City of Dublin
Climate Action Plan Update

July 2013

Letter from the Mayor

The City of Dublin Mission Statement lists, "The City of Dublin promotes and supports a high quality of life which ensures a safe and secure environment that fosters new opportunities." It is with this mission in mind that I present to you our updated Climate Action Plan. Over the past several years, the City has worked diligently to ensure a high quality of life for its residents by enacting sound and effective environmental programs. In fact, the City's many environmental goals have established it as a leader in environmental stewardship. This document codifies much of the City's environmental work and provides an overarching plan for further protecting our community and maintaining our goal of a high quality of life for our residents and businesses.

The City of Dublin has exerted considerable effort over the years in creating a more sustainable environment to protect current and future generations. As a result, the City has developed, implemented, and is actively monitoring programs that manage its natural resources and eliminate waste. Specifically, the City has placed significant emphasis on promoting conservation efforts and establishing renewable energy sources. In addition, the City plays a primary role in administering and enforcing many environmental laws that protect our community. By way of example, in the last five to 10 years, the City has built facilities with more energy efficient and green building principles; installed solar arrays at seven city facilities; legislated transit-oriented, high-density and mixed use developments to minimize the need for automotive travel; improved bicycle pathways; enhanced our recycling and organics collection programs; installed more energy efficient lighting, including LED streetlights; and convened a City Council-initiated Green Initiatives Taskforce, which engaged community stakeholders in the process of developing important environmental objectives, many of which have already been obtained. The City of Dublin has been, and will continue to be, at the forefront of the environmental movement.

While this Climate Action Plan Update will primarily serve the community as a greenhouse gas reduction strategy, the plan is also an invitation for the community to join with us in continuing to improve the quality of life for everyone who works, stays or plays in Dublin. While the City can do many things, it is also up to you, the citizens, students, organizations and businesses of this great community to take the initiative to do more in your daily lives. By doing simple things such as reducing your energy consumption, increasing your recycling, increasing your use of alternative transportation, and buying local, you can and will play a large role in making Dublin a better, more sustainable city. Remember every contribution helps no matter the size, so please join us in these efforts. Thank you for your interest and participation!

Sincerely,

Tim Sbranti, Mayor
City of Dublin

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Pacific Gas & Electric Company provides comprehensive climate planning assistance to local governments, from providing energy usage and assistance with greenhouse gas inventories, to training and guidance on climate action plans.

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Executive Summary

The world's population is releasing greenhouse gases (GHG) as byproducts from combusting fossil fuels, disposing of waste, using energy, and changing land uses and other human activities. Although the United States accounts for only 4% of the world's population, it produces over 20% of the world's GHG emissions. Within this context, the City of Dublin (City) seeks to be a good environmental steward by curtailing emissions within its jurisdiction. Residents, businesses, and government operations within Dublin released 328,155 $MTCO_2e$ in 2010. Under a business-as-usual scenario, these emissions would grow over the next 10 years (by 2020) by approximately 14% from 328,155 $MTCO_2e$ to 374,790 $MTCO_2e$. This growth in community emissions is attributable to the expected new residential and commercial growth between 2010 and 2020.

In November 2010, the City of Dublin adopted a Climate Action Plan (CAP) and the accompanying environmental review documents, which declare that the measures contained within the CAP will have no negative environmental impact on the Dublin community (a Negative Declaration under CEQA). The adopted CAP presented Dublin's baseline GHG emissions inventory in 2005 and a forecast of GHG emissions within the community for 2020, based on a business-as-usual scenario. The 2010 CAP also established a GHG emissions reduction target of 20% below the 2020 GHG emissions forecast. In order to more fully understand the City's GHG reduction progress, the completion of an updated GHG emissions inventory and CAP is necessary. The City began work on this effort in 2012 and project findings are included within this CAP Update. It is estimated that state and local reductions included in the CAP Update will result in an annual emissions reduction by approximately 102,380 $MTCO_2e$ from 2010 levels, which exceeds the emissions reduction target established in the City's original CAP.

On July 17, 2007, the City pledged to take action to reduce GHG emissions within the community. The Dublin City Council passed Resolution 139-07, committing Dublin to join other jurisdictions in the Alameda County Climate Protection Project. In so doing, Dublin committed to the ICLEI–Local Governments for Sustainability's five-milestone methodology. The execution of this CAP Update fulfills the final step in the process as well as begins a new iteration of efforts within the cycle. The milestone process consists of:

- Milestone 1: Conduct a baseline emissions inventory and forecast.
- Milestone 2: Adopt an emissions reduction target.
- Milestone 3: Develop a Climate Action Plan to reduce emissions.
- Milestone 4: Implement policies and measures.
- Milestone 5: Monitor and verify results.

The City is committed to reducing community-wide GHG emissions by ***15% below the 2010 inventory levels by 2020***. The City expects this reduction target to be achieved through a combination of the reduction measures included in the CAP Update and state initiatives, such as the Renewables Portfolio Standard, Title 24 and Assembly Bill (AB) 1493 (Pavley). In addition, the CAP employs the Bay Area Air Quality Management District (BAAQMD) GHG efficiency threshold of 6.6 $MTCO_2e$ per service population per year as evidence of the City's intent to meet the intent of AB 32 to reduce GHG emissions to 1990 levels by 2020. Primarily, the City has shifted its base year from 2005 to 2010 in an effort to more fully capture community emissions and to employ more aggressive calculation methodologies not present in 2005, thereby, producing a more precise GHG reduction goal.

Local governments play an integral role in reducing GHG emissions because they have direct or indirect control over many emissions sources. The Climate Change Scoping Plan (Scoping Plan), adopted by the California Air Resources Board (ARB) pursuant to AB 32, states that land use

planning and urban growth decisions will play a role in the state's GHG emissions reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth.

The City of Dublin is currently implementing numerous programs and projects across multiple sectors that are helping to reduce GHG emissions. Although the City has taken significant steps to address climate change, the City's CAP adopted in November 2010 was the first document that assembled all of the City's climate action efforts into a centralized plan.

Strategies to reduce GHG emissions are organized into 45 reduction measures applicable to community and/or to municipal activities. These measures represent actions to reduce GHG emissions that City government has taken since 2010. While there may be some policies included within the CAP that existed prior to 2010, such policies were only included within the CAP if the impact of the policy did not occur until after 2010. The City has attempted to prevent any situation where the double counting of a policy's reduction impact might occur.

The City is committed to continuing actions to reduce GHG emissions and to supplementing these actions in future years if needed to achieve the reduction target. In addition, these actions will result in many other benefits for the Dublin community such as improved environmental quality and public health and a more sustainable business-friendly environment.

The City of Dublin's Climate Action Plan

The City's original CAP was adopted by the City in November 2010. The City's CAP established a GHG emissions reduction target of 20% from the original 2020 GHG emissions forecast. In addition, the CAP employed the BAAQMD GHG efficiency threshold of 6.6 $MTCO_2e$ per service population per year. The 2010 CAP included 34 reduction measures outlining a GHG emissions reduction strategy for transportation/land use, energy, and solid waste and recycling. Since the adoption of the 2010 CAP, the City has completed a re-inventory of its emissions for 2010 and implemented 11 new reduction measures.

The CAP Update serves as the City of Dublin's qualified GHG Reduction Plan and programmatic tiering document for the purposes of the California Environmental Quality Act (CEQA) for analysis of impacts of GHG emissions and climate change. The City has determined that the reduction target will reduce the impact from activities under the CAP to a less than significant level under CEQA. Therefore, the CAP may be used for the cumulative impact analysis for future development and projects in the City covered by the CAP. If a proposed project is consistent with the applicable emissions reduction measures identified in the CAP, the project would be considered to have a less than significant impact (i.e., less than cumulatively considerable contribution to significant cumulative impact) due to GHG emissions and climate change consistent with Public Resources Code 21083.3 and CEQA Guidelines Sections 15183.5, 15064 and 15130. Please refer to Chapter IX. Relationship to the California Environmental Quality Act for additional detail.

I. Introduction

The following sections describe international, federal, state, and local actions being taken to curb GHG emissions.

A. GHG Emissions Reduction Action

In 1997, 10,000 international delegates, observers, and journalists gathered in Kyoto, Japan, to participate in the drafting and adoption of the Kyoto Protocol, which requires industrialized nations to reduce their collective GHG emissions to 5.2% below 1990 levels. Additionally, since 1995, the annual Conference of the Parties has met to discuss action and implementation to reduce GHG emissions. Currently, there are 192 parties to the Kyoto Protocol.

State Action

California has taken significant steps at the state level and has been leading the charge on combating GHG emissions through various pieces of legislation, which include:

Senate Bill 1771 Sher, 2000 – Requires the California Energy Commission (CEC) to prepare an inventory of the state's GHG emissions, study data on global climate change, and provide government agencies and businesses with information on the costs and methods for reducing GHGs. Senate Bill (SB) 1771 also established the California Climate Action Registry to serve as a certifying agency for companies and local governments to quantify and register their GHG emissions for possible future trading systems.

Senate Bill 1078 Sher, 2002 – Established the Renewables Portfolio Standard, which requires electricity providers to increase purchases of renewable energy resources by 1% per year until they have attained a portfolio of 20% renewable resources.

Assembly Bill 1493 Pavley, 2002 – Requires the Air Resources Board (ARB) to develop and adopt regulations that achieve the maximum feasible reduction of GHGs from vehicles primarily used for noncommercial transportation. To meet the requirements of Assembly Bill (AB) 1493, in 2004, ARB approved amendments to California's existing standards for motor vehicles. These amendments require automobile manufacturers to meet fleet-averaged GHG emissions limits for all passenger cars, light-duty trucks, and medium-duty passenger vehicle weight classes, beginning in 2009. Cars sold in California are anticipated to emit an average of 16% less GHGs than current models.

Executive Order S-3-05, 2005 – Proclaims that California is vulnerable to the effects of climate change and establishes targets for GHG emissions, which include reducing GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80% below 1990 levels by 2050.

Assembly Bill 32 Núñez & Pavley, 2006 – Institutes a mandatory limit on GHG emissions, which is to reduce emissions in California to 1990 levels by the year 2020, or 30% below forecasted levels. The bill also directs ARB to establish a mandatory reporting system to track and monitor emissions levels and requires ARB to develop various compliance options and enforcement mechanisms. This led to the creation of the Climate Change Scoping Plan in 2008. The Scoping Plan is currently being updated.

Assembly Bill 811, 2007 – Authorizes all local governments in California to establish special districts that can be used to finance solar or other renewable energy improvements to homes and businesses in their jurisdiction.

Senate Bill 97, 2007 – Acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA and directed the Governor's Office of Planning & Research to develop guidelines for mitigating GHG emissions or the effects of GHG emissions, as required by CEQA. These revisions to the CEQA guidelines took effect in March 2010.

Executive Order S-1-07, 2007 – Identifies the transportation sector as the main source of GHG emissions in California, accounting for more than 40% of statewide GHG emissions. This executive order also establishes a goal to reduce the carbon intensity of transportation fuels sold in California by a minimum of 10% by 2010.

Senate Bill 375 Steinberg, 2008 – Aims to reduce GHG emissions by connecting transportation funding to land use planning. SB 375 creates a process by which local governments and other stakeholders work together within their region to achieve reduction of GHG emissions through integrated development patterns, improved transportation planning, and other transportation measures and policies.

Executive Order S-13-08, 2008 – Directs the California Natural Resources Agency to identify how state agencies can adapt to rising temperatures, changing precipitation patterns, sea level rise, and extreme natural events. This led to creation of the California Climate Adaptation Strategy.

Executive Order S-14-08, 2008 – Expands California's Renewable Energy Standard to 33% renewable power by 2020.

Title 24 – Is a statewide standard applied at the local level by local agencies through building permits. It mandates requirements for structural, plumbing, electrical, and mechanical systems of buildings and for fire and life safety, energy conservation, green design and accessibility in and around buildings. The Cal Green Building Standards are a part of Title 24 (Part 11). The purpose of the Cal Green Building Standards is to improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or positive environmental impact and encouraging sustainable construction practices. CGBSC 101.2

California has led the nation in addressing this global issue with the hope that through collective action at the local level, global changes in the way we use resources and develop as a society will change and ultimately reduce the effects of GHG emissions on the human and natural environment.

Local Action

<u>Bay Area Air Quality Management District</u>

In June 2010, the Bay Area Air Quality Management District (BAAQMD) adopted CEQA air quality thresholds of significance for use within its jurisdiction. The BAAQMD has direct and indirect regulatory authority over sources of air pollution in the San Francisco Bay Area Air Basin, of which the City of Dublin is part. The overall goal of this effort was to develop CEQA significance criteria that ensure that future development implements appropriate and feasible emissions reduction measures to mitigate significant air quality and climate change impacts.

The BAAQMD adopted a threshold of 1,100 $MTCO_2e$ per year or 4.6 metric tons per service population (residents and employees) per year for development projects. The adopted project threshold (1,100 metric tons of CO_2e/year) is equivalent to approximately 60 single-family units, 78 multi-family units, a supermarket exceeding 8,000 square feet, and an office park exceeding 50,000 square feet. Projects with emissions greater than the adopted threshold would be required to mitigate to the threshold level or reduce project emissions by a percentage deemed feasible by the lead agency. The adopted plan threshold is 6.6 $MTCO_2e$ per service population per year, where service population is the summation of population and the number of jobs within the City.

The BAAQMD's approach is to identify the emissions level for which a project would result in a less than significant impact under CEQA and would not be expected to substantially conflict with existing California legislation adopted to reduce statewide GHG emissions. If a project would generate GHG emissions above the threshold level, it would be considered to contribute substantially to a cumulative impact and would be considered to result in a significant impact under CEQA.

On March 5, 2012, the Alameda County Superior Court issued a judgment finding that the BAAQMD had failed to comply with CEQA when it adopted the thresholds. The court did not determine whether the thresholds were valid on the merits, but found that the adoption of the thresholds was a project under CEQA. The court issued a writ of mandate ordering the BAAQMD to set aside the thresholds and cease dissemination of them until the BAAQMD had complied with CEQA. The BAAQMD appealed the ruling, and on August 13, 2013, the California First District Court of Appeal reversed the Alameda County Superior Court's decision.

