Climate Change topical category, an assessment of the extent of this occurrence was performed. Of the 17 topical categories, 12 included GHG reduction-related policies; these categories are marked in bold above. While policies were most prevalent in the Global Climate Change category, they were also frequent in other categories, including: 1) Population and Housing; 2) Public Services; 3) Transportation; and 4) Land Use Planning. The frequency of policies in topical categories is listed below.

Frequency	Topical Category
32	Global Climate Change
19	Population and Housing
15	Public Services
15	Transportation
13	Land Use and Planning
9	Utilities and Services
8	Agricultural Resources
8	Air Quality
7	Hydrology and Water Quality
4	Biological Resources
4	Hazards and Hazardous Materials
2	Aesthetics

Common Policies across Topical Categories

The EIR of the City's General Plan referenced 70 different policies that had some effect in reducing GHG emissions. These policies occur in various topical categories, appearing 136 times in the EIR. Converting these 70 policies to code is simply not feasible within the scope of the PCAP project. To determine which policies should be considered, staff identified those policies that had the highest frequency rate in the EIR. For example, City policy to encourage infill development and a compact urban form appeared in six different topical categories. The assessment performed by staff found that 16 policies accounted for 60 of the 136 occurrences of GHG-related policies in the EIR. These policies and their frequency of occurrence are listed below.

Frequency	Policy
6	Policy L-3.2: Encourage infill development and a compact urban form.
5	Policy UE-1.2: Foster compact and efficient development patterns to maintain a compact urban form.
5	Policy LU-1.9: Ensure connectivity between existing and planned urban areas.
4	Policy OS-1.4 Improve and expand the City's urban forest.

4	Policy SD-1.3: Integrate land use planning, transportation planning, and air quality planning for the most efficient use of public resources and for a healthier environment.
4	Policy P-4.2 calls for the City to consider the use of reclaimed water to reduce non-potable water demands whenever practical.
4	Policy L-3.1: Create land use patterns that will encourage people to walk, bicycle, or use public transit for an increased number of their daily trips.
4	Policy L-3.3: promote site designs that encourage walking, cycling, and transit use.
3	Policy P-1.2: Utilize existing infrastructure and public service capacities to the maximum extent possible and provide for the logical, timely and economically efficient extension of municipal infrastructure and services where necessary.
3	Policy P-6.1 Establish programs to recover recyclable materials and energy from solid wastes generated within the City.
3	UD-1.1: Apply Urban Village design principles to new development in the City's new growth areas.
3	Policy SD-3.2: Encourage the use of energy conservation features, low-emission equipment, and alternative energy sources for all new residential and commercial development.
3	Policy P-3.2 of the Public Services and Facilities Element states that the City will work with the County and MID to stabilize the region's aquifer.
3	Policy UE-1.5: Promote the annexation of developed areas within the City's SUDP/SOI during the planning period
3	Policy UD-1.2: Distribute and design Urban Villages to promote convenient vehicular, pedestrian, and transit access.
3	Policy L-1.7: Encourage the location of multi-family developments on sites with good access to transportation, shopping, employment centers, and services.

Mitigations for Key Policies

A selection of relevant impacts identified in the General Plan EIR and associated mitigation measures are presented below. General Plan EIR mitigations were adopted by City Council to mitigate, or lessen, the impact of General Plan policies.

KEY FOR MITIGATIONS:

Effect on GP Mitigation Implementation

M Mitigate: Action mitigates identified impact of the City's GP unless marked with SOC.

R Reduce: Policies reduce impact to less than significant.

E Enhance. Improve effect of existing policy or code, but no direct change in impact classification because impact is either already less than significant (lts) or significant and unavoidable (su).

Scale of Development:

Macro	Urban Expansion (SUDP, Annexation), or collaborative program
Mid	Land Use Inter-relationships (Zoning)
Micro	Site Design (CUP, SPV)

Impact #3.2-1: Directly or indirectly result in conversion of Prime Farmland, Unique Farmland or Farmland of Statewide Importance (Farmland) to non-agricultural use

(M-Macro) Mitigation Measure #3.2-1: The City will encourage property owners outside the City limits but within the Specific Urban Development Plan (SUDP)/ Sphere of Influence (SOI) to maintain their land in agricultural production until the land is converted to urban uses. The City will also work cooperatively with land trusts and other non-profit organizations to preserve agricultural land in the region. This may include the use of conservation easements. Infill development will be preferred and encouraged over fringe development. Sequential and contiguous development is also preferred and encouraged over leap-frog development.

Slow Conversion of Ag in the City's SUDP

(E-Macro) Policy UE-1.1, Implementing Action 1.1.a, the City shall direct development away from significant concentrations of "Prime" agricultural soils and give priority to the conversion of non-prime agricultural land if reasonable alternatives exist.

(E-Macro) Policy L-3.2 encourages infill development and a compact urban form.

(E-Mid) Policy L-3.2, Implementing Action 3.2.a, the City encourages infill of vacant parcels.

Protect Ag Lands Outside SUDP:

(E-Macro) Policy UE-1.1, Implementing Action 1.1.d, the City shall work with Merced County to establish policies to protect prime agricultural areas around the SUDP/Sphere of Influence.

(E-Macro) Policy OS-2.1, Implementing Action 2.1.a, the City shall continue to explore the use of Farmland Trusts, exclusive agricultural zoning, and the transfer of development rights to protect prime agricultural areas.

(E-Mid) Policy UE-1.1, Implementing Action 1.1.b, the City shall limit development and development related impacts on agricultural lands along the City's urban fringe.

(E-Mid) Policy OS-2.1 calls for the City to protect agricultural areas outside the City's SUDP/SOI from urban impacts.

Impact #3.3-1: Construction activities associated with development under the Merced Vision 2030 General Plan would result in criteria pollutants, ozone precursors, and other pollutants.