The City as a lead agency relies on the substantial evidence based on statewide data and analysis relative to AB 32 that underlie the BAAQMD thresholds in making a determination of significance of plan-level GHG impacts.

Under the BAAQMD guidelines, a city may prepare a Qualified GHG Reduction Strategy that furthers AB 32 goals. If a project is consistent with an adopted Qualified GHG Reduction Strategy that addresses the project's GHG emissions, the strategy/plan can be used as a basis for determining that the project would have a less than significant impact (i.e., less than cumulatively considerable contribution) due to GHG emissions and climate change under CEQA.

CEQA contains standards for Greenhouse Gas Reduction Plans that can be used in the cumulative impacts analysis for projects covered under the CAP (CEQA Guidelines Section 15183.5). The BAAQMD recognizes these CEQA standards as meeting the district's standards for a Qualified GHG Reduction Strategy. The BAAQMD contains some standards in addition to those under CEQA. However, BAAQMD's additional standards are not a legal requirement for CEQA compliance. Nevertheless, the City has developed its CAP to substantially comply with the BAAQMD standards.

The CAP has been developed to meet both the CEQA and BAAQMD standards for a Qualified GHG Reduction Plan/Strategy. Below is a description of how the CAP substantially complies with these standards:

(A) Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area.

The City of Dublin CAP includes a GHG emissions inventory that quantifies an existing baseline level of emissions for 2010 and projected GHG emissions from a business-as-usual (BAU), i.e., if no plan existed, forecast scenario for 2020 (see Chapter II. Emissions Inventory). The baseline year is based on the existing growth pattern. The projected GHG emissions are based on the emissions from anticipated growth through 2020.

Furthermore:

- The baseline inventory includes one complete calendar year of data for 2010. GHG emissions are inventoried for residential, commercial/industrial, transportation, and waste sectors.
- BAU emissions are projected in the absence of policies or actions that would reduce emissions. The forecast includes only adopted and funded projects.
- The BAU forecast projects emissions from the baseline year using growth factors specific to each of the different economic sectors.

(B) Establish a level, based on substantial evidence, below which the contribution of GHG emissions from activities covered by the plan would not be cumulatively considerable.

The 2010 City of Dublin CAP established a reduction target of 20% below business-as-usual GHG emissions by 2020. The updated City of Dublin CAP proposes a reduction target of ***15% below 2010 emissions levels by 2020***. This target will be adopted by resolution, as a component of the CAP. This reduction target establishes a level below which the contribution to GHG emissions by activities covered under the CAP will be less than cumulatively considerable under CEQA standards.

Further, the City's CAP employs BAAQMD's GHG efficiency-based metric of 6.6 $MTCO_2e$ per service population per year as evidence of consistency with AB 32. As a result of the policies within the CAP and their resultant GHG reductions, the City of Dublin's efficiency metric is well below this established threshold for 2020. The City's efficiency measure for 2020 is projected to be 3.2 $MTCO_2e$ per service population per year. The baseline efficiency metric for 2010 is 5.0 $MTCO_2e$ per service population per year. This scenario highlights the fact that the City will be growing significantly over the 10-year period of the CAP, but during this same time period, the City's GHG emissions will be decreasing significantly on a per-individual basis. Thus, even though the City will be growing through 2020, growth will occur in a manner consistent with AB 32.

(C) Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area.

The City of Dublin CAP identifies and analyzes GHG reductions from local and state policies and regulations that may be planned or adopted but not implemented to understand the amount of reductions needed to meet its target. The City's CAP identifies and analyzes the effects of statewide GHG emissions reductions including those related to implementation of the Renewables Portfolio Standard (RPS), Title 24 and AB 1493 fuel efficiency standards (see Chapter VI. Measures Implemented by the State).

(D) Specify measures or a group of measures, including performance standards that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level.

The City of Dublin CAP includes mandatory and enforceable measures that affect new development projects.

The CAP includes quantification of expected GHG emissions reductions from each measure where substantial evidence is available (See Chapter V. Emissions Reduction Measures and Policies, and Chapter VI. Measures Implemented by the State), including disclosure of calculation methods and assumptions (See Appendix D. GHG Reduction Calculation Methods and Assumptions). Quantification reflects the annual reduction of GHG emissions and demonstrates how the GHG emissions reduction target will be met.

The CAP also identifies the various measures that apply to new development projects (See Appendix E. Applicability of GHG Emissions Reduction Measures to New Development). It includes a mechanism for reviewing and determining if all applicable mandatory measures are being adequately applied to new development projects as part of the development review process. Identification of implementation steps and parties responsible for ensuring implementation of each action is also included.

(E) Monitor the Plan's Progress.

The City of Dublin will monitor results that are achieved by the various CAP programs and policies. Monitoring results is a critical step in verifying that the various policies and programs within the City's CAP are achieving the anticipated GHG emissions reductions. The City will

review the CAP on an annual basis to verify that the various reduction measures are being implemented appropriately. Additionally, the City will re-inventory its emissions every five years. The process of conducting a review will allow the City to demonstrate progress toward local emissions reduction targets and identify opportunities to integrate new or improved measures into the emissions reduction plan, including additional measures if necessary to meet the reduction target.

(F) Adopt the GHG Reduction Strategy in a public process following environmental review.

The City of Dublin's CAP will be adopted following a public hearing process and preparation of an Initial Study and Negative Declaration pursuant to CEQA.

II. Emissions Inventory

A. Reasoning, Methodology, and Model

1. ICLEI's Emissions Analysis Software

To facilitate local government efforts to identify and reduce GHG emissions, ICLEI developed the Clean Air and Climate Protection (CACP) software package with Torrie Smith Associates. This software estimates emissions derived from energy consumption and waste generation within a community. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used. Emissions are aggregated and reported in terms of carbon dioxide equivalents (CO_2e). Converting all emissions to CO_2e allows for the consideration of different GHGs in comparable terms. For example, methane is 21 times more powerful than CO_2 in its capacity to trap heat, so the model converts one ton of methane emissions to 21 tons of CO_2e.

The emissions coefficients and methodology employed by the software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (IPCC) (Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories), the Department of Energy (DOE) Guidelines for Voluntary Greenhouse Gas Reporting and, for emissions generated from solid waste, the Environmental Protection Agency (EPA) Waste Reduction Model.

The CACP software has been and continues to be used by many local governments to reduce their GHG emissions. However, it is worth noting that although the software provides the City of Dublin with a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. The model depends on numerous assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the model as an approximation rather than an exact value.

2. Inventory Data Sources and Creation Process

An inventory of GHG emissions requires collecting information from a variety of sectors and sources. For community electricity and natural gas data, Pacific Gas & Electric Company (PG&E) was consulted. The Metropolitan Transportation Commission (MTC), Livermore Amador Valley Transit Authority (LAVTA), BAAQMD, and Bay Area Rapid Transit (BART) provided transportation data. Solid waste data was gathered from StopWaste, Amador Valley Industries (AVI), CalRecycle, and the EPA. Data on municipal operations was gathered by City of Dublin staff.

This data was entered into the CACP software to create a community emissions inventory and a municipal emissions inventory. The community inventory represents sources from the following sectors: transportation, residential energy, commercial/industrial energy, wastewater and waste; it includes all the energy used and waste produced within Dublin, and Dublin's contribution to community GHG emissions. The municipal inventory is a subset of the community inventory and includes emissions derived from internal government operations, including vehicle emissions from contracted services such as fire and waste hauling.

Two main reasons exist for completing separate emissions inventories for community and municipal operations. First, the municipal government is committed to action on reducing GHG emissions and has a higher degree of control over reducing its own emissions than those created by the community at large. Second, by proactively reducing emissions generated by its own activities, Dublin's city government takes a visible leadership role. This is important for inspiring local action in Dublin and in other communities.

Dublin's updated inventory is based on calendar year 2010 in order to include more accurate data and a broader source of emissions. When calculating Dublin's emissions inventory, all energy used in the community was included. This means that even though the electricity used by Dublin's residents is produced elsewhere, this energy and the emissions associated with it appear in Dublin's inventory.

B. Inventory Results

1. Baseline Emissions Inventory

The City of Dublin's baseline emissions inventory was originally conducted by ICLEI in partnership with City staff. The purpose of the baseline emissions inventory was to establish an initial level of GHG emissions for the community, which allows the City to measure future progress. The City chose calendar year 2005 as its base year. The baseline inventory was completed and approved by the Dublin City Council in October 2008. The baseline GHG inventory included GHG emissions from the following sectors: transportation, residential energy, commercial/industrial energy and waste, and included energy- and waste-related activities at the community scale, as well as those resulting directly from municipal operations. Additionally, a municipal operations inventory was included, which is a subset of the community inventory.

As part of the CAP Update, the City prepared an updated emissions inventory for calendar year 2010. It became evident that using the original emissions inventory completed for baseline year 2005 was problematic for several reasons and therefore, the determination was made to switch to 2010 as the baseline year. Switching to 2010 as the baseline is a better choice for a variety of reasons. Community activities that affect GHG emissions have changed considerably since 2005 due to increased awareness of sustainability, as well as to a downturn in the economy. In addition, numerous efficiency improvements have occurred in electric equipment, vehicles, and other devices, resulting in lower emissions per use. Furthermore, the 2010 inventory contains additional subsectors and activities not accounted for in the 2005 inventory (e.g., water emissions, wastewater emissions, BART emissions). A 2010 emissions inventory is therefore more complete and accurate.

The baseline inventory provided the basis for creating the City's initial emissions forecast and reduction target and enabled the emissions reductions associated with implemented and proposed measures to be quantified.

2. Revised Inventory

As part of its commitment to climate action, the City has set as goals, as well as completed, various milestones to manage and improve GHG emissions within the community. Specifically, the City has established a framework and methodology to identify and reduce GHG emissions, organized along the following five milestones:

- Conduct an inventory and forecast of local greenhouse gas emissions.
- Establish a greenhouse gas emissions reduction target.
- Develop a climate action plan for achieving the emissions reduction target.
- Implement the climate action plan.
- Monitor and report on progress.

The five-milestone process is meant to be iterative in the sense that the City will be in a constant process of measuring, evaluating, and improving its efforts in managing GHG emissions within the Dublin community. With the adoption and implementation of the CAP in 2010, the City had

effectively completed milestones 1-4, and entered into the monitoring and evaluation stage. Since that time, the City has been working diligently to ensure that its targeted GHG emissions reduction goal was met and obtained according to the measures outlined within the CAP.

In order to fully gauge the City's GHG emissions reduction progress, an additional GHG inventory was conducted. Best practices within the industry suggest that a new GHG inventory should be completed every five years. As the City baseline GHG inventory was completed for calendar year 2005, the City began work on an updated GHG inventory for 2010. As the work continued for the 2010 inventory, the City became aware that certain revisions to the baseline inventory would be necessary to make comparisons to the 2010 inventory possible. For example, certain coefficients used by PG&E to calculate GHG emissions from the energy produced from nonrenewable sources had been updated. Additionally, improved data-gathering methods, which had not been available for the baseline inventory, could now be employed to make the inventory more accurate. Also, it became clear that new methods of analysis could help improve the inventory to allow for "apples-to-apples" comparisons between the baseline inventory and the 2010 update. It is acknowledged that a complete apples-to-apples comparison is rarely possible; however, the updated inventory and the resulting comparison provide Dublin with a more accurate assessment of how each source and sector has changed over time, and will enable more detailed tracking of both emissions and actions taken to reduce emissions in the future. A discussion of the 2005 and 2010 GHG emissions inventories has been included as Appendix B for comparative and informational purposes.

3. Inventory Update

In compliance with its desire to update the GHG inventory every five years, the City engaged StopWaste to assist with a new GHG inventory for calendar year 2010. This new inventory aided the City in understanding its progress in implementing the many GHG reduction strategies as part of the adopted CAP. Having completed the inventory update, the City will be able to evaluate the effectiveness of those measures as well as ensure that proper progress is being maintained in reaching the established reduction threshold. Should the City's strategies be deemed deficient, conducting mid-term inventories will provide the City with enough time to remedy any issues and/or update the reduction goal as necessary.

4. Inventory Results

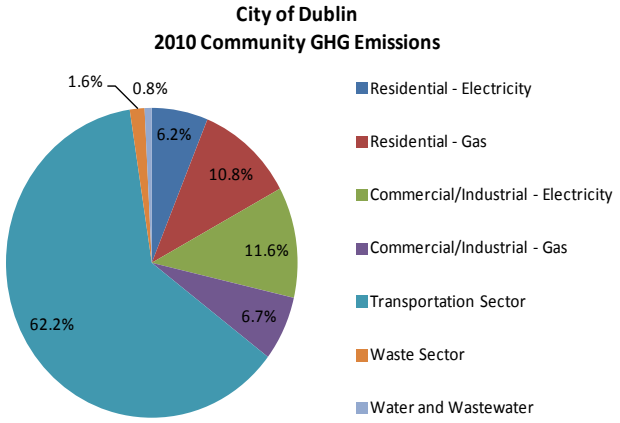
1. Community Emissions Inventory

Numerous items can be included in a community emissions inventory, as described above.

This inventory includes sources from the following sectors:

- Residential energy
- Commercial/industrial energy
- Transportation
- Water and wastewater
- Solid waste

Figure 1 – Community Greenhouse Gas Emissions by Sector



Emissions by Sector

The Dublin community emitted approximately 328,155 $MTCO_2e$ in the year 2010. As visible in Figure 1 above and Tables 1 and 2 below, vehicles on roads and highways in Dublin are by far the largest sources of Dublin's community emissions (62.2%). Emissions from the built environment (e.g., residential and commercial/industrial sectors) account collectively for about one-third (35.4%) of community emissions. The rest of Dublin's emissions are from wastewater transport to treatment facilities and waste sent to landfills (2.4%) by Dublin residents and businesses.

TABLE 1: COMMUNITY GREENHOUSE GAS EMISSIONS BY SECTOR ($MTCO_2E$)

2010 Community Emissions by Sector	$MTCO_2e$	Percent of Total CO_2e
Residential	55,966	17.1%
Commercial/industrial	60,098	18.3%
Transportation	204,151	62.2%
Solid waste	5,330	1.6%
Water & wastewater (electricity and fugitive emissions)	2,610	0.8%
TOTAL	328,155	100.0%

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

Stationary source emissions within Dublin are excluded from the inventory due to their low contribution to community emissions, or because they are captured elsewhere in the inventory. Stationary sources within Dublin are permitted by the BAAQMD and represent less than 1% of the inventory total presented above, including activities such as diesel equipment at facilities and buildings and vehicle miles traveled.

Transportation

Like most jurisdictions in the San Francisco Bay Area, the majority of Dublin's community emissions are from the transportation sector. As Table 1 and Figure 1 show, nearly two-thirds (62.2%) of Dublin's estimated emissions came from the transportation sector, with overall emissions from the sector totaling 204,151 $MTCO_2e$.

The transportation sector analysis includes emissions from vehicles using MTC's trip generation model, which assigns Dublin 50% of VMT from trips that begin or end in the city, and 100% of the VMT trips that begin and end in the city. The transportation sector also includes off-road vehicles and an apportioned amount of emissions generated by the City's use of the BART passenger rail service.

The majority of emissions estimated are detailed in Table 2 below including passenger vehicles, which account for approximately 62% of total transportation emissions in 2010. Emissions are calculated from both fuel consumption data which provides direct CO_2 emissions, and from vehicle miles travelled (VMT) which provides CH_4 and N_2O emissions estimates. Similarly, heavy trucks, which participate in commercial activities within the boundary of Dublin, generate about 27% of total transportation related emissions. Buses account for over 2% of transportation-related emissions, while off-road vehicles generated approximately 9% of transportation-related GHG emissions. Lastly, activity on the BART system accounts for less than 1%.

TABLE 2: TRANSPORTATION GREENHOUSE GAS EMISSIONS BY ROAD TYPE

Transportation Emission Sources 2010	$MTCO_2e$	Percentage of Total CO_2e
Passenger vehicles	125,916	61.7%
Heavy trucks	54,425	26.7%
Off-road vehicles	18,490	9.1%
BART	658	0.3%
Buses	4,662	2.3%
TOTAL	204,151	100%

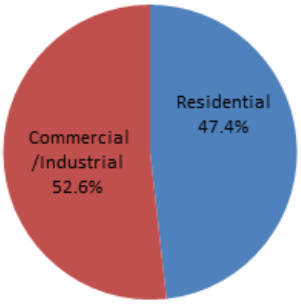
Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

The Built Environment (Residential and Commercial/Industrial)

In 2010, 35.4% of total community emissions came from the built environment, which consists of the residential and commercial/industrial sectors. These sectors emitted approximately 116,064 $MTCO_2e$.

Dublin receives electricity from PG&E. The types of power sources that make up a utility's electricity generation mix can affect a community's GHG emissions. A coal-fired power plant, for example, releases 1.3 tons of CO_2e per megawatt-hour of electricity generated versus 0.7 tons for gas turbines and zero tons for renewable sources such as solar, wind, or hydroelectric power. Dublin's emissions from the built environment are slightly more from the commercial/industrial sectors (52.6%); the residential sector makes up 47.4% of community stationary emissions (Figure 2).

Figure 2 – Built Environmental Emissions



Residential

In 2010, Dublin's residential sector consumed 100,679,670 kWh of electricity. This energy consumption resulted in 55,966 $MTCO_2e$ emissions. Major residential energy uses include refrigeration, lighting, air conditioning, heating, and water heating.

Commercial/Industrial

In 2010, Dublin's commercial/industrial sector consumed 178,203,608 kWh of electricity, which resulted in 60,098 $MTCO_2$ emissions. Emissions from industrial electricity and natural gas use, as well as direct access electricity use, are included within the industrial sector category. Industrial natural gas and electricity consumption data are reported within this sector under Public Utility Commission confidentiality rules that prohibit the release of such data in certain cases.

Waste

In 2010, the City of Dublin sent approximately 24,860 tons of solid waste and zero tons of ADC to a landfill, resulting in a total of about 5,330 $MTCO_2e$, or 1.6% of total GHG emissions (Table 1).

Emissions from the waste sector are an estimate of methane (CH_4) generation that will result from the anaerobic (without access to oxygen) decomposition of the waste sent to a landfill from the community as a whole in 2010. It is important to note that these emissions are not solely generated in said year, but occur over the 100+ year time frame in which the waste generated in 2010 will decompose. This "frontloading" of future emissions allows for simplified accounting

and accurate comparison of the emissions impacts of waste disposed in each year. Therefore, if the amount of waste sent to a landfill is significantly reduced in a future year that year's emissions profile will reflect those reductions[1].

Some types of waste (e.g., paper, plant debris, food scraps) generate CH_4 within the anaerobic environment of a landfill and others (e.g., metal, glass) do not. Characterizing the various components of the waste stream is important. Alameda County is unique among California counties because it conducted its own waste characterization study in 2008. The waste characterization study highlights the waste types that could be diverted from the waste stream. StopWaste used this study to determine the average composition of the waste stream for all Alameda County municipalities. The specific characterization of ADC tonnage was provided by CalRecycle via the Disposal Reporting System.

The tonnage of waste that is recycled, composted, or otherwise diverted from landfills is not a direct input into CACP. The effect of such programs, however, is reflected in the CACP software model as a reduction in the total tonnage of waste going to the landfill (therefore reducing the amount of methane produced at that landfill). The CACP model does not capture the emissions reductions in "upstream" energy use from recycling (or any other emissions reduction practice) in the inventory. However, recycling and composting programs can reduce GHG emissions because manufacturing products with recycled materials avoids emissions from the energy that would have been used by extracting, transporting, and processing virgin materials.

TABLE 3: COMMUNITY WASTE COMPOSITION AND EMISSIONS BY WASTE TYPE*

Waste Type	$MTCO_2e$	Percentage of Total CO_2e	Percent of Total Tonnage Disposed
Paper products	3,025	56.8%	25.1%
Food waste	1,505	28.2%	22.1%
Plant debris	148	2.8%	3.8%
Wood/textiles	652	12.2%	19.1%
All Other**	N/A	N/A	29.9%
TOTAL	5,330	100%	100%

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

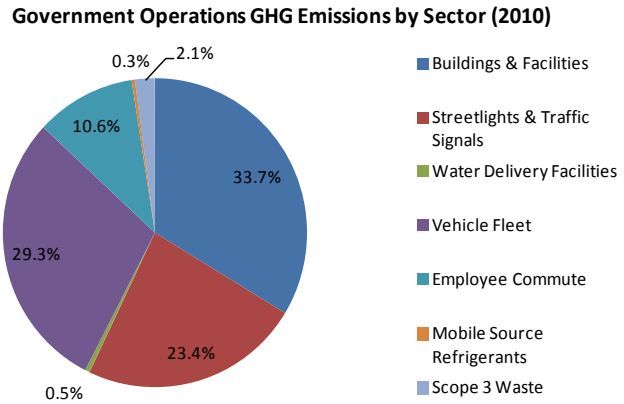
* Waste characterization study conducted by StopWaste.org for the year 2008. This total does not include alternative daily cover.

**All other waste is considered inorganic and doesn't emit CO_2.

2. Municipal Emissions Inventory

The sources of emissions counted under the government's inventory are facilities and equipment owned and operated by the City. The government operations inventory includes sources from the following sectors:

Figure 3 – Government Operations Emissions



[1] The emissions reductions associated with decreasing the amount of waste being added to a landfill are real and few external variables usually exist that change those emission levels later; therefore, this practice of frontloading is considered an accurate way to count and report the emissions that will be generated over time.

- Buildings and facilities
- Streetlights and traffic signals
- Water delivery
- Vehicle fleet
- Employee commute
- Mobile source refrigerants
- Solid waste

Emissions by Sector

Government operations in the City of Dublin emitted approximately 2,343 $MTCO_2e$ in 2010. As shown in Figure 3 and Table 4, the largest source of emissions from government operations is the City's buildings, which emit slightly more than one third (33.7%) of the municipal GHGs. Vehicle fleet is the second largest source of emissions, comprising just under one third (29.3%) of all emissions. Public lighting emissions are also a large source of GHGs (23.4%), as are emissions from employees commuting (10.6%). The remaining sectors add an additional 2.9% of the total remaining emissions.

TABLE 4: GOVERNMENT GHG EMISSIONS BY SECTOR

Government Emissions 2010	$MTCO_2e$	Percentage of Total CO_2e
Buildings and facilities	790	33.7%
Streetlights and traffic signals	548	23.4%
Water delivery	12	0.5%
Vehicle fleet	687	29.3%
Employee commute	249	10.6%
Mobile source refrigerants	8	0.3%
Solid waste	49	2.1%
TOTAL	2,343	100%

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

Municipal Buildings/Facilities

In 2010, Dublin municipal buildings and other facilities consumed about 2,566,566 kWh of electricity and 50,604 therms of natural gas, which resulted in 790 $MTCO_2e$ emissions (approximately 33.7% of total municipal emissions).

Table 5 shows energy consumption and emissions by facility. In 2010, the Dublin Civic Center was the largest municipal energy consumer. Energy consumption from the Civic Center resulted in 351 $MTCO_2e$, or 44% of all municipal facility emissions. The swim center and fire stations (3 stations combined) were also large source of emissions. The fire stations and the swim center each resulted in 93 $MTCO_2e$, or 12% of all municipal facility emissions.

TABLE 5: ENERGY CONSUMPTION & GHG EMISSIONS FROM FACILITIES

Facility	$MTCO_2e$	Percentage of Total Facility CO_2e	Electricity Consumption (kWh)	Natural Gas Consumption (therms)	Energy Equivalent (MMBtu)
Civic Center	351	44%	1,176,989	21,115	6,128
Shannon Community Center	68	9%	248,480	3,289	1,177
Swim Center	93	12%	181,240	10,570	1,676
Senior Center	61	8%	177,893	4,744	1,082
Emerald Glen Park & Preschool	58	7%	285,326	____	974
Parks & Other	66	8%	292,347	1,215	1,119
Fire Stations	93	12%	204,291	9,671	1,664
TOTAL	790	100%	2,566,566	50,604	13,820

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

Vehicle Fleet

As shown in Figure 3 and Table 4, the City's vehicle fleet was the second largest source of municipal emissions in 2010, emitting 29.3% of all municipal emissions. The municipal fleet includes all vehicles owned and operated by the City of Dublin in addition to vehicles owned and operated by City contractors and the City's solid waste hauler (AVI).

Public Lighting

Public lighting includes all streetlights and traffic signals in the City. In 2010, public lighting consumed about 2,696,580 kWh of electricity. This energy consumption resulted in approximately 548 metric tons of CO_2e emissions. Table 6 breaks down energy use and emissions from public lighting by use type.

Across all sectors of municipal operation, public lighting generated just under a quarter (23.4%) of all emissions (Figure 3 & Table 4), representing the third largest source of emissions.

TABLE 6: PUBLIC LIGHTING GHG EMISSIONS

Facility	$MTCO_2e$	Percentage of Total CO_2e (Public Lighting)	Electricity Consumption (kWh)	Energy Equivalent (MMBtu)
Streetlights	464.9	84.9%	2,289,061	7,812.5
Traffic Signals	68.9	12.6%	339,026	1,157.1
Art lights/Outdoor Lighting	13.9	2.5%	68,493	233.8
TOTAL	547.7	100%	2,696,580	9,203.4

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

Water

The water category includes all electricity used for pumping water and irrigation control. In 2010, water infrastructure resulted in 12 $MTCO_2e$. Total energy use and emissions from water pumps and irrigation generated about 0.5% of the total municipal emissions (Figure 3 & Table 4).

Employee Commute

As shown in Figure 3 and Table 4, employee commute was the fourth largest source of municipal emissions in 2010, resulting in 249 $MTCO_2e$, or 10.6% of all municipal emissions.

Solid Waste

Solid waste generated by City-owned facilities and infrastructure produced an estimated 2.1% (Figure 3 & Table 4) of the total emissions from government operations. Like the community analysis, these emissions are an estimate of future CH_4 generation over the full, multiyear decomposition period of the waste generated in the year 2010.

In 2010, the City of Dublin sent approximately 195 tons of solid waste to the landfill, resulting in 49 $MTCO_2e$

Mobile Source Refrigerants

As shown in Figure 3 and Table 4, mobile source refrigerants were the smallest percentage of municipal emissions in 2010, resulting in 8 $MTCO_2e$, or 0.3% of all municipal emissions.

III. Forecast for Greenhouse Gas Emissions

As a result of the effort to update the City of Dublin's GHG Inventory, there was a need to recalculate the community's GHG emissions forecast for 2020. The updated forecast includes new data as well as new forecast methodology to provide a clear picture of emissions in 2020. This section includes a separate forecast for community emissions and municipal emissions. Emissions from municipal operations were not included in the original forecast.

Under a BAU scenario between 2010 and 2020, Dublin's community GHG emissions would grow by approximately 14%, from 328,155 to 374,790 $MTCO_2e$. This amounts to a 1.3% annual growth rate in community emissions between 2010 and 2020 and underscores Dublin's predicted jobs and population growth in the next decade. This also underscores the importance of acting to reduce emissions now, because policies Dublin enacts now will affect future residents and businesses.

To illustrate the potential emissions growth based on projected trends in energy use, driving habits, job growth, and population growth from 2010 going forward, an emissions forecast for the year 2020 was conducted. Table 7 shows the results of the forecast. A variety of reports and data were used to create the emissions forecast.

Methods

This section discusses changes to the forecasting and target-setting methods between the original and updated forecasts.

Forecast Year

Dublin's original CAP forecasted 2020 emissions based on 2005 levels, consistent with accepted methods at the time the plan was written. The CAP Update bases the forecast and reduction target on a 2010 baseline. This represents a better choice for numerous reasons. Activity behavior that affects GHG emissions has changed considerably since 2005, due to increased awareness of sustainability and climate issues as well as to a downturn in the economy. Additionally, numerous efficiency improvements have occurred in electric equipment, vehicles, and other devices, resulting in lower emissions per use. The BAU scenario assumes that efficiency rates remain the same across all sectors between the baseline and forecast year (e.g., a car will emit the same amount per mile driven), and as 2010 is a more recent year, these efficiency rates are likely to result in a more accurate forecast than if figures from 2005 are used. Additionally, the 2010 inventory contains additional subsectors and activities not present in the 2005 inventory (e.g., water emissions, wastewater emissions, BART emissions). A forecast based on 2010 data is therefore more complete.