(M-Micro) Mitigation Measure #3.3-1b: To reduce emissions and thus reduce cumulative impacts, the City of Merced shall consider adoption of an ordinance requiring the following measures to be implemented in conjunction with construction projects within the City:

1. *The idling time of all construction equipment used in the plan area shall not exceed ten minutes when practicable.*
2. *The hours of operation of heavy-duty equipment shall be minimized when practicable.*
3. *All equipment shall be properly tuned and maintained in accord with manufacturer's specifications when practicable.*
4. *When feasible, alternative fueled or electrical construction equipment shall be used at the project site.*
5. *The minimum practical engine size for construction equipment shall be used when practicable.*
6. *When feasible, electric carts or other smaller equipment shall be used at the project site.*
7. *Gasoline-powered equipment shall be equipped with catalytic converters when practicable.*

Impact #3.3-2: Development and operation under the General Plan would result in emissions of criteria pollutants, ozone precursors, and other pollutants caused by mobile source activity, area sources, and stationary sources.

(M/SOC-Micro) Mitigation Measure #3.3-2: The following BACT (Best Available Control Technology) installations and mitigation shall be considered for new discretionary permits, to the extent feasible as determined by the City:

1. *Trees shall be carefully selected and located to protect building(s) from energy consuming environmental conditions, and to shade paved areas when it will not interfere with any structures. Trees should be selected to shade paved areas that will shade 50% of the area within 15 years. Structural soil should be used under paved areas to improve tree growth.*
2. *If transit service is available to a project site, development patterns and improvements shall be made to encourage its use. If transit service is not currently available, but is planned for the area in the future, easements shall be reserved to provide for future improvements such as bus turnouts, loading areas, route signs and shade structures.*
3. *Multi-story parking facilities shall be considered instead of parking lots to reduce exposed concrete surface and save green space.*
4. *Sidewalks and bikeways shall be installed throughout as much of any project as possible, in compliance with street standards, and shall be connected to any nearby existing and planned open space areas, parks, schools, residential areas, commercial areas, etc., to encourage walking and bicycling.*
5. *Projects shall encourage as many clean alternative energy features as possible to promote energy self-sufficiency. Examples include (but are not limited to): photovoltaic cells, solar thermal electricity systems, small wind turbines, etc. Rebate and incentive programs are offered for alternative energy equipment.*

As many energy-conserving features as possible shall be included in the individual projects. Energy conservation measures include both energy conservation through design and operational energy conservation. Examples include (but are not limited to):

1. *Increased energy efficiency (above California Title 24 Requirements)*
2. *Energy efficient widows (double pane and/or Low-E)*
3. *Use Low and No-VOC coatings and paints*
4. *High-albedo (reflecting) roofing material*
5. *Cool Paving. "Heat islands" created by development projects contribute to the reduced air quality in the valley by heating ozone precursors*
6. *Radiant heat barrier*
7. *Energy efficient lighting, appliances, heating and cooling systems*
8. *Install solar water-heating system(s)*
9. *Install photovoltaic cells*
10. *Install geothermal heat pump system(s)*
11. *Programmable thermostat(s) for all heating and cooling systems*
12. *Awnings or other shading mechanism for windows*
13. *Porch, patio and walkway overhangs*
14. *Ceiling fans, whole house fans*
15. *Utilize passive solar cooling and heating designs (e.g. natural convection, thermal flywheels)*
16. *Utilize daylighting (natural lighting) systems such as skylights, light shelves, interior transom windows, etc.*
17. *Electrical outlets around the exterior of the unit(s) to encourage use of electric landscape maintenance equipment*
18. *Bicycle parking facilities for patrons and employees in a covered secure area. Bike storage should be located within 50' of the project's entrance. Construct paths to connect the development to nearby bikeways or sidewalks*
19. *On-site employee cafeterias or eating areas*
20. *Low or non-polluting landscape maintenance equipment (e.g. electric lawn mowers, reel mowers, leaf vacuums, electric trimmers and edger's, etc.)*
21. *Pre-wire the unit(s) with high speed modem connections/DSL and extra phone lines*
22. *Natural gas fireplaces (instead of wood-burning fireplaces or heaters)*
23. *Natural gas lines (if available) and electrical outlets in backyard or patio areas to encourage the use of gas and/or electric barbecues*
24. *Low or non-polluting incentives items should be provided with each residential unit (such items could include electric lawn mowers, reel mowers, leaf vacuums, gas or electric barbecues, etc.)*

Attachment 3: San Joaquin Valley Air Pollution Control District Indirect Source Review Mitigations

City of Merced Climate Action Plan
Technical Memorandum #2
Attachment 3

The following list presents potential mitigation measures suggested by the San Joaquin Valley Air Pollution Control District (SJVAPCD) for projects to meet the emission levels of the Indirect Source Review (ISR) program. The ISR rules do not regulate greenhouse gas (GHG) emissions, but reduce air pollution from nitrogen oxides (NO_x) and particulate matter (PM_{10}). However, ISR mitigations also support GHG emissions from activities such as on-road transportation.

This list provides current mitigations encouraged by the SJVAPCD. However, this list is not exhaustive. The SJVAPCD also provides flexibility to the developers to reduce NO_x and particulate matter PM_{10} with other measures, beyond those included in this list. This list was copied verbatim from the SJVAPCD website. [5]

1. Project is located within 1/2 mile of existing or planned Class I or II bike lanes on arterial/collector streets, or where a suitable parallel route exists.
2. Project is located within 1/4-1/2 mile of a transit stop.
3. Project is located within one mile of a park and ride lot operated by a transportation agency.
4. Other trip reduction services on site or within 1/4 mile of site.
5. Projects that minimize the need for trips in high density residential, mixed, or retail/commercial use areas that are located within a 1/2 mile of project centers.
6. Increase residential density.
7. Designate a portion of residential units as deed-restricted below-market-rate (BMR housing; Affordable Housing.
8. Provide Class I and Class II bicycle parking/storage facilities on-site. Bicycle parking facilities should be near destination points and easy to find. At least one bicycle parking space for every 20 vehicle parking spaces.
9. Provide shower and locker facilities to encourage employees to bike and/or walk to work, typically one shower and three lockers for every 25 employees.
10. Provide Class I bicycle parking at apartment complexes or condos without garages.
11. Install Class I or II bike lanes on arterial/collector streets, or where a suitable route exists.
12. Provide building access and paths which are physically separated from street parking lot traffic and that eliminate physical barriers such as walls, berms, landscaping and slopes that impede the use of pedestrians, bicycle facilities, or public transportation vehicles.
13. Provide continuous sidewalks separated from the roadway by landscaping and on-street parking.
14. Provide on and off-site pedestrian facility improvements such as trails linking them to designated pedestrian commuting routes and/or on-site overpasses and wider sidewalks.
15. Link cul-de-sacs and dead-end streets to encourage pedestrian and bicycle travel.