TABLE 7: COMMUNITY GREENHOUSE GAS EMISSIONS FORECAST PROJECTIONS

Community Emissions Growth Forecast by Sector	2010 $MTCO_2e$ Emissions	2020 $MTCO_2e$ Emissions	Percent Change (2010–2020)
Residential	55,966	65,200	16.5%
Commercial/industrial	60,098	71,156	18.4%
Water & wastewater electricity	2,610	3,419	31.0%
Transportation	204,151	228,037	11.7%
Solid waste	5,330	6,982	31.0%
TOTAL	**328,155**	**374,790**	**14.2%**

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions. Total may not equal sum of component parts due to rounding

TABLE 8: COMMUNITY FORECAST INDICATOR

Indicator	Sectors	2010	2020	Source
Households	Residential energy use Off-road equipment	14,910	17,380	US 2010 Census, ABAG One Bay Area Plan
Population	-	46,040	62,700	US 2010 Census, ABAG One Bay Area Plan
Employment	Nonresidential energy use	19,000	22,500	2012 Dublin Economic Development Strategy
Service population	Solid waste Water and wastewater	65,040	85,200	Sum of population and jobs
Daily Alameda County VMT	On-road transportation	34,180,606	38,006,574	MTC Transportation 2035
Annual BART passenger miles	BART	1,469,000,000	1,743,261,595	BART 2008 Fiscal Year Short-Range Transit Plan

Municipal Forecast

A 2020 emissions forecast was also completed to describe the City of Dublin's municipal activities. The original inventory included a 2005 municipal inventory, but no forecast, so no comparison is provided. Table 9 summarizes the results of the municipal forecast. In total, municipal emissions are projected to grow by 172 $MTCO_2e$ or 7.3% between 2010 and 2020.

TABLE 9: MUNICIPAL FORECAST

Municipal Emissions Growth Forecast by Sector	2010 $MTCO_2e$ Emissions	2020 $MTCO_2e$ Emissions	Percent Change (2010–2020)
Building energy use	790	790	0%
Vehicle fleet	687	687	0%
Streetlights and traffic signals	548	720	31.4%
Water delivery	12	10	-16.7%
Employee commute	249	249	0%
Government-generated solid waste	49	49	0%
Refrigerants	8	10	25.0%
TOTAL	**2,343**	**2,515**	**7.3%**

Municipal Forecast Indicators

Emissions from municipal operations were not included in the original forecast. Such a forecast is useful to identify reduction priorities in municipal activities, and is part of the updated forecast. Emissions from government activities across five categories have been inventoried: building energy use, streetlight/traffic signal electricity use, water delivery facilities electricity use, City vehicle fleet, and solid waste from municipal facilities.

For building energy use, the best indicator is how much square feet of building space the City would occupy in 2020. However, without specific plans for future growth of City operations in 2020, it is difficult to accurately estimate future municipal emissions. An acceptable substitute

would be to use the number of full-time equivalent (FTE) City employees, which is the best available indicator for projecting changes in emissions from the City vehicle fleet, employee commutes, and solid waste. As the City does not have FTE estimates for 2020, a common practice is to assume that FTE will stay the same as it was in the baseline year of 2010. This approach has been used for the municipal forecast.

Because emissions from water- and wastewater-related electricity use are forecasted using service population, this indicator is also used to forecast electricity use for water delivery facilities. Service population is also used for electricity from streetlights and traffic signals, as the number of streetlights and traffic signals is related to development in the community and is generally independent from the size of municipal operations.

Table 10 summarizes the various indicators used in the municipal forecast.

TABLE 10: MUNICIPAL FORECAST INDICATORS

Indicator	Sectors	2010	2020	Source
City employment (FTE)	Building energy use Off-road equipment Vehicle fleet Employee commute Government-generated solid waste Refrigerants	204.27	204.27	Dublin Fiscal Year 2010/11 Comprehensive Annual Fiscal Report
Population	-	46,040	62,700	US 2010 Census, ABAG One Bay Area Plan
Community employment	-	19,000	22,500	2012 Dublin Economic Development Strategy
Service population	Streetlights and traffic signals Water-pumping facilities	65,040	85,200	Sum of population and community employment

IV. Greenhouse Gas Emissions Reduction Target

A reduction target provides a tangible goal for Dublin's efforts to reduce GHG emissions. The emissions reduction target for the community aims to decrease emissions by 15% below 2010 levels by 2020.

Many factors were considered when selecting Dublin's reduction target. The City strove to choose a target that is both aggressive and achievable given local circumstances.

Local factors considered in selecting the target percentage to reduce GHG emissions included estimation of the effects of implemented and planned programs and policies, an approximate assessment of future opportunities to reduce emissions, targets adopted by peer communities, BAAQMD guidance and CEQA significance thresholds, and emissions reductions expected to be achieved by state-level policy under AB 32 and other regulations. The City of Dublin is adopting a community emissions reduction target of 15% below 2010 levels by 2020. By using 2010 GHG emission levels, the target is based on more reliable data that includes sectors not captured in the 2005 inventory. To reach this target, the Dublin community must reduce annual emissions by about 102,380 $MTCO_2e$ from 2010 levels, which includes both the state reductions and CAP measures.

TABLE 11 – DUBLIN COMMUNITY-WIDE EMISSIONS SUMMARY

Dublin Community-wide Emissions Summary	
Base year	**2010**
$MTCO_2e$ emissions	328,155
Target year	**2020**
BAU projection $MTCO_2e$ emissions	374,790
Reductions from State GHG reduction measures	-63,460
Forecast after state reductions $MTCO_2e$ emissions	311,330
Reductions from CAP GHG reduction measures	-38,920
Forecasted Emissions with Reduction Measures ($MTCO_2e$/yr)	272,410

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions; BAU = business-as-usual
Sources: ICLEI CACP model output, summarized by PMC 2013

Further, the City of Dublin's CAP is designed to meet or exceed the goals of AB 32. Generally, the AB 32 goal refers to a 15% reduction below baseline levels, and the BAAQMD plan-level thresholds of significance identifies a baseline year from 2005-2008 to be an acceptable baseline. The intent of AB 32 is to reduce mass emissions, consistent with these baseline years. The City has determined that emissions in 2010 were not substantially different than emissions in 2008, and that a reduction target of 15% below 2010 emissions levels would meet similar goals. Estimates from the California Department of Finance indicate a slight increase in population and housing in Dublin since 2005, with 2010 residents and housing just 3% above 2008 levels. Although the City experienced significant growth during the 2005-2008 timeframe, growth has slowed following the recession as shown in Table 12 below. Thus, the 2010 inventory provides a more conservative analysis that likely overinflates emissions above 2005-2008 levels, resulting in a larger absolute amount of reductions that the City must reduce. The 2010 inventory also provides a more complete inventory, capturing additional sectors (e.g. wastewater and BART) that lack comparable data for the 2005-2008 timeframe. A complete 2010 inventory allows the City to create a comprehensive baseline and forecast accounting for all emissions-generating activities within the community, consistent with the intent of AB 32.

TABLE 12 – COMPARISON OF SELECT EMISSIONS INDICATORS, 2005 – 2010

Emissions Indicator	2005	2008	2010	% Change 2005-2010	%Change 2008-2010
Population	38,147	44,321	45,681	20%	3%
Housing	13,105	15,280	15,782	20%	3%

1. State of California, Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2001-2010, with 2000 & 2010 Census Counts. Sacramento, California, November 2012.
2. State of California, Department of Finance, E-8 Historical Population and Housing Estimates for Cities, Counties, and the State, 2000-2010. Sacramento, California, 2012.

To further demonstrate the City's commitment to the goals of AB 32, the City's CAP achieves the BAAQMD's plan-level GHG efficiency-based metric of 6.6 $MTCO_2e$ per service population per year, where service population is the summation of population and the number of jobs within the City. As displayed in Table 13 below, the City of Dublin's measures achieve both the 15% reduction target and the BAAQMD efficiency metric. The City will be growing over the 10-year period covered by the CAP Update, but during this same time, the City's GHG emissions will be decreasing on a per-individual basis. While this CAP identifies a 2020 reduction target, Executive Order S-3-05 identifies a state target of 80% below 1990 emissions levels by 2050. Dublin's CAP identifies near-term, strategic 2020 target as a first step to support longer-term reduction consistent with the state's 2050 goals

TABLE 13 – DUBLIN COMMUNITY-WIDE EMISSIONS ANALYSIS

CAP Reduction Goal Analysis		
Emissions Summary	**Year**	**Emissions ($MTCO_2e$)**
GHG Emissions Inventory	2010	328,155
GHG BAU Emissions Forecast	2020	374,790
Reductions from State GHG reduction measures	2020	-63,460
Forecast after State Reductions	2020	311,330
Reductions from Local GHG reduction measures	2020	-38,920
Forecast after State and Local Reductions	2020	272,410
Compared to 2010 Baseline		-17%
Item	**Year**	**Persons**
Service Population (SP)	2010	65,040
Service Population (SP)	2020	85,200
*US 2010 Census, ABAG One Bay Area Plan, 2012 Dublin Economic Development Strategy		
Item	**Year**	**$MTCO_2e$/SP**
GHG Efficiency Metric	2010	5.04
GHG Efficiency BAU Metric	2020	4.40
GHG Efficiency Goal Metric	2020	3.20

V. Emissions Reduction Measures and Policies

At both the community scale and within municipal operations, the City of Dublin has undertaken a number of programs, policies, and projects that result in reduced GHG emissions. Not only do these measures reduce GHG emissions, they also have the co-benefit of achieving other City policy goals, such as reducing local air pollution, reducing traffic, improving public health, increasing energy efficiency and conservation, reducing solid waste, and improving solid waste management. Ultimately, the goal of Dublin's CAP is to build on existing planning and implementation efforts and integrate them into the broader task of reducing the GHGs emitted within the community. In addition, the CAP intends to encourage action by citizens, jurisdictional partners, and business members of the community as they will also have an integral role in reducing emissions through programs of their own as well as the programs listed below.

The City's CAP will continue to evolve. The City of Dublin has undertaken and continues to implement numerous measures to reduce GHGs since its baseline emissions were determined. The City expects to continue to add additional programs, practices, and policies that will contribute to GHG reductions for many years to come. As these programs, practices, and policies are developed and implemented, they will be folded into the CAP.

The various GHG reduction measures are organized into three categories: transportation/land use, energy (which includes both energy efficiency and renewable energy), and waste management. These categories follow the major sources of emissions found in the GHG emissions inventory (described in Chapter II). Where possible, anticipated emissions reductions have been quantified based on substantial evidence. Many of these reduction measures were part of the original CAP, although the GHG reductions from each measure have been recalculated to reflect the revised inventory, activity data, and methods. In addition, some measures were not included in the original CAP, and have been added to reflect new conditions, programs, and priorities. The reduction measures include activities begun since 2005 that are ongoing in the community, as well as those initiated after 2010 that are expected to continue through 2020. For the ongoing 2005 measures, only additional reductions that have happened, or are expected to happen, after 2010 have been quantified, as any earlier reductions are already included in the 2010 inventory.

Within each measure outlined below, the City has attempted to explain its reasoning for including the measure as well as to define the assumptions used in deriving the quantified reduction value. Additional detail and references to substantial evidence supporting quantified GHG reductions are provided in Appendix D. GHG emissions reduction measure performance can be quantified using top-down or bottom-up calculations, and both methods are used to quantify reductions in this CAP.

A top-down approach to quantifying GHG emissions starts with a GHG reduction measure (e.g., installation of photovoltaic panels). If the measure is assumed to reduce electricity demand by a certain number of kWh, this can be converted to GHG emissions reductions using an emissions factor for electricity generation. Adjusted emissions factors were developed by accounting for the effects of State actions on the adjusted forecast, recognizing that by 2020, California will achieve lower emissions rates for each unit of energy or transportation based on the implementation of State programs. The adjusted emissions factors are then used to calculate the emissions reductions anticipated for each measure, ensuring that reduction measures do not double-count the effects of state actions.

A bottom-up calculation begins with the community-wide GHG emissions inventory. A recommended emissions reduction measure (e.g., energy efficiency) targets a certain emissions sector (e.g., natural gas, electricity), emissions subsector (e.g. residential, commercial) and portion thereof (e.g., space heating, water heating, air conditioning). Thus, the community-wide

GHG emissions inventory is scaled according to the applicability of the measure being evaluated. A reduction per participant is calculated (e.g., how much energy would be saved from energy-efficiency upgrades in a multi-family house), along with the number or percent of the applicable participants (e.g., the percent of multi-family units in the community that can be reasonably assumed to undertake energy-efficiency upgrades). These participation and efficiency assumptions are then multiplied by the relevant portion of the community-wide inventory to derive an amount (in $MTCO_2e$) of emissions reduced.

A. Community-wide Measures

The measures outlined in this section represent reductions of GHG emissions in the community. They are organized by sector and outlined below.

A.1 Transportation and Land Use Measures

Broadly, there are three main ways to reduce GHG emissions from the transportation sector. One way is to implement policies that reduce dependence on personal motor vehicles and encourage alternative modes of transportation, such as public transit, cycling, and walking. Another way is to use vehicles that release fewer GHGs, such as hybrids, electric vehicles, more fuel-efficient vehicles, and vehicles that run on alternative fuels. A final way is to encourage "smart growth" (i.e., policies that promote efficient land use development). Smart growth reduces the need to travel long distances, facilitates transit and other nonautomotive travel, increases the availability of affordable housing, employs existing infrastructure capacity, promotes social equity, helps protect natural assets, and maintains and sustains existing communities.

Vehicles on roads and state highways are by far the largest source of Dublin's community emissions. In 2010, 62.2% of the community's GHG emissions were from the transportation sector.

A.1.1 Transit-Oriented Development

Context – In November 2002, the City of Dublin adopted a general plan amendment, specific plan amendment, and zoning for the Eastern Dublin Transit Center, located near the Dublin/Pleasanton BART station. The plan allows for the eventual construction of 1,800 high-density residential units, in addition to close to 2 million square feet of commercial space, and a new park. Due to a project being approved with a lower density than the maximum allowed by the specific plan, the total number of units for the Eastern Dublin Transit Center project at build-out is expected to be 1,605. A 505-unit project in the Transit Center is currently under construction, and construction is expected to begin soon on a 105-unit project.

The City of Dublin also adopted a West Dublin BART Specific Plan in December 2000, which was subsequently amended in November 2007. In February 2011, the City Council adopted the Downtown Dublin Specific Plan (DDSP), which replaced and combined five existing specific plans, one of which was the West Dublin BART Specific Plan. The area formerly within the West Dublin BART Specific Plan area is the transit-oriented district of the DDSP. This is intended to be a high-density mixed-use area, capitalizing on regional transit linkages provided by both the BART line and supported by nearby freeways, including Interstate 580 and Interstate 680. The DDSP allows a total of 1,300 residential units, of which 1,100 units are within the Transit Oriented District of the DDSP adjacent to the BART station. To date, 1,007 units have already been approved in the Transit Oriented District, in addition to new square footage for retail/restaurant, lodging, and office uses.

Research indicates that developments adjacent to transit services, such as BART, can expect to experience a reduction in vehicle trips, especially for commute trips. Further, vehicle trip reductions may be possible if residential locations are within walking distance of retail/service

amenities or an employment center. In July 2009, Fehr & Peers Transportation Consultants reviewed data from a variety of sources to develop a likely range of vehicle trip reductions for transit-oriented development (TOD) adjacent to the BART stations in Dublin (see Appendix C). Based on its research, Fehr & Peers identified a reduction in vehicle trips of 25% for multi-family residential developments located in a mixed-use environment within a barrier-free, half-mile walk of a BART station.

Emissions Reductions – Dublin's planned TOD developments and those constructed after 2010, in conjunction with the City's policies that promote high-density development (see Measure A.1.2) and mixed-use development (see Measure A.1.3), are estimated to result in a reduction of **8,380 MTCO$_2$e/year** (22% of local reductions).

A.1.2 High-Density Development

Context – The City of Dublin has a high-density residential land use designation, which allows 25.1+ dwelling units per acre. These high-density developments are located near the Dublin/Pleasanton BART station and along Dublin Boulevard. High-density development has been approved near the West Dublin BART Station. Additionally, Area G of Dublin Ranch includes approximately 1,400 medium-high and high-density residential units. The high-density residential land use designation was included in the City's original General Plan, which was adopted in 1985. While this policy did exist prior to 2010 baseline year, the total impact of the policy was not reflected in the 2010 inventory.

Emissions Reductions – Emissions reductions for this measure support those calculated for Measure A.1.1.

A.1.3 Mixed-Use Development

Context – Several areas in the city allow mixed-use development. The mixed-use land use designation encourages the combination of medium- to medium-high-density residential housing and at least one nonresidential use, such as office or retail. The mixed-use land use designation was added to the City's General Plan in 2004. Several projects have been approved in the City that includes a mixed-use component, such as the Transit Center, Groves, Tralee, Jordan Ranch, San Ramon Village, and Kingsmill.

Emissions Reductions – Emissions reductions for this measure support those calculated for Measure A.1.1.

A.1.4 Bicycle Parking Requirements

Context – Bicycle parking requirements are implemented during the development review process. Under the City's Off-Street Parking and Loading Regulations, parking lots with 20 or more spaces in nonresidential zoning districts are required to provide bicycle parking. Pursuant to the Zoning Ordinance, one bicycle parking space in a bicycle rack is required for each 40 vehicular parking spaces. Additionally, requirements exist for bicycle parking in multi-family residential complexes. The City is currently implementing the bicycle parking requirements from the 2010 California Green Building Standards, which are more stringent than what currently exists in the City's Zoning Ordinance. The City is in the process of evaluating the bicycle parking standards in the Zoning Ordinance as part of an update to the Bikeways Master Plan. Availability of bike racks throughout the city supports the use of the city's bike lanes and bike paths, and is an essential part of encouraging individuals to choose biking over driving.

Emissions Reductions – It is estimated that the City's bike parking requirement, in addition to implementation of the Bikeways Master Plan (see Measure A.1.10), will result in a reduction of **950 MTCO$_2$e/year** (2% of local reductions).

A.1.5 Streetscape Master Plan

Context – In June 2005, the Dublin City Council adopted a resolution approving a streetscape master plan. The goals of the streetscape plan are to better coordinate streetscape design throughout the community, clearly delineate public and private responsibilities for improving aesthetics, and provide a mechanism for promoting capital improvement projects with built-in streetscape improvements. Additionally, the Zoning Ordinance has requirements for planting trees in parking lots (minimum of one tree for every four parking spaces). Policies that promote trees within the community, such as those in the streetscape master plan and the Zoning Ordinance, play a valuable role in reducing GHGs within the community because trees can capture and store CO_2. Furthermore, more attractive and better shaded streets create a more conducive environment for walking, bicycling, and transit use, which can shift trips away from single-occupancy vehicles.

Emissions Reductions – The City of Dublin added approximately 3,500 trees over the past 10 years. It is anticipated that approximately 350 new trees will be planted annually between 2010 and 2020. Continued implementation of the streetscape master plan will result in a reduction of **1,530 $MTCO_2e$/year** (4% of local reductions).

A.1.6 Multi-Modal Map

Context – In June 2009, the City adopted a multi-modal map, which is a comprehensive tool to relay transportation opportunities within a specific location. The function of the multi-modal map is to show the various methods of transportation within the city, including pedestrian, vehicle, and bicycle trips as well as connections to other cities. The multi-modal map is currently posted on the City's website. Additionally, the City continues to explore opportunities to distribute the map to residents and businesses to promote alternative modes of transportation in Dublin.

Emissions Reductions – Although the map was adopted prior to 2010, it is anticipated that updates and continued use of the map will have further reductions on transit decisions taken after 2010. The multi-modal map is expected to have further reductions of **1,140 $MTCO_2e$/year** (3% of local reductions).

A.1.7 Electric and Plug-In Hybrid Charging Stations at the Library

Context – The library, which was constructed in 2005, was designed to include recharging stations to be utilized by community members for electric and plug-in hybrid vehicles. The City replaced the charging stations at the library in February 2012. The charging stations were an outdated technology. There has been a significant increase in use from 2012 to 2013. For example, in April 2012, there were 59 users; in April 2013, the number of users increased to 211. The City also has parking spaces designated for low-emission vehicles at the Shannon Community Center. As required by CALGreen, all new City facilities will have low-emission vehicle parking within the parking lots.

Emissions Reductions – Assuming that the rate of adoption of electric vehicles in Dublin is consistent with statewide adoption projections, it is estimated that the charging stations at the library will result in a reduction of **90 $MTCO_2e$/year** (less than 1% of local reductions).

A.1.8 General Plan Community Design and Sustainability Element

Context – In September 2008, the City of Dublin adopted a Community Design and Sustainability Element. The Community Design and Sustainability Element establishes design principles, policies, and implementation measures to enhance the livability of Dublin and encourages a high level of quality design that supports sustainability. The Community Design and Sustainability Element applies to new development and redevelopment throughout the city.

Emissions Reductions – Reductions anticipated from the Community Design and Sustainability Element have not been quantified. However, this measure supports achievement of other recommended transportation measures.

A.1.9 Work with the Livermore Amador Valley Transit Authority to Improve Transit

Context – The City works with the Livermore Amador Valley Transit Authority (LAVTA) to provide improved transit opportunities in the community. As part of the review process for proposed development projects, the City and project proponents work with LAVTA on planning future bus stop locations and extending service routes.

LAVTA's Bus Rapid Transit, or RAPID, began operations in early 2011. RAPID runs a similar route to one of LAVTA's existing routes (Route 10) but it offers more direct and efficient service between Livermore, the Dublin/Pleasanton BART station and Stoneridge Mall in Pleasanton. Efficiencies have been achieved by following a shorter route, using advanced technology to minimize delays at traffic signals, and increasing spacing between stops. The buses run more frequently, thus reducing passenger waiting time. Within Dublin, RAPID runs along Dublin Boulevard between San Ramon Road and Fallon Road and also pulls into the BART station.

Emissions Reductions – The implementation of RAPID and the City's continued efforts to work with LAVTA to improve transit within the community is estimated to result in a reduction of **1,210 MTCO$_2$e/year** (3% of local reductions).

A.1.10 Bikeways Master Plan

Context – In July 2007, the City of Dublin adopted a Bikeways Master Plan. Policies in the plan include the continued development of successful bicycle and pedestrian trail corridors, improved bicycle access to parks and open space areas, improved bicycle lanes and/or routes on several key cross-city corridors, bikeways on key freeway crossings, the development of education and enforcement programs, and improvements to the City's Bicycle Parking Ordinance. The City is in the process of updating the Bikeways Master Plan. Currently within the City of Dublin, there are approximately 42 miles of bike paths/lanes. The Bikeways Master Plan update proposes adding another 44.5 miles of bike paths/lanes.

The City of Dublin recognizes the many benefits of creating additional bicycle routes and improving existing routes. Pedal power is a clean source of energy that does not produce GHG emissions; however, lack of adequate bike infrastructure is a major barrier to cyclists. Providing and promoting a convenient and safe bike infrastructure serves to reduce trips by motor vehicles. Bicycles are especially appropriate in reducing the number of short trips (up to five miles), which constitute more than half of all driving. Shifting trips from cars to bikes also reduces street traffic. An investment in bike infrastructure is also an investment in public health, because cycling is an excellent mode of physical activity.

Emissions Reductions – Emissions reductions for this measure support those calculated for Measure A.1.4.

A.1.11 West Dublin/Pleasanton BART Station

Context – The West Dublin/Pleasanton BART Station opened to the public in February 2011. Consistent with the transit-oriented district of the DDSP, the area adjacent to the West Dublin/Pleasanton BART Station is intended to be a high-density mixed-use area, capitalizing on regional transit linkages provided by the BART line and supported by nearby freeways. Each week, BART passengers travel about 950,000 miles to and from this station.

Emissions Reduction – It is estimated that the addition of the new West Dublin/Pleasanton BART Station will result in a reduction of **10,980 MTCO$_2$e/year** (28% of local reductions).

A.1.12 City Design Strategy

Context – The City Design Strategy has been incorporated into the City's General Plan as part of the Community Design and Sustainability Element. The City anticipates that there will be a few large-scale projects to which the Design Strategy will apply. The overarching goals of the Community Design and Sustainability Element include:

- Creating neighborhoods with a robust network of internal streets and good connections to surrounding neighborhoods where pedestrians, bicyclists, and drivers can move efficiently and safely.
- Promoting walking and cycling by providing safe, appealing, and comfortable street environments that support public health by reducing pedestrian injuries and encouraging daily physical activity.
- Improving physical and mental health and social capital by providing a variety of open spaces (public and private) close to work and home to facilitate neighborhood connectivity.

Emissions Reductions – Reductions anticipated from the City Design Strategy have not been quantified. However, this measure supports achievement of other recommended transportation measures.

A.2 Energy Measures

Increasing energy efficiency and renewable energy throughout the community has immense potential to both reduce GHG emissions and save money. The energy consumed to heat, light, and power buildings within the community is a direct source of GHG emissions. The reduction of GHG emissions from building energy use can be achieved in a variety of ways, which include optimizing energy efficiency in new construction; retrofitting existing buildings to reduce energy consumption; promoting energy and water conservation and efficiency; and advancing the use of renewable energy. Other methods to increase community energy efficiency include subsidizing energy management services such as energy audits for residents and businesses and ensuring that developers and building contractors are trained on energy conservation and efficiency.

Available sources of renewable energy include solar, wind, biomass, and geothermal energy. Hydrogen fuel cells and tidal current power are renewable energy sources that hold promise but require further research and innovation before they are as practical and possible to implement as other options. Renewable energy sources offer the potential for a clean, decentralized energy source that can reduce Dublin's GHG emissions.

A.2.1 Green Building Ordinance

Context – In 2009, the City passed a Green Building Ordinance (DMC Chapter 7.94) requiring residential projects over 20 units to reach 50 points on the GreenPoint Rated system. Alternatively, LEED for Homes is approved in the ordinance. Other types of rating systems may be approved by the City's Building Official on a case-by-case basis. The majority of residential projects within the City are subject to the Green Building Ordinance. There are few to no planned residential projects within the City that are 20 units or less. The City is in the process of adopting the 2013 California Green Building Standards Code, which will also reduce water use in existing buildings.

GreenPoint Rated is a green building program administered by the nonprofit organization Build It Green. GreenPoint Rated was conceived of and developed with assistance from StopWaste. The GreenPoint Rated guidelines and rating system, begun in 2000, has grown rapidly and is

becoming a standard for the construction of green residential homes and major renovation projects throughout California. The GreenPoint Rated system comprises five related categories: energy efficiency, resource conservation, indoor air quality, water conservation, and community, all of which are important to the practice of green building. All new residential development in Dublin over 20 units (multi-family and single-family homes) is required to meet the GreenPoint standard.

Emissions Reductions – Implementation of the Green Building Ordinance for new single-family and multi-family housing projects over 20 units, assuming that all projects achieve the required minimum of a 15% improvement over California's energy-efficiency standards for new buildings, is estimated to result in a reduction of **1,110 MTCO$_2$e/year** (3% local reductions).

A.2.2 Energy Upgrade California

Context – The StopWaste-initiated Energy Upgrade California program established countywide building retrofit measures and specifications for energy efficiency, water and resource conservation, and indoor air quality and health. The program provides a standardized countywide approach that identifies specific green retrofits to improve existing buildings. The Energy Upgrade California program has done the following:

- Developed a technical advisory group.
- Conducted outreach at the countywide level.
- Provided training of contractors.
- Provided verification and tracking of projects.
- Leveraged funding for project implementation (stimulus funds, other grants, municipal contributions).
- Provided economies of scale and scope for all jurisdictions within Alameda County.