[5] San Joaquin Valley Air Pollution Control District. n.d. On-site Emission Reduction Mitigation Measures. http://www.valleyair.org/ISR/ISROnSiteMeasures.htm

16. Provide traffic reduction modifications to project roads, such as: narrower streets, speed platforms, bulb-outs and intersection modifications designed to reduce vehicle speeds and to encourage pedestrian and bicycle travel.
17. Provide a parking lot design that includes clearly marked and shaded pedestrian pathways between transit facilities and building entrances.
18. Provide pedestrian access between bus service and major transportation points and to destination points within the project.
19. Provide a display case or kiosk displaying transportation information in a prominent area accessible to employees, residents, or visitors.
20. Display Bike Route Maps, Bus Schedules, and any other transportation information such as carpooling, car sharing.
21. Project design uses models by the Local Government Commission (LGC) in the "Smart Growth Guidebook," such as: street block patterns that form an interconnected grid, short block faces, numerous alleys and narrow streets.
22. Develop and implement parking pricing strategies, such as charging parking lot fees to low occupancy (single occupant vehicles) vehicles.
23. Provide preferential parking spaces near the entrance of buildings for those who carpool/vanpool/rideshare and provide signage.
24. Install efficient heating and other appliances, such as water heaters, cooking equipment, refrigerators, furnaces and boiler units beyond Title 24 requirements (see Title 24, Part 6, Energy Efficiency Standards for Residential and Nonresidential Buildings: http://www.energy.ca.gov/title24/standard)
25. Improve the thermal integrity/efficiency of buildings, and reduce the thermal load with automated and timed temperature controls or occupant sensors.
26. Solar Design.
27. Use devices that minimize the combustion of fossil fuels.
28. Install high efficiency Energy Star heating or ground source heat pumps.
29. Install energy efficient interior lighting.
30. Install built-in energy efficient appliances.
31. Install electrical outlets on the exterior walls of both the front and back of residences or all commercial buildings to promote the use of electric landscape maintenance equipment.
32. Install electric vehicle recharging station with both conductive and inductive charging capabilities in residential garages/parking lots.
33. Install a gas outlet for use with outdoor cooking appliances, and in any proposed fireplaces, including outdoor recreational fireplaces or pits.
34. Install HEPA (High Efficiency Particle Arrestance) Filters.
35. Install "whole-house" or "fresh-air" ventilation system.
36. Reduce Wood Burning Fireplaces and/or Woodstoves above that required by District Rule 4901.

37. Provide guaranteed ride home.
38. Provide carpool support system.
39. Provide car-sharing services support system.
40. Employ or appoint an Employee Transportation Coordinator to work with the TMA and the District.
41. Implement a rideshare program.
42. Provide incentives to employees to carpool/vanpool, take public transportation, telecommute, walk, bike, etc.
43. Participate in an employee "flash-pass" program, which provides free travel on transit buses.
44. Provide transit pass subsidy (100%) and/or commute alternative allowance.
45. Provide an employer subsidized shuttle service to connect to existing transit sites.
46. Implement a lunchtime shuttle to reduce single occupant vehicle trips.
47. Provide electric shuttle or minibus service to transit stops.
48. Provide free transfers between all shuttles and transit.
49. Operation of a shuttle bus to shopping, health care, public services sites, etc. to reduce automobile use.
50. Implement alternative work schedules such as compressed workweek schedules where weekly work hours are compressed into fewer than five days. Examples of these options are: 9/80, 4/40, 3/36.
51. Project provides and/or requires use of electric maintenance equipment; including, but not limited to electric lawn mowers, electric leaf blowers, etc.
52. Prohibit gas powered landscape maintenance equipment within developments.
53. Replace diesel fleet with alternative fuel engine technology and infrastructure.
54. Retrofit existing equipment to reduce emissions using methods such as particulate filters, oxidation catalysts, or other approved technologies.
55. Adopt a Vehicle Idling Policy requiring all vehicles under company control to adhere to a5 minute idling policy.
56. Add-on control devices, e.g., particulate traps, catalytic oxidizers on construction equipment.
57. Repower/Retrofit heavy-duty diesel fleet with cleaner diesel engine technology and/or diesel particulate filter after-treatment technology.
58. Replace auxiliary power units with cleaner engine technology, alternative fuels, or require electric connection while at loading dock.
59. Replace diesel fleet vehicles with cleaner fueled low emission vehicles (i.e. school buses, buses, on- and off- road heavy duty vehicles, lighter duty trucks and passenger vehicles).

City of Merced Climate Action Plan
Technical Memorandum #2
Attachment 3

Attachment 4: Framework of Concepts for Unified Design Manual

Framework of Concepts for Unified Design Manual

The following outline presents a preliminary framework of key concepts for the Unified Design Manual. These concepts implement or support the Merced Vision 2030 General Plan, SJVAPCD Indirect Source Review (ISR) design features (given in Attachment 3), or mitigation measures adopted for the General Plan (given in Attachment 2).

CHAPTER 1 INTRODUCTION

1.1 Purpose and Intent of the UDM

1.2 Applicability and Process

1.3 Organization and Use

1.4 Relationship to Other Plans and Policies

CHAPTER 2 LAND PLANNING

2.1 Land Use Framework. This section could explain to the reader that land use is established and modified through the General Plan Land Use Plan and Zoning Map. Also reference the opportunity to establish special planning areas through community plans, specific plans, planned developments, and the like.

2.2 Land Planning Principles. This section would explain to the reader that when master plans are being prepared or land use changes proposed, several important land planning principles may apply:

- Compact urban form
- Mixed-use and transit-oriented development (includes core commercial concept)
- Employment centers near transit and services

CHAPTER 3 SUBDIVISION DESIGN

3.1 Subdivision Design for Connectivity. This section would include access, circulation, and block length at a minimum.

3.2 Complete Streets. This section would reference the City's adopted Circulation Plan and adopted street standards. Depending on the City's practices and preferences, the UDM could include any or all of the following items:

- Prototype sections
- Wide sidewalks
- Planting strips
- Bike lanes
- Sharrows

- Tree wells in roadway

3.3 Road Diet. This section would include considerations for narrowing of streets for reduced speeds and traffic volumes.

3.4 Traffic Calming. This section could list best practices/options and/or preferences for traffic calming measures to be implemented in new or existing areas, including but not limited to:

- Traffic circles
- Bulbouts
- Speed tables

3.5 Mix and Distribution of Housing Types. This section could include special design considerations for desirable development patterns. The following items could be addressed:

- Preferred design for corner lot duplexes (entrances on different street frontages)
- Second units (lot layout options and/or design plans)

CHAPTER 4 SITE DEVELOPMENT AND DESIGN

4.1 Site Planning for Nonresidential Development. This section could include best practices for building orientation, layout, and relationship to streets and parking.

4.2 Site Planning for Transit, Bike, and Pedestrian Accessibility. At a minimum, this would include loading and unloading areas at destination places.

4.3 Building Orientation to Parks and Greens

4.4 CPTED Principles and Standards

CHAPTER 5 INFILL STANDARDS AND INCENTIVES

5.1 Compatibility Regulations. This section would address compatibility with adjacent uses/development (objectives, standards, and guidelines).

5.2 Infill Incentives. This section would cover both zoning and development incentives.

CHAPTER 6 PEDESTRIAN IMPROVEMENTS

6.1 Pedestrian Access and Connectivity. At a minimum, this section would address:

- Sidewalks
- Pathways
- Access from sidewalks to building entrances
- Outdoor seating

6.2 Facility Development and Design Standards. At a minimum, this section would address:

- Width
- Clearance
- ADA requirements
- Lighting
- Permeable paving

CHAPTER 7 BICYCLE IMPROVEMENTS

7.1 Bicycle Facility Standards and Guidelines. At a minimum, this section would address:

- Bicycle parking, short-term and long-term
- Showers and lockers

CHAPTER 8 PARKING IMPROVEMENTS

8.1 Vehicle Parking Requirements. This section would reiterate or reference updated vehicle parking requirements in the Zoning Code.

8.2 Special Parking Provisions. At a minimum, this section would address the items listed below. The UDM could reiterate, reference, and/or expand upon the updated standards in the Zoning Code.

- Compact parking
- Handicapped parking
- Electric vehicle charging stations
- Priority parking (e.g., carpool, car share, family)

8.3 Parking Reductions. This section would include the qualifying conditions (e.g., infill, proximity to transit) and the process for reductions. The UDM could reiterate, reference, and/or expand upon the updated parking reductions in the Zoning Code.

8.4 Parking Lot Design. At a minimum, the following items would be addressed. The UDM could reiterate, reference, and/or expand upon the updated parking lot design provisions in the Zoning Code.

- *Location*
- *Solar panel–covered parking areas*
- *Perimeter landscape screening*
- Shade tree requirements
- *Permeable paving*
- *Stormwater runoff into planting areas*

CHAPTER 9 TRANSIT IMPROVEMENTS

9.1 Transit Shelter Development and Design Standards. At a minimum, this section would address:

- Safety
- Shade
- Solar-panel shelters that provide lighting

CHAPTER 10 LANDSCAPE IMPROVEMENTS

10.1 Trees. At a minimum, this section would address:

- Street trees
- Shade trees (along pedestrian paths and shade programs for energy efficiency)

10.2 General Requirements. At a minimum, this section would address:

- Landscape areas/minimum requirements for nonresidential development (this could simply be a code reference)
- Pervious surface provisions (e.g., maximum lot coverage)

10.3 Water-Conserving Landscape. At a minimum, this section would address:

- Drought-tolerant/native planting
- Minimizing turf areas
- Water Efficient Landscape Ordinance
- Use of greywater for landscaping

10.4 Stormwater Considerations. At a minimum, this section would address:

- Direct runoff to planters
- Green roofs
- Rain gardens and/or vegetated bioswales to filter and detain rainwater

10.5 Special Requirements for High Profile Projects?

CHAPTER 11 RECYCLING AND COMPOST FACILITIES

11.1 Location, Access, and Enclosure Design

11.2 Recyclable Materials Collection for Residential

11.3 Food/Green Waste Requirements

CHAPTER 12 RENEWABLE ENERGY FACILITIES AND ENERGY EFFICIENCY

12.1 Renewable Energy Design and Siting. This section could include requirements for integrated solar design and exemptions for historic property. It could also include solar-powered lighting provisions and/or standards for wind turbines.

12.2 Passive Solar Design. This section could include overhangs, shading, and windows.

12.3 Efficient Lighting

12.4 Cool Pavements and Roofs

CHAPTER 13 DENSITY BONUS PROVISIONS

13.1 Density Bonus. Discretion to increase density where necessary conditions are met, special consideration for increased densities near urban services.

13.2 Other Incentives? (meet CALGreen Tier 1 standards)

Attachment 5: Key Concepts for Code Amendments and Unified Design Manual

KEY ISSUE #1: SUBDIVISION DESIGN FOR CONNECTIVITY

Background/Context

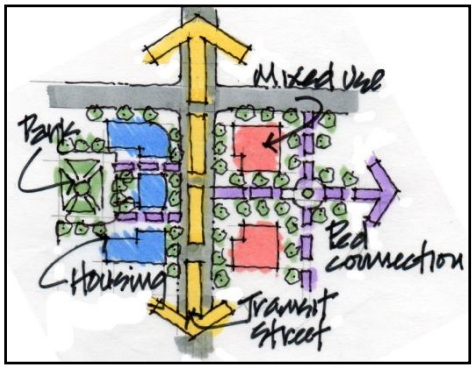
The City does not currently have standards in place to ensure good design of new subdivisions for connectivity. As in most communities, the City's Subdivision Ordinance is focused on application requirements and process consistent with the Subdivision Map Act. While the City did adopt Neighborhood Traffic Calming Guidelines, those provisions are focused primarily on improvements to solve problems in existing neighborhoods. However, the City's General Plan provides good policy direction relative to subdivision design. Therefore, the Unified Design Manual (UDM) will include new provisions to instruct and guide new subdivisions in the city as it relates to connectivity with the existing circulation system and best practices to maximize mobility and good neighborhood development patterns.