There are two upgrade packages available to Alameda County residents: basic and advanced. Each package offers different rebates and incentives. The basic upgrade addresses basic energy problems and helps to improve a home's comfort and efficiency. An advanced upgrade is customized for each individual's home and needs, resulting in more energy saved and bigger rebates.

StopWaste notes that buildings account for 23% of statewide GHG emissions, and existing buildings represent the majority of the state's building stock. The level of emissions from existing buildings in Dublin is higher than the state level. According to the 2010 GHG inventory, approximately 35.4% of emissions come from the residential and commercial sector. Therefore, participation in the Energy Upgrade California program will help achieve any future GHG reduction targets that the City may set.

Emissions Reductions – Implementation of the basic and advanced Energy Upgrade California packages in the City of Dublin, assuming that 7% of households built prior to 2010 (1,044 households) participate, is estimated to result in a reduction of **1,610 MTCO$_2$e/year** (4% of local reductions).

A.2.3 Solar Conversion Programs

Context – The City of Dublin promotes solar installation within the community through solar conversion programs, including Solar Cities and Property Assessed Clean Energy (PACE) programs.

Solar Cities is a joint project of the cities of Dublin, Livermore, and Pleasanton focused on educating consumers about residential solar energy. The City of Dublin joined Solar Cities in

2008. The program features internet resources and targeted information to assist homeowners to make decisions about investing in a photovoltaic (PV) solar system. Furthermore, the City is a participant in the CaliforniaFIRST program, which provides access to financial assistance for business owners seeking to install PV systems.

The CaliforniaFIRST and Figtree Energy Resource Company programs are PACE financing programs. The City joined CaliforniaFIRST in 2009 and Figtree in 2011. PACE programs allow property owners within participating regions to finance the installation of energy and water improvements and pay the amount back as a line item on their property tax bill.

Solar PV systems generate energy by harnessing sunlight. Technologies that can convert solar energy into electricity can be installed at the point of use. Solar energy is a clean source of electricity that does not produce GHG emissions. Installing PV panels on homes and businesses can also save residents and business owners money by offsetting the need for power from the grid and can increase local energy security and reliability.

Benefits of solar include reduced emissions of criteria air pollutants from power plants, development and local demonstration of renewable energy technology, and increased energy reliability, security, and cost certainty.

The State of California offers rebates to homeowners and businesses owners who install solar PV systems on their homes and businesses. Additionally, the federal government offers tax incentives for installing PV panels on commercially-zoned buildings. The City of Dublin tracks solar panel installations. Since January 2011, 203 residences and 4 businesses have installed solar panels, with a combined potential to generate up to 7,712 kW of power per year.

Emissions Reductions – Assuming that 5% (869) homes and a comparable number of businesses install solar panels, it is estimated that solar projects installed on homes and businesses after 2010 will result in a reduction of **9,180 MTCO$_2$e/year** (24% of local reductions).

A.2.4 Reduce Solar Installation Permit Fee

Context – In 2006, the City of Dublin reduced the building permit fee related to the installation of photovoltaic systems installed as an incentive for property owners to install solar electricity generating capacity on their homes and businesses.

The City of Dublin recognizes the value of solar energy. Solar energy is a clean source of electricity that does not produce GHG emissions. Installing PV panels on homes can also save residents money by offsetting the need for power from the grid, and can increase local energy security and reliability. Other benefits include reduced emissions of criteria air pollutants from power plants, development and local demonstration of renewable energy technology, and increased energy reliability, security, cost certainty and local green jobs.

Emissions Reductions – Reductions from this measure support those calculated for Measure A.2.3.

A.2.5 LED Streetlight Specifications for New Projects

Context – The City has developed a LED streetlight specification that requires all future development projects to install LED streetlights. The existing streetlights in the city (excluding the decorative streetlights) have been changed from high-pressure sodium to LEDs. To date, one development project (Schaefer Ranch Unit 2) has used the LED streetlight specifications.

Emissions Reduction – Reductions anticipated from the LED streetlight specifications have not been quantified. However, this measure supports achievement of other recommended energy measures.

A.2.6 California Youth Energy Services Program

Context – The City of Dublin is partnering with Rising Sun Energy Center to promote energy conservation and sustainable living via a youth employment program, known as California Youth Energy Services (CYES). The CYES program is a youth and young adult summer employment and training program open to those who are 15–22 years old. The CYES program trains and employs local youth to provide resource conservation audits and retrofits to local residences in the form of a Green House Call. A CYES Green House Call consists of:

- A walkthrough energy assessment of the house with the client, looking for energy- and water-saving opportunities.
- Direct installation of free energy and water conservation saving measures; for example, efficient-flow faucet, aerators and showerheads, and screw-in compact fluorescent lamps.
- Checking for adequate attic insulation, pipe insulation, and a water heater blanket.
- Testing gallon per minute flow rates on all feasible kitchen and bathroom water fixtures.
- Assessment of toilets for leaks and flush volume.
- Assessment of refrigerator and water heater temperature settings.
- Collecting irrigation information.
- Providing energy and water conservation education.

Each resident receives by e-mail a customized follow-up report that documents work completed during the Green House Call. The report includes ways to capture additional water and energy savings through rebates and other programs such as bill discounts, weatherization, and attic insulation.

Emissions Reduction – It is estimated that participation in the CYES program will result in a reduction of **80 $MTCO_2e$/year** (less than 1% of local reductions).

A.2.7 Implementation of Green Shamrock Program

Context – The City of Dublin will be rolling out the Green Shamrock Program in fiscal year 2013-14. The City will invite Dublin businesses to get recognition for their sustainable actions. The program levels will be determined by a recognition program checklist of actions taken (points earned in various green categories, including water, waste, energy and pollution prevention). The program will have three levels of achievement: bronze, silver and gold. The program will encourage businesses to advance to the Bay Area Green Business Program. There is no cost to become a green business partner. Businesses will pledge to use sustainable practices in their operations.

Emissions Reduction – Reductions anticipated from the Green Shamrock Program have not been quantified and supported by substantial evidence. However, this measure supports achievement of other recommended energy measures and waste reduction measures.

A.2.8 Direct Commercial Energy Outreach

Context – In the fall of 2012, City staff accompanied PG&E on business visits. The purpose of the visits was to promote the various rebates available to commercial customers. A total of 489 businesses were contacted and 95 customers received audits. The outreach resulted in several businesses replacing their outdated lights with newer, more efficient technologies. Additional nonresidential energy efficiency projects have also been conducted with the assistance of the East Bay Energy Watch program.

Emissions Reduction – It is estimated that the improved electricity and natural gas efficiencies from this direct commercial energy outreach will result in a reduction of **640 $MTCO_2e$/year** (2% of local reductions).

A.2.9 Behavioral Energy Change

Context – The City of Dublin will be encouraging residents and employees to track their personal energy use and adopt behaviors that reduce energy use. By using PG&E's online MyEnergy tool, individuals in Dublin can easily monitor the energy use of their home or office, compare the energy use of their building to that of similar buildings, and set goals for personal energy reduction. MyEnergy also provides users with ways to reduce energy use with little or no cost. The City of Dublin can educate residents and employees about the MyEnergy tool and energy-saving behaviors through information on the City website, tabling at public events and by promoting a competition to reduce energy use between neighborhoods, among other strategies.

Emissions Reductions – Assuming that 10% of Dublin residents participate and that the average reduction in energy use per participating home is approximately 2.5%, consistent with reductions from similar programs in California and throughout North America, promoting behavioral energy change is estimated to result in a reduction of **180 $MTCO_2e$/year** (less than 1% of local reductions).

A.3 Solid Waste and Recycling Measures

The City of Dublin has a goal of reducing waste sent to the landfill by 75%. To achieve this reduction goal, the City has implemented a variety of measures, which include expanding existing commercial and residential recycling and composting programs and expanding community education and outreach initiatives. ICLEI and StopWaste have produced studies and evidence to show the reductions in GHG emission from recycling, composting, and reducing waste.

For example, programs for recycling and preventing waste contribute to reducing the energy and transportation needed to manufacture and ship virgin products and packaging. Composting contributes by reducing methane produced in the landfill and reducing the need for energy intensive fertilizers and pesticides.

Practices such as residential and commercial recycling and composting, buying recycled products, and green building play important roles in a local government's strategy to mitigate emissions.

A.3.1 Construction and Demolition Debris Ordinance

Context – Since 2005, the City has implemented a Construction and Demolition Debris Ordinance, which requires that 100% of asphalt and concrete be recycled and a minimum of 50% of all other materials be recycled. The City's diversion rate has consistently been between 80% and 90% since 2005, well above the 50% requirement.

Construction and demolition (C&D) debris represents a substantial portion of the total waste stream in Alameda County—up to 21%. Construction of a typical residential home produces approximately 17,000 pounds of C&D waste. Reducing C&D waste is critical to the City of Dublin because the city is still growing. C&D waste generally consists of wood, drywall, metal, concrete, dirt, and cardboard. After the organic materials are sent to the landfill, they break down and emit methane, a potent GHG. Recycling C&D waste not only keeps it from ending up in the landfill, but also reduces the upstream energy consumption that would occur to manufacture new construction materials.

Emissions Reductions – Emissions reductions for this measure support those calculated for Measure A.3.2.

A.3.2 Citywide Diversion Goal of 75%

Context – In 2008, the Dublin City Council adopted a goal to divert 75% of waste from the landfill. To achieve this goal, the City is focusing its efforts on increasing the recycling of organics, cardboard boxes, plastic film, paper, and packaging material. The City currently has in place a variety of programs for diverting waste and the City continues to explore additional programs to increase diversion in the city. In 2010 the City's diversion rate was 69%, adjusted for annual fluctuations in waste diversion based on trends from preceding and following years.

Emissions Reductions – Attainment of the 75% diversion goal as an improvement over the adjusted 69% diversion rate of 2010 is estimated to result in a reduction of **1,270 MTCO_2e/year** (3% of local reductions).

A.3.3 Tiered Rate Structure for Garbage and Recycling

Context – Since 2005, the City has offered a tiered rate structure, which places recycling services free and organics (composting) services at a significant discount to garbage services to encourage greater recycling and composting within the community. Recycling and composting programs reduce GHG emissions because manufacturing products with recycled materials avoids emissions associated with extracting, transporting, and processing virgin materials.

Emissions Reductions – Emissions reductions for this measure support those calculated for Measure A.3.2.

A.3.4 Commercial Recycling Program

Context – The business community and schools are important components of the Dublin community. In 2005, the City began offering a free commercial recycling program that also includes free indoor recycling containers for schools and businesses. Indoor recycling containers encourage employees and students to recycle by conveniently locating recycling containers near their work areas. Additionally, the 2010 CALGreen Code requires a recycling area in new commercial buildings. Programs to increase recycling help reduce emissions from extracting, transporting, and processing virgin materials.

Emissions Reductions – Emissions reductions for this measure support those calculated for Measure A.3.2.

A.3.5 Commercial Food Waste Collection Program

Context – In 2005, the City began offering a commercial food waste recycling program, which includes a subsidy to encourage greater food waste recycling. In 2012, a total of 1,768 tons of commercial green waste was collected in the commercial sector. The amount of businesses participating in the commercial green waste program has grown significantly in recent years. There are currently 102 establishments participating in the commercial food waste/organics program.

Reducing the amount of food waste sent to the landfill also reduces the CH_4 emissions produced when organic waste decomposes in the absence of oxygen at the landfill. CH_4 is a powerful GHG, 21 times more potent than CO_2. Food waste, which produces more methane than any other organic material, can be used for producing compost. Additionally, the resultant compost reduces GHGs in three ways:

1) The composting process itself helps to bind or sequester carbon in the soil.
2) The resultant compost results in reduced use of nitrogen fertilizers, which are not only energy intensive to produce, but are also a leading source of N_2O emissions, a potent GHG.
3) Sending organics to a composting facility reduces more GHGs than sending organics to a landfill, even one with methane recovery.

If the City of Dublin were to reduce the amount of food waste that is sent to the landfill by one metric ton, the community would prevent approximately one $MTCO_2e$ from entering the atmosphere.

***Emissions Reductions* –** Emissions reductions for this measure support those calculated for Measure A.3.2.

A.3.6 Promote Commercial Recycling

***Context* –** In 2005, the City began promoting commercial recycling in the city. The City has developed commercial recycling guides for businesses and the City's franchise waste hauler conducts two business audits per business day to increase diversion efforts in the commercial sector. Additionally, the 2010 CALGreen Code requires a recycling area in new commercial buildings. As with other efforts to improve recycling, this program helps reduce the need to extract, process, and transport virgin materials, thereby decreasing GHG emissions from these activities.

***Emissions Reductions* –** Emissions reductions for this measure support those calculated for Measure A.3.2.

A.3.7 Promote Multi-family Recycling

***Context* –** In 2005, the City began promoting multi-family recycling. The City has developed multi-family outreach packets and recycling bags for all multi-family units with shared recycling service. Historically, recycling participation rates within multi-family developments are lower than for single-family homes. The City of Dublin promotes high-density residential development; therefore, it is important to promote recycling within these developments. Increased recycling reduces the GHG emissions from extracting, processing, and transporting virgin materials.

***Emissions Reductions* –** Emissions reductions for this measure support those calculated for Measure A.3.2.

A.3.8 Curbside Residential Recycling Program

***Context* –** The City offers a convenient, free recycling program that includes curbside pickup for residential neighborhoods to encourage greater recycling efforts. The curbside residential recycling program was established prior to 2005. Curbside pickup includes garbage, recycling, and organics (composting). The goal of curbside pickup is to remove barriers to recycling, helping to increase recycling rates and decrease emissions from the extraction, processing, and transportation of virgin materials.