Considerations and Alternatives

The most significant subdivision design issues for Merced will be the design of collector streets and the street network within new Urban Villages. Currently, the Transportation and Circulation chapter of the General Plan (Table 4.2) establishes standards for right-of-way, number of lanes, driveway access restrictions, and street intersection spacing for arterials, collectors, and local streets. The chapter goes on to describe the existing challenges and nuances of major and minor collector roads in the city relative to function, traffic volumes, and fronting on lots. The Urban Design chapter describes the goals and objectives for new Urban Villages scaled at approximately 1 square mile in the city's existing arterial grid system. Specifically, the General Plan directs the design of the street pattern for new Urban Villages with multiple and parallel routes to destinations without relying on arterials. This is intended to keep volumes lower on collector streets within the Urban Villages.

The Unified Design Manual will build on the goals, objectives, and policy direction in the General Plan to provide more guidance regarding the City's expectations for subdivision design for connectivity. Key opportunities and potential approaches are provided herein for consideration.

Connectivity



Land use patterns and distribution are part of a larger community or master planning effort. When designing subdivisions, it's important to consider what people need to be connected to and the range of ways they may need or want to get there.

In the UDM, it will be important to identify the need to connect neighborhoods, employment centers, shopping areas, schools, open space, and recreation areas, as well as other target destinations in the community. The UDM can include a sample exhibit to graphically identify connection opportunities within and outside of a new subdivision. This exhibit could simply be informational. Alternatively, the UDM could establish a requirement to list important connections and/or to provide a connectivity exhibit as part of a subdivision application.

Street Layout/Configuration

The UDM can provide performance targets and a range of solutions for street layout in a grid or modified grid system. While the existing General Plan provides one good and one bad circulation

example, the UDM could offer additional details and a range of solutions that meet the same objective. This could simply involve layout alternatives showing connectivity or could include detailed block length targets and/or ranges to direct or guide subdivision design.

Collector Street Design

As mentioned above, the General Plan Transportation and Circulation chapter identifies existing challenges with collector streets functioning more like arterial roads, traffic calming guidelines, and fronting lots/driveway curb cuts. Ultimately, the General Plan encourages the collector roads in new Urban Villages to encourage lower volumes, slower speeds, and neighborhood design with lots fronting collectors. To encourage this type of design, the UDM will need to show how a variety of designs can alleviate the need for a row of fences or walls along collector roads. The UDM could simply provide examples of several design options, could discourage walled collectors, or could mandate one or more of the fronting lot designs on collector roads that meet the General Plan definition of a collector in terms of the projected volume of traffic.

Recommendation

In order to create useful guidance and tools to implement the General Plan goals, objectives, and policies, the Unified Design Manual should include the following items:

1. Clarify connectivity targets for new subdivisions (informational or as a required exhibit).
2. Provide performance targets and a range of solutions for street layout in a grid or modified grid system (example or with block length target range).
3. Show a range of successful design options for collector streets with and without fronting lots (informational or with some type of mandate for fronting lots on minor collectors).

KEY ISSUE #2: SITE PLANNING FOR TRANSIT, BIKE, AND PEDESTRIAN ACCESSIBILITY

Background/Context

Site planning for transit, bike, and pedestrian accessibility involves the consideration of how people will get access to and through new developments using alternative modes of transportation (i.e., other than in personal vehicles). Site planning for transit users, pedestrians, and cyclists considers two primary components:

1. The surrounding off-site context that facilitates or impedes users' access to the site.
2. The on-site characteristics that facilitate or impede users' movement through the property.

These two components put site planning in the context of the experience of the users as they travel to and through the site.

As with most existing codes, Merced's current code contains site-specific standards for pedestrian, transit, and bicycle access and circulation at a very basic level, and each mode of travel is addressed individually. While a number of policies throughout the General Plan and standards in the Development Code may address site planning for these users, there is not a single document location that guides developers in the process of considering these factors collectively in a holistic manner. In addition, some gaps in current policy/code may exist when considered through this lens.

Considerations and Alternative Standards

Integrated site planning for transit users, pedestrians, and cyclists may address a number of factors, including but not limited to those listed below. The discussion of each topic identifies the ways in which it is either addressed in the proposed code or can be addressed with additional standards in the code or in the UDM.

1. Off-site factors

- Off-site context is currently not addressed in the code as it relates to site planning for pedestrians, transit users, and cyclists. Considerations for addressing off-site factors through both the code and UDM include the surrounding uses; the location of the closest transit stop; sidewalk location, and connection to the sidewalk system; adjacent intersection conditions, e.g., marked or signalized crossings; and bike lanes or other bike facilities along the fronting street.

2. On-site factors

- Loading/unloading areas are addressed in the code as applicable to delivery vehicles. The UDM could also address loading/unloading areas for passengers, cyclists, and transit riders.
- Waiting and resting areas are not addressed in the code. The UDM could address consideration of inclusion of plazas, benches, leaning rails, and/or planters with seat walls adjacent to transit stops and heavy traffic pedestrian areas, such as shopping centers and downtown.
- Wayfinding is addressed in the code by way of a requirement for signs to bicycle parking for uses over 10,000 square feet. The UDM could include standards for pedestrians such as kiosks with maps to destinations.
- Landscaping and furnishings are addressed in the code, which requires shade trees in parking lots for commercial developments. The UDM could address landscaping and furnishings throughout the site for all three types of users.
- Design, location, and configuration of plazas for transit users and cyclists. Standards in the code and UDM could enhance the pedestrian environment, create safe and attractive locations for transit facilities such as bus shelters, and provide amenities for cyclists such as bicycle racks. New guidance could also identify the appropriate placement of bicycle lanes in the public right-of-way.
- Site access and driveway design are addressed in the code, which requires design and placement of driveways to minimize impacts on pedestrians to the greatest extent possible. The code also recommends that parking areas include designated pedestrian access to building entrances in commercial developments. The UDM could provide more detail and/or visual guidance for achieving the desired quality of design.
- Shared parking is addressed in the code. The code or the UDM can also address shared site access, such as shared driveways, even where parking is not shared.
- Information on building location, configuration, and entries is included in the code via a recommendation building entries be easily identifiable. For each building type in the Urban Residential overlay, the code specifies building orientation and how pedestrians would gain access to the building from the sidewalk. The UDM could provide more detail and illustrations, while the code could make this mandatory rather than recommended.
- The connection between the sidewalk and building entries is addressed in the code, which recommends a well-defined entry sequence for pedestrians and vehicles. The UDM could

provide more detail and illustrations, while the code could make such actions mandatory rather than recommended.

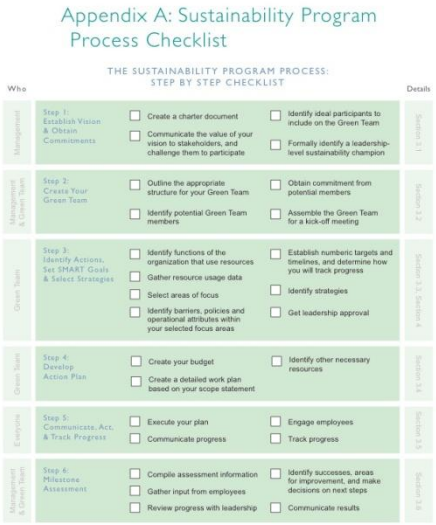
- Connections between adjacent buildings, outdoor amenities, and properties are recommended in the code through connections between buildings and to plazas. The UDM could demonstrate options for connecting different types of uses, such as residential and neighborhood commercial or retail uses, appropriate transitions between uses, and design methods to encourage the flow pedestrians between buildings. Street furniture, lighting, water features, and other improvements could create common areas that further strengthen connections between buildings.
- Obstructions and/or openings through fences, gates, and walls are addressed in the code, which requires that fences and gates not obstruct the open-ended cul-de-sac lots. The UDM could address more provisions such as encouraging openings between adjacent uses and properties to provide convenient and efficient access for pedestrians and cyclists.
- Pedestrian paths through parking lots are addressed in the code in a requirement for a pedestrian walkway for lots with more than 30 spaces and for the use of contrasting paving material. The UDM could provide additional standards for the walkway such as width, landscape buffer, and orientation.
- The code provides requirements for the location and design of bicycle parking and requires bike parking located within 750 feet of the use to be served. The UDM could provide more detail about visibility or parking and a preference for parking near the building entry.
- Internal street pattern and crossings are recommended in the code as clearly marked crossings in commercial developments; the code restricts block length to 500 feet in urban village districts. The UDM could recommend a grid or modified grid street pattern.
- The visibility of pedestrians and of approaching transit is not addressed in the code. The UDM could provide guidelines or standards for improving pedestrian visibility, such as the incorporation of bulb-outs at intersections, and ensuring the visibility of approaching transit vehicles is maintained around transit stops.
- A mobility plan is addressed in the code via a requirement for a Final Site Utilization Plan for Planned Developments, which includes a map and descriptions of the major circulation features within the site including vehicular, bicycle, and pedestrian facilities; traffic flow of internal traffic; and existing and proposed public streets and sidewalk improvements. During review of a Design Review Permit application, the City may consider the "Design of all circulation, parking and loading facilities for vehicles, bicycles, pedestrians, and transit." The code could be modified to also include transit facilities for planned developments and to require that the map show mobility sequence for each user type, not just for vehicles. The code could be modified to require the review of all transportation modes during design review in the form of a mobility plan.

Alternative Approach

An alternative method to addressing site planning for these three modes of transportation is to develop an integrated approach that is context sensitive and includes performance standards. Site planning considerations for these users can be organized as a checklist of performance standards to guide developers through the process of ensuring that their access needs are being considered. The checklist would help ensure that taken together, the various components result in safe, convenient, and comfortable travel for pedestrians, cyclists, and transit users. A review of current policy would help to

identify where existing standards are in place and where there are gaps to be filled by new performance standards. The checklist would cross reference existing codes and policies and also list new ones.

Depending on the context of the site, the conditions to support integrated site design would vary. Therefore, solutions would need to be flexible while still meeting the City's objectives. The City may consider providing a menu of options to choose from, as appropriate. Establishing clear objectives with options for compliance provides flexibility in site design. Measures could codify or graphically convey existing City policy.


Appendix A: Sustainability Program Process Checklist

THE SUSTAINABILITY PROGRAM PROCESS: STEP BY STEP CHECKLIST

Who | Details

Step 1: Establish Vision & Obtain Commitments
- Create a charter document
- Communicate the value of your vision to stakeholders, and challenge them to participate
- Identify ideal participants to include on the Green Team
- Formally identify a leadership-level sustainability champion

Step 2: Create Your Green Team
- Outline the appropriate structure for your Green Team
- Identify potential Green Team members
- Obtain commitment from potential members
- Assemble the Green Team for a kick-off meeting

Step 3: Identify Actions, Set SMART Goals & Select Strategies
- Identify functions of the organization that use resources
- Gather resource usage data
- Select areas of focus
- Identify barriers, policies and operational attributes within your selected focus areas
- Establish numberic targets and timelines, and determine how you will track progress
- Identify strategies
- Get leadership approval

Step 4: Develop Action Plan
- Create your budget
- Create a detailed work plan based on your scope statement
- Identify other necessary resources

Step 5: Communicate, Act, & Track Progress
- Execute your plan
- Communicate progress
- Engage employees
- Track progress

Step 6: Milestone Assessment
- Compile assessment information
- Gather input from employees
- Review progress with leadership
- Identify successes, areas for improvement, and make decisions on next steps
- Communicate results

Questions

Is a checklist a useful way to package current and new standards and guidelines that relate to site planning for transit users, pedestrians, and cyclists? Should the checklist include only existing code requirements, or should it include any/all of the gaps identified above? The code addresses most site planning issues with guidelines; should any be modified to become requirements? Should developers be required to prepare a mobility map illustrating how the three user types gain access to and move through their site?