***Emissions Reductions* –** Emissions reductions for this measure support those calculated for Measure A.3.2.

A.3.9 Curbside Organics Collection Program

***Context* –** The City offers a convenient organics program that includes curbside pickup of food waste and yard waste for residential neighborhoods. This program, which began in 2005, is designed to encourage greater recycling efforts. In 2010, food waste and plant debris accounted for 28% of the community's waste. It is critical to remove these items from the waste stream because they generate methane within the anaerobic environment of a landfill. Additionally, food waste and plant debris can be composted to produce a natural fertilizer, which helps to reduce the need for energy-intensive and petroleum-based fertilizers and pesticides. In 2012, the curbside organics collection program resulted in 5,003 tons of organic material being diverted from the landfill.

***Emissions Reductions* –** Emissions reductions for this measure support those calculated for Measure A.3.2.

A.3.10 Reusable Bag Ordinance

Context – The Alameda County Waste Management Reusable Bag Ordinance went into effect on January 1, 2013. Alameda County stores affected by the ordinance include grocery stores, supermarkets, convenience stores, liquor stores, or other entities that sell milk, bread, soda, and snack food (there must be all four items for the ordinance to apply) and/or alcohol.

Emissions Reductions – Emissions reductions for this measure support those calculated for Measure A.3.2.

B. Municipal Operations Measures

The City of Dublin has also undertaken a number of municipal operations measures resulting in reduced GHG emissions relative to the base year of 2010. As noted in Chapter III. Forecast for Greenhouse Gas Emissions, the forecast of government operations emissions is included within the CAP's community inventory. As such, the various municipal operations that reduce GHG emissions and the resultant reduction metric are outlined below.

B.1 Transportation and Land Use Measures

There are several ways to reduce GHG emissions from the transportation sector, which include encouraging alternative modes of transportation other than solo driving, using vehicles that release fewer GHGs, and implementing smart growth policies. The measures below outline policies that the City has in place to encourage its employees to reduce their GHG emissions related to the transportation sector.

B.1.1 City Hybrid Vehicles

Context – The City of Dublin has a limited amount of vehicles for its employees to use, two of which are hybrid vehicles. Hybrid cars often get gas mileage of 20 to 30 miles per gallon more than the traditional internal combustion engine in non-hybrid vehicles. All hybrids shut off the gas engine automatically when the car is stopped and turn it back on only when the gas pedal is pressed again, saving fuel. Additionally, many hybrid cars run on batteries at low speeds, powered by energy produced by braking. Because less gasoline is burned in these vehicles, they emit lower levels of GHGs and other pollutants into the atmosphere.

Emissions Reductions – Reductions anticipated from use of City hybrid vehicles have not been quantified. However, this measure supports achievement of other recommended transportation measures.

B.1.2 Commute Alternative Program

Context – The City's Commute Alternative Program is a policy designed to encourage alternative modes of transportation among the City's workforce. The City provides incentives to its employees who use alternatives to solo driving, which include public transportation, biking, walking, or carpooling. The City provides an incentive of $2.00/day to use alternative transportation modes. Additionally, the City participates in the Alameda County Congestion Management Agency Guaranteed Ride Home Program. Since 2010, the number of employees that participated in the program doubled and the money spend on the program increased by nearly 50%.

Emissions Reductions – Reductions anticipated from the Commute Alternative Program have not been quantified. However, this measure supports achievement of other recommended transportation measures.

B.1.3 Green Fleet Policy for City Vehicles

Context – The City adopted a Green Fleet Policy in July 2012. The Green Fleet Policy provides guidelines for the procurement, management, and operation of fleet vehicles to:

- Reduce the consumption of petroleum fuels and other non-renewable resources.
- Replace petroleum fuels with renewable/sustainable alternatives, when feasible.
- Reduce vehicle emissions.
- Maximize fuel efficiency.
- Minimize vehicle idling.
- Reduce costs and save money.

Pursuant to the Green Fleet Policy, the City is required to make every effort to obtain the "cleanest" vehicles possible as measured by the then-existing emissions certification standards and those published by the manufacturers.

Emissions Reductions – While replacing vehicles with hybrids, plug-in electric vehicles, or other vehicles that produce low or no emissions does reduce emissions, specific reductions anticipated from the Green Fleet Policy have not been quantified due to a lack of local data. However, this measure supports achievement of other recommended transportation measures.

B.2 Energy Measures

Increasing the energy efficiency of municipal buildings has substantial potential to both reduce GHG emissions and save the City and the community money. The energy consumed to heat, light and power City-owned buildings is a direct source of municipal GHG emissions. The largest source of emissions from government operations is the City's buildings, which emit about half of the municipal GHGs.

B.2.1 LEED Silver Requirement for New City Buildings Costing More Than $3 Million

Context – In 2004, the City Council adopted a resolution which required that all new civic buildings over $3 million be built to achieve silver certification under the Leadership in Energy and Environmental Design (LEED) Green Building Rating System. The LEED program recognizes that building performance in the areas of human and environmental health, sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality results in more efficient buildings. The Shannon Community Center, which was the first completed in February 2009, includes numerous energy-efficient measures. The Shannon Community Center has been certified and is waiting for the appeals to reach silver certification. Several capital improvement projects are planned that will trigger the LEED silver certification requirement, such as the Emerald Glen Park Recreation & Aquatic Complex, the Cultural Arts Center, Public Safety Complex, and the City's new Corp Yard building. These buildings will be constructed to achieve LEED silver certification.

Emissions Reductions – Reductions anticipated from LEED certification of municipal buildings have not been quantified due to a lack of substantive data about these new facilities. However, this measure supports achievement of other recommended energy measures.

B.2.2 Window Film on the Civic Center

Context – In September 2009, an energy-efficient window film at the Dublin Civic Center was installed. The installation of the window film has improved the energy efficiency of the Civic Center.

Emissions Reductions – Because this action did not occur after 2010, and is not anticipated to change, all reductions from this measure have already been included in the 2010 inventory. However, this measure supports achievement of other recommended energy measures.

B.2.3 Light Emitting Diode (LED) Park Lights

Context – The City of Dublin was awarded a grant in 2009 for the installation of LED lights in various parks within the community. Sixty-five LED park lights were installed in 2011, replacing an equal number of metal halide fixtures in three park sites.

Emissions Reductions – The installation of the LED lights at the three park sites is estimated to result in a reduction of **20 $MTCO_2e$/year** (less than 1% of local reductions).

B.2.4 – Energy Action Plan

Context – In May 2011, with the help of Chevron Energy Solutions (Chevron ES), the City conducted an energy audit of all City facilities. From that audit, several recommendations were made for projects that would incorporate energy conservation measures as well as renewable energy options. Specifically, the Chevron ES evaluation covered the following types of energy efficiency and alternative energy measures:

- Lighting fixtures and controls
- Building automation and controls
- Air-handling systems
- Equipment modifications
- Heating, cooling and ventilation (HVAC) replacement and/or upgrades
- Streetlighting technologies
- Alternative energy production including photovoltaic systems and fuel cells
- Water irrigation systems

Photovoltaic Electricity

Seven PV electricity-producing (solar) installations have been constructed as part of the Energy Action Plan at the following locations: Civic Center; library; Shannon Community Center; senior center; and all three fire stations. These installations will generate more than 700 kW of solar energy at all sites combined. Additionally, a display monitor at the library with a link to the City website allows for public viewing of real-time tracking of production, savings, and environmental benefits. The solar arrays are a combination of solar shade structures at the Civic Center, library, Shannon Community Center, Fire Station 17, and Fire Station 18, with roof-mounted solar installations at the remaining facilities. Most importantly, the solar arrays will help power the diverse city operations. In addition to the solar arrays, the City will be upgrading its heating and cooling systems at the Civic Center and the library with more efficient technology.

Lighting and Irrigation Changes

Over 3,100 fixtures have been retrofitted. The high-pressure sodium cobra head lamps have been exchanged for energy-efficient LED streetlights. This project has benefited both the City's public safety responders as well as the public with improved lighting quality. The decorative fixtures along the Village Parkway corridor, in the Dublin Ranch area, and Transit Center were not switched to LED. The decorative streetlights will be looked at in a future time when decorative light technology advances.

Interior lighting retrofits have also occurred as part of the project. Encompassing all fire stations, Civic Center, the library, the senior center, and Shannon Community Center, these retrofits have

had an immediate effect in reducing electrical consumption of the City's facilities. Existing fixtures at all these locations have been retrofitted with more energy-efficient bulbs and ballasts. Motion sensors have been added, and more efficient lighting technologies will be incorporated as appropriate.

The City is in the process of upgrading the watering systems within all of its parks with a centralized irrigation system that will ensure that water is delivered to these locations only when needed, cutting the cost of maintaining the landscaping within City parks. Additionally, City facilities have been retrofitted with low-flow toilets and sinks.

Emissions Reductions – Implementation of the City's Energy Action Plan is estimated to result in a reduction of **550 MTCO$_{2e}$/year** (1% of local reductions).

B.3 Solid Waste and Recycling Measures

As mentioned previously, the City of Dublin has a goal of reducing waste sent to the landfill by 75%. To achieve this reduction goal, the City has implemented a variety of community-wide measures. Furthermore, Dublin is placing increasing emphasis on achieving emissions reductions through promoting sustainable landscaping practices such as those outlined in StopWaste's Bay-Friendly Landscape Guidelines.

B.3.1 Bay-Friendly Landscaping Policy

Context – The City has been employing Bay-Friendly Landscaping practices within the City-owned parks and landscaping medians for some time. Also, in 2009, the City adopted a Bay-Friendly Landscaping policy requiring new large civic projects to meet a certain level of points on the Bay-Friendly Landscaping checklist.

Bay-Friendly Landscaping is an integrated solution that fosters soil health, conserves water, reduces waste, and reduces emissions. Through the Bay-Friendly Landscaping Program, StopWaste provides training, landscape design assistance, and grant funding to local governments in Alameda County. The objective of the resources that StopWaste provides is to assist local governments to design public landscapes that cost less to maintain, consume fewer resources, send less waste to the landfill, and do not negatively affect the San Francisco Bay.

Bay-Friendly Landscaping practices reduce emissions and provide many additional benefits. Trees, for example, provide habitat for birds, beautify urban areas, decrease the heat island effect, increase property values, and help to control stormwater runoff. Shade trees also reduce the need for air conditioning, thereby cutting energy costs. Selecting appropriate plants that require less shearing reduces the need for running various pieces of equipment. This not only reduces GHG emissions, but reduces local air and noise pollution. Additionally, keeping lawn and plant clippings on-site helps to improve soils. Grass-cycling, mulching, and using compost creates healthier landscapes without the use of synthetic pesticides and fertilizers, all of which can help reduce water pollution.

Emissions Reductions – Emissions reductions anticipated from implementation of the Bay-Friendly Landscaping policy have not been quantified. However, this measure supports achievement of recommended energy efficiency and waste management measures.

C. Public Outreach Programs

Public outreach programs constitute an important component of the City's GHG reduction strategies. The City of Dublin, through its many environmental programs and City events, can educate the community on environmentally friendly behaviors. The City also can motivate the community to improve their community and environment and to reduce GHG emissions through reductions in energy use, transit, and waste and through many other actions.

C.1 Great Race for Clean Air

Context – The Great Race for Clean Air Challenge is a friendly competition between Bay Area employers to encourage the use of commute alternatives to and from work such as carpooling, biking, and publicly provided transit. These commute alternatives can provide significant GHG savings. The competition is held each year and lasts two months. The City of Dublin has been participating in the challenge since 2009.

Emissions Reductions – Emissions reductions anticipated from participation in the Great Race for Clean Air Challenge have not been quantified. However, this measure supports achievement of transportation measures.

C.2 Tri-Valley Spare the Air Resource Team

Context – The City of Dublin is a member of the Tri-Valley Spare the Air Resource Team. The resource team develops and carries out local projects to improve air quality. In recent years, the Tri-Valley Spare the Air Resource Team has developed the following projects:

- Walk & Roll to School Campaign was designed to educate tri-valley parents and students about clean and green alternatives for getting to and from school, such as walking and biking. The goal of this month-long campaign is to reduce school commute traffic, which results in reduced GHG emissions and increased safety around schools, and provides an opportunity for children to incorporate more exercise into their day.
- Idle Free Campaign educated parents about the negative impacts associated with idling cars. As part of this project, the resource team developed outreach materials to encourage parents to turn the key and be idle-free when picking up their kids from school.
- Extreme Makeover: Commute Edition gave employers located in San Ramon, Dublin, Pleasanton, and Livermore an opportunity to apply for and receive an employee commute program makeover.

Emissions Reductions – Emissions reductions anticipated from participation in the Tri-Valley Spare the Air Resource Team have not been quantified. However, this measure supports achievement of transportation measures.

C.3 Work with Schools on "Go Green" Recycling and Composting Programs

Context – The Go Green program is an education tool that encourages schools in the city to increase their recycling and composting efforts. The Go Green Initiative is a simple, comprehensive program designed to create a culture of environmental responsibility on school campuses across the nation. Founded in Pleasanton in 2002, Go Green provides a framework for environmental responsibility through five principles: 1) generate compost, 2) recycle, 3) educate, 4) evaluate the environmental impact of all activities, and 5) nationalize responsible paper consumption. In Dublin, the City's waste hauler, AVI, funds Dublin Unified School District schools that choose to participate in the Go Green program. As of June 2012, nine Dublin Unified Schools were participating in the program (82% participation rate).

Emissions Reductions – Emissions reductions anticipated from working with the schools on the Go Green Recycling and Composting Program have not been quantified. However, this measure supports achievement of waste reduction measures.

C.4 AVI Educational Presentations

Context – As part of its contract, AVI, the City's waste hauler, is required to present information on recycling and composting programs that the City offers to various organizations and businesses. AVI provides a minimum of 12 presentations a year.

Emissions Reductions – Emissions reductions anticipated from AVI's educational presentations have not been quantified. However, this measure supports achievement of waste reduction measures.

C.5 Promote Bike to Work Day

Context – Each year, the City of Dublin participates in Bike to Work Day. The 2013 Bike to Work Day and the sponsored Energizer Stations were held on Thursday, May 9, at the Dublin/Pleasanton BART station underpass and at the West Dublin/Pleasanton BART station underpass. The Energizer Stations, co-hosted by the cities of Dublin and Pleasanton, Alameda County Public Works, Dublin Cyclery, REI Dublin, Hacienda Business Park, Workday, and BART saw over 550 cyclists pass through.