Recommendation

Establish a clear set of objectives and a checklist of performance standards for developers to review against their plans to ensure site planning factors for transit users, cyclists, and pedestrians are addressed sufficiently. Require developers of certain types of projects, such as planned unit developments, to prepare a mobility map illustrating how transit users, pedestrians, and cyclists are addressed sufficiently. Require developers of certain types of projects, such as planned unit developments, to prepare a mobility map illustrating how transit users, pedestrians, and cyclists gain access to and through the site.

KEY ISSUE #3: RENEWABLE ENERGY DESIGN AND SITING

Background/Context

Renewable energy facilities are devices capable of producing usable energy from a source that is effectively infinite (such as light from the sun). These facilities produce little or no pollution or greenhouse gases, making them substantially clearer than traditional energy sources such as coal or natural gas. Renewable energy facilities can be integrated into new and existing structures or located in an unused area of a parcel, allowing homes and businesses to generate their own electricity and heat. The most common renewable energy facilities in developed areas are photovoltaic (PV) panels, which generate electricity from sunlight. Other facilities may include wind turbines, which produce electricity from the movement of the wind, and solar heating facilities. Since 2008, close to 200 PV arrays have been installed in Merced, producing enough electricity to meet the yearly needs of approximately 870 homes. The vast majority of PV arrays are small-scale facilities, along with a handful of much larger facilities owned by businesses, nonprofits, and government agencies.

Merced's existing planning documents address renewable energy generation, although in a limited way. The Sustainable Development chapter of the City's General Plan encourages new buildings to be

positioned so as to maximize the availability of sunlight for renewable energy facilities. The May 2014 public review draft of the City's Zoning Code allows PV panels to be mounted on the ground or on the roof of a building, integrated into the building's design to the extent possible.

The development of the CAP implementation programs and the UDM offers an opportunity for the City to facilitate residents and businesses installing renewable energy facilities on their property. In addition to reducing greenhouse gases, renewable energy facilities decrease a building's utility bill and allow the building owner to sell excess electricity back to the utility provider. Renewable energy facilities can be purchased and installed from local or regional companies, providing a benefit to the economy in and around Merced. Since a home or business with a renewable energy facility can generate electricity or heat even if utility service is disrupted, renewable energy facilities also increase resiliency to disasters and climate change.

Considerations and Alternatives

In order to facilitate on-site renewable energy facilities in Merced, there are a number of options to consider:

1. Requiring or facilitating renewable energy in new or existing development
2. Allowable types and sizes of renewable energy facilities
3. Pre-wiring for rooftop renewable energy facilities
4. Compatibility of renewable energy facilities with surrounding uses

These issues are addressed to some degree in the General Plan and in the public review draft of the City's Zoning Code. However, these documents do not apply to all types of renewable energy facilities and do not discuss these issues in great detail to provide clear guidance. The following discussion describes these issues at greater length, explains how they are addressed in current City documents, and identifies potential opportunities.

1. Renewable energy in new development

Current Conditions: Merced's General Plan requires new buildings to be positioned so as to maximize solar opportunities and encourages the use of solar energy in new construction; wind is not mentioned. Solar energy facilities that generate energy for on-site use are already incentivized to some extent under the California Solar Rights Act of 1979, which requires that local governments provide an administrative, nondiscretionary review process for the approval of such facilities. The Solar Rights Act also limits the ability of governments to regulate on-site solar energy facilities, prohibiting restrictions based on visual or aesthetic concerns and requiring that a permit for a solar energy facility may only be denied with written findings that it would have an adverse effect on public health and safety and that no feasible mitigation methods are available. Additionally, the 2013 Title 24 Building Energy Standards require that new buildings must be "solar ready"; they have a designated roof space, or solar zone, that is free of shade or penetration of other building elements, making it suitable for solar energy facilities.

Alternatives: While state law helps to achieve the goal of Merced's General Plan by encouraging solar energy facilities, the City may choose to offer additional encouragement or incentives in order to increase the number of renewable energy facilities in the community. A number of tools are available to the City and have been implemented in other communities; for example, Sonoma County offers density bonuses to developments with renewable energy facilities. Merced may offer developers increased flexibility by encouraging or incentivizing new development to receive a certain amount of energy (either in an absolute sense, e.g., a set amount of electricity, or in a relative sense, e.g., a certain proportion of the building's electricity needs) from renewable sources, including on-site renewable energy facilities,

off-site renewable energy facilities (through use of a Power Purchase Agreement (PPA) or similar arrangement), or a combination of the two.

Communities also have the option of requiring renewable energy facilities on all new development or certain types of development. The desert city of Lancaster requires solar panels on all new single-family houses, while the community of Sebastopol in Sonoma County requires solar energy facilities on all new buildings and major additions. These actions may not be feasible in all communities, although Merced can realize widespread use of renewable energy facilities through an effective campaign of education, incentives, and other encouragements.

Question: What tools can maximize the use of renewable energy and are best suited for Merced? Should Merced explore creating additional requirements for renewable energy on new buildings?

2. Allowable types and sizes of renewable energy facilities

Current Conditions: The General Plan encourages solar energy facilities. Development standards or permit requirements are established in the City Zoning Code. The public review draft of Merced's Zoning Code allows roof- and ground-mounted PV renewable energy facilities in all zones as an accessory structure, provided the facility meets applicable standards and the electricity is only used on-site; wind and solar heating facilities are not mentioned.

Alternatives: The community may be limiting its solar potential by requiring that all PV facilities only generate electricity for on-site use, as this rule prohibits the possibility of any larger facilities. An alternative can be to create a "tiered" facility, which provides greater guidance for larger PV facilities that generate electricity for off-site use. Under this regulatory structure, on-site facilities continue to be accessory structures as defined in the current draft Zoning Code, while facilities for off-site use are designated as Tier 2 PV arrays, subject to heightened permit requirements. The City may also choose to define tiers by other factors, including physical size and power-generating capacity. Tiered facilities are more common in unincorporated counties (Kern, Marin, Butte, and Yolo are among the counties using this approach), although some counties are urbanized and can provide examples for an incorporated community to follow. For example, Los Angeles County simply defines two tiers of facilities: those producing power for on-site use and those producing power for on or off-site use.

The City can maximize the potential for renewable energy by clarifying standards for other renewable energy types. Wind energy is not very common in urban areas, although some communities allow small-scale facilities as defined by power capacity and height. Solar heating facilities are generally unobtrusive devices mounted on roofs, and all energy supplied by these facilities is used on-site. These facilities are frequently classified as accessory structures, a decision Merced may wish to adopt.

Question: Is a tiered facility of rooftop solar energy facilities appropriate? If so, how many tiers are necessary and how should they be defined? Does the City want to allow wind energy facilities? If so, can they be adequately addressed in the existing code or is new code language needed?

3. Pre-wiring for rooftop renewable energy facilities

Current Conditions: Pre-wiring or other renewable preparatory actions exist when the electrical work and other infrastructure needs for a renewable energy facility (although not the facility itself) are installed in a building, decreasing the resources needed for the building owner to install a renewable energy facility at a later date. Integrating early electrical work into building construction allows the developer to finance the costs of installation as part of the overall project, reducing the amount of subsequent financing that would be required to install solar PV or another energy facility at a later date. Merced's General Plan encourages the use of solar energy in new construction, but does not address the importance of pre-wiring or related actions. Pre-wiring is often done during building construction, but can be completed as part of major retrofits as well. New nonresidential buildings, multifamily

residential buildings, and developments of 10 or more single-family units will be required to install pre-wiring as part of the California Building Code beginning on July 1, 2014.

Alternatives: Merced has the option to follow other communities by extending this requirement to all new single-family houses like the City of Chula Vista, or to all buildings undergoing a major retrofit. Alternatively, the community may require houses without pre-wiring to install the necessary components prior to transfer of ownership or as part of a major retrofit. If the City does not wish to require pre-wiring, this behavior can still be incentivized or otherwise encouraged in buildings not subject to the provisions in the California Building Code, potentially by offering reduced permit fees or expedited permitting.

Question: Should requirements for pre-wiring be extended to new residential units not covered by the pre-wiring standards in the California Building Code? If the City does not wish to require pre-wiring for buildings, should pre-wiring be encouraged or incentivized? Should pre-wiring be encouraged, incentivized, or required for major retrofits or for existing buildings prior to sale?

4. Compatibility of renewable energy facilities with surrounding uses

Current Conditions: In order to maximize the feasibility of renewable energy facilities and to encourage widespread adoption, it is vital that these facilities not be disruptive or cause conflicts with surrounding activities. The Merced draft Zoning Code requires that ground-mounted solar PV panels be screened from public view and that roof-mounted solar PV panels comply with applicable height limits for their zone. Merced's existing standards do not address wind energy facilities.

Alternatives: It is possible that the existing standards for solar PV facilities may limit the installation of solar panels on flat roofs of buildings constructed to the maximum allowable height or very close to it. As solar panels are often angled vertically to catch light more directly, the most feasible configuration for solar panels on some buildings may exceed height limits. Other communities have addressed this issue by allowing roof-mounted panels to exceed height limits by a certain amount (Los Angeles County has adopted this approach) or by allowing panels to rise to a set height above the roof surface, regardless of the height limits in the zone (this is the standard adopted by the City of Santa Monica). Roof-mounted solar heating facilities are very frequently covered by the same standards as roof-mounted PV facilities, due to the similarity of their appearance and installation, which the City of Merced may wish to make explicit in the applicable code.

To ensure such facilities are compatible with surrounding activities, wind energy facilities in urban areas are subject to height limits. While the exact height can vary widely across communities, in developed areas the limit should be low enough to avoid detracting from the overall feel of the neighborhood while still allowing a facility that is tall enough to effectively use wind resources. Merced may also wish to impose noise and setback standards on any wind energy facility to ensure that any sounds made by the wind turbine during operation, or any shadows cast by it, are not disruptive to surrounding uses. While solar energy facilities, particularly rooftop facilities, have little chance of affecting neighboring parcels and can be addressed through a building permit or a ministerial solar permit, the community may choose to require a minor use permit for wind energy facilities to address any potential siting concerns.

Question: Should the City allow solar panels to exceed height limits in order to maximize solar resources, and if so, by how much? What standards should be applied to wind energy facilities to minimize conflicts?

Recommendation

This section summarizes the consultant and staff recommendation to the committee for input and direction as appropriate.

1. Renewable energy in new development

Requiring renewable energy facilities in new development, or a set amount of energy for new development to come from on- or off-site renewable energy facilities, may not be suitable for Merced. Recommend developing a series of incentives to promote solar energy facilities (including solar thermal) on new development. Incentives may include density bonuses, in addition to any others the City finds to be effective and feasible with available staff resources.

2. Allowable types and sizes of renewable energy facilities

Recommend creating two tiers of solar PV facilities: Tier 1 (produces no more than 125% of the electricity used on-site) and Tier 2 (produces more than 125% of the electricity used on-site). Explore the appropriate level of increased permitting requirements for Tier 2 facilities. Recommend treating all solar thermal facilities as Tier 1. Explore whether wind energy facilities are appropriate for Merced.

3. Pre-wiring for new development

Recommend determining whether the mandatory California Building Code standards for pre-wiring should be extended to all new development. If not, recommend creating incentive program for developments not covered by mandatory standards. Explore means of promoting pre-wiring in existing development, including at time of sale or during major retrofits/additions.

4. Compatibility of renewable energy facilities with surrounding uses

Recommend requiring roof-mounted solar energy facilities to be no more than 5 to 10 feet above the surface of the roof, allowing facilities to exceed height limits. Recommend treating ground-mounted solar energy facilities as accessory uses, subject to relevant height limits, setbacks, and other development standards. If wind energy facilities are deemed appropriate, explore feasible standards for wind energy facilities to ensure compatibility with surrounding land uses.