Emissions Reductions – Emissions reductions anticipated from the promotion of Bike to Work Day have not been quantified. However, this measure supports achievement of transportation reduction measures.

C.6 Outreach at Dublin Farmers Market

Context – The Dublin farmers market made its debut in 2010. The farmers market is held every Thursday from 4:00 p.m. to 8:00 p.m. from April through September. The Environmental Services Division attends the market once a month to provide outreach and information to residents on the City's environmental programs, including solid waste and recycling, clean water, and energy efficiency.

Emissions Reductions – Emissions reductions anticipated from outreach at the farmers market have not been quantified. However, this measure supports achievement of energy measures and waste reduction measures.

VI. Measures Implemented By the State

In addition to Dublin's implementation of measures to reduce GHG emissions within the community, the effects of measures recently implemented at the state level will reduce GHGs emitted within the city and are included as part of the City's GHG emissions inventory and forecast.

In California, numerous policies that have been adopted by the state legislature or the governor are projected to reduce GHG emissions. The following sections briefly describe the policies that could have the greatest effect on reducing GHG emissions in Dublin. Additional legislation affecting GHG emissions in Dublin is summarized in Chapter I. Introduction.

A. State Climate Change Planning

A.1. California Global Warming Solutions Act (AB 32)

Context – In 2006, Governor Schwarzenegger signed AB 32, the Global Warming Solutions Act, into law. AB 32 institutes a mandatory limit on GHG emissions to achieve the target of reducing statewide emissions to 1990 levels by the year 2020. The bill directs ARB to establish a mandatory emissions reporting system to track and monitor emissions levels and to develop a wide range of compliance options and enforcement mechanisms.

As a part of AB 32 implementation, ARB adopted a Climate Change Scoping Plan in December 2008. This plan provides some guidance on how local governments can address climate change and play an active role in reducing statewide emissions. Specifically, the plan sets a target to reduce statewide emissions by nearly 30% below 2008 levels by 2020. To reach this target, the plan establishes many measures, including:

- Developing a California cap-and-trade program.
- Expanding energy-efficiency programs.
- Establishing targets for transportation-related GHG emissions.
- Supporting the implementation of a high-speed rail system.
- Expanding the use of green building practices.
- Increasing waste diversion, composting, and commercial recycling toward zero waste.
- Continuing water efficiency programs and using cleaner energy sources to move and treat water.
- Establishing a Million Solar Roofs Programs.
- Achieving a statewide renewable energy mix of 33%.
- Developing and adopting the Low Carbon Fuel Standard.
- Implementing vehicle efficiency measures for light, medium, and heavy-duty vehicles.
- Adopting measures to reduce gases with high global warming potential.
- Reducing methane emissions at landfills.
- Preserving forest sequestration and encouraging the use of forest biomass for sustainable energy generation.

Emissions Reductions – ARB has not set recommendations for local governments for reducing GHG emissions; however, the scoping plan states that land use planning and urban growth

decisions will play an important role in reducing GHGs within the state. These decisions will play an important role because local governments have the primary authority to plan, zone, approve, and permit how land is developed to accommodate the changing needs of their communities and population growth.

A.2 Executive Order S-13-08 and the California Climate Adaptation Strategy

Context – In November 2008, Executive Order S-13-08 was signed, which specifically asked the California Natural Resources Agency to identify how state agencies can respond to rising temperatures, changing precipitation patterns, sea level rise, and extreme natural events. The California Climate Adaptation Strategy, completed in December 2009, is a first-of-its-kind multi-sector strategy to help guide California's efforts in adapting to climate change impacts. It summarizes climate change impacts in seven specific sectors and provides recommendations on how to manage against those threats. The strategy considers the long-term complex and uncertain nature of climate change and establishes a proactive foundation for an ongoing adaptation process. Rather than address the detailed impacts, vulnerabilities, and adaptation needs of every sector, it prioritizes those sectors determined to be at greatest risk. The strategy is intended to be used directly by California state agencies in their efforts to plan for climate impacts.

Emissions Reductions – Emissions reductions anticipated from actions of Executive Order S-13-08 have not been quantified. However, this measure supports achievement of recommended CAP measures.

A.3 Senate Bill 732 – California Strategic Growth Council

Context – In 2008, the California Senate passed SB 732, which established a Strategic Growth Council, which is charged with coordinating policies across State agencies to support a unified vision for land use development in the state. This vision will serve as a reference point for local land use policies.

Emissions Reductions – Emissions reductions anticipated from actions of the Strategic Growth Council have not been quantified. However, this measure supports achievement of recommended CAP measures.

B. Energy

B.1 Senate Bill 1078, Senate Bill 107, and Executive Order S-14-08 – Renewables Portfolio Standards

Context – In 2002, the California Senate passed SB 1078 requiring public utilities to gradually increase the percentage of their energy supply generated from renewable sources, reaching 20% renewable content by 2017. SB 107 accelerated the time frame of SB 1078 for it to take effect in 2010. In November of 2008, Executive Order S-14-08 was signed, which increased the amount of renewable power generation to 33% by 2020. Renewable energy could include wind, solar, geothermal, or any “Renewables Portfolio Standard (RPS)-eligible” sources. This means that, over time, an increasingly larger share of the energy electrifying homes and businesses in the City of Dublin will be generated with clean power. The policy should have an important effect on city emissions because 35.4% of total emissions come from commercial and residential energy use in Dublin, according to the 2010 inventory.

Emissions Reductions – It is estimated that the RPS in Dublin would result in a reduction of **7,720 $MTCO_2e$/year.**

B.2 Executive Order S-20-04 – Energy Efficiency in State Buildings

Context – Executive Order S-20-04 was signed July 27, 2004, and directs the State to commit to aggressive actions to reduce the electricity use of state buildings by implementing cost-effective

energy efficiency and green building strategies. To this end, the executive order directs all facilities owned, funded, or leased by the State (and encourages cities, counties, and schools as well) to take measures to reduce grid-based energy purchases for State-owned buildings by 20% by 2015. This is to be done through cost-effective measures to increase energy efficiency and distributed generation technologies. These measures include designing, constructing, and operating all new and renovated facilities owned by the State and paid for with State funds as buildings certified "LEED Silver" or higher; seeking out office space leases in buildings with a EPA ENERGY STAR rating; and purchasing or operating ENERGY STAR electrical equipment whenever cost-effective.

***Emissions Reductions* –** This measure will result in reductions of GHG emissions in the city. However, the amount of reductions anticipated from increasing energy efficiency in state buildings has not been quantified, so an estimated amount has not been included in the CAP. Therefore, GHG emissions reductions from these measures would result in additional reductions not included in the quantified reductions under this CAP.

B.3 Title 24

***Context* –** Title 24 of the California Code of Regulations is a statewide standard applied at the local level by local agencies through building permits. It mandates how each new home and business is built in California. It includes requirements for the structural, plumbing, electrical, and mechanical systems of buildings and for fire and life safety, energy conservation, green design, and accessibility in and around buildings. This forecast focuses on Part 6 (the California Energy Code) and Part 11 (the California Green Building Standards Code), which require direct electricity, natural gas, and water savings for every new home or business built in California.

This forecast includes estimates of reductions from future reductions that have not yet gone into effect, including the 2013 update to Title 24, which is scheduled to be enforced beginning on January 1, 2014. These estimates are based on California Energy Commission studies that compare each new update of Title 24 to its former version.

***Emissions Reductions* –** It is estimated that the changes to Title 24 would result in a reduction of **2,600 $MTCO_2e$/year.**

C. Transportation and Land Use

C.1 Assembly Bill 1493 – Vehicle Fuel Efficiency Standards

***Context* –** Nationwide, automobile manufacturers are bound by fuel efficiency standards set by the US Department of Transportation. These standards, known as the Corporate Average Fuel Economy (CAFE) standards, require that the fleet of passenger cars sold by any single manufacturer have an average fuel economy of 27.5 mpg—the same standard that was in place in 1985, despite technical progress and increased understanding of the environmental impacts of fossil fuel combustion. The CAFE standards are adopted at the federal level, and states are prevented from passing laws addressing vehicle fuel economy. In response to these stagnant federal standards, the California Assembly passed AB 1493, which allows ARB to create carbon dioxide emissions standards for cars sold in California. They argue that a GHG emissions standard is distinct from a fuel economy standard, despite the fact that it would necessitate improved gas mileage. The EPA granted a waiver to California in February 2009 to pursue its own regulations under AB 1493; however, the State has not yet done so. If AB 1493 is implemented in the next few years, this could have a significant impact on the reduction of GHG emissions in the City of Dublin because the total percentage of emissions from transportation was 62.2% in 2010.

Emissions Reductions – It is estimated that the GHG emissions reduction of AB 1493 for on-road mobile source GHG emissions in Dublin, in conjunction with the Low Carbon Fuel Standard (see C.2), would result in a reduction of **53,140 $MTCO_2e$/year.**

C.2. Executive Order S-01-07 – Low Carbon Fuel Standard

Context – Executive Order S-01-07 was signed January 18, 2007, and directs ARB to develop a Low Carbon Fuel Standard (LCFS). The LCFS would reduce the carbon intensity of California's transportation fuels by at least 10% by 2020. The LCFS will also incorporate compliance mechanisms providing flexibility to fuel providers to meet requirements to reduce GHG emissions. The LCFS will examine the full fuel cycle impacts of transportation fuels and ARB will work to design the regulation in a way that most effectively addresses the issues raised by the Environmental Justice Advisory Committee and other stakeholders.

Emissions Reductions – Emissions reductions from this measure support those calculated for Measure C.1.

C.3. Senate Bill 375

Context – In 2008, the California Senate passed SB 375, which aims to reduce GHG emissions by connecting transportation funding to land use planning. SB 375 creates a process by which local governments and other stakeholders work together within their region to reduce GHG emissions through integrated development patterns, improved transportation planning, and other transportation measures and policies. SB 375 requires ARB to develop the targets for reducing GHG emissions caused by passenger vehicles for 2020 and 2035 by September 30, 2010. Targets were released in 2010. Implementation of these targets and the measures to achieve those targets will require the collaboration of local governments such as Dublin and metropolitan planning organizations such as MTC.

Emissions Reduction – This measure will result in the reduction of GHG emissions, but due to a lack of specific information, the amount of reductions anticipated from SB 375 have not been quantified.

VII. Summary of Emissions Reduction Measures

Based on the emissions reductions estimated to be achieved after 2010 through the above measures, the GHG emissions in the City of Dublin are estimated to be 272,410 $MTCO_2e$ in 2020, or 17.0% below 2010 emissions. This exceeds the target of 15% below 2010 emissions. GHG emissions with the above reductions equal 3.2 $MTCO_2e$ per service population, below the BAAQMD plan-level efficiency threshold of 6.6 $MTCO_2e$ per service population.

Table 13 summarizes the contribution of proposed CAP measures toward achievement of the reduction target.

TABLE 14 – SUMMARY OF GHG REDUCTION MEASURE PERFORMANCE

Measure Number and Title	GHG Reductions ($MTCO_2e$/yr)	% of 2020 Local Reductions
A. Community-wide Measures		
A.1. Transportation and Land Use Measures		
A.1.1. Transit-Oriented Development	-8,380	22%
A.1.2. High-Density Development	*Included in A.1.1*	
A.1.3. Mixed-Use Development	*Included in A.1.1*	
A.1.4. Bicycle Parking Requirements	-950	2%
A.1.5. Streetscape Master Plan	-1,530	4%
A.1.6. Multi-Modal Map	-1,140	3%
A.1.7. Electric and Plug In-Hybrid Charging Stations at the Library	-90	<1%
A.1.8. General Plan Community Design and Sustainability Element	*Supporting Measure*	
A.1.9. Work with LAVTA to Improve Transit	-1,210	3%
A.1.10. Bikeways Master Plan	Included in A.1.4	
A.1.11. West Dublin/Pleasanton BART Station	-10,980	28%
A.1.12. City Design Strategy	*Supporting Measure*	
Subtotal Transportation and Land Use	**-24,280**	**62%**
A.2. Energy Measures		
A.2.1. Green Building Ordinance	-1,110	3%
A.2.2. Energy Upgrade California	-1,610	4%
A.2.3. Solar Conversion Programs	-9,180	24%
A.2.4. Reduce Solar Installation Permit Fee	*Included in A.2.3*	
A.2.5. LED Streetlight Specifications for New Projects	*Supporting Measure*	
A.2.6. California Youth Energy Services Program	-80	<1%
A.2.7. Implementation of Green Shamrock Program	*Supporting Measure*	
A.2.8. Direct Commercial Energy Outreach	-640	2%
A.2.9. Behavioral Energy Change	-180	<1%
Subtotal Energy	**12,800**	**33%**
A.3. Solid Waste and Recycling Measures		
A.3.1. Construction and Demolition Debris Ordinance	*Included in A.3.2*	
A.3.2. Citywide Diversion Goal of 75%	-1,270	3%
A.3.3. Tiered Rate Structure for Garbage and Recycling	*Included in A.3.2*	
A.3.4. Commercial Recycling Program	*Included in A.3.2*	
A.3.5. Commercial Food Waste Collection Program	*Included in A.3.2*	
A.3.6. Promote Commercial Recycling	*Included in A.3.2*	
A.3.7. Promote Multi-family Recycling	*Included in A.3.2*	
A.3.8. Curbside Residential Recycling Program	*Included in A.3.2*	
A.3.9. Curbside Organics Collection Program	*Included in A.3.2*	
A.3.10. Reusable Bag Ordinance	*Included in A.3.2*	
Subtotal Solid Waste and Recycling	**-1,270**	**3%**
Total Community-wide Measures	**-38,350**	**99%**

Measure Number and Title	GHG Reductions ($MTCO_2e$/yr)	% of 2020 Local Reductions
B. Municipal Operations Measures		
B.1. Transportation and Land Use Measures		
B.1.1. City Hybrid Vehicles	*Supporting Measure*	
B.1.2. Commute Alternative Program	*Supporting Measure*	
B.1.3. Green Fleet Policy for City Vehicles	*Supporting Measure*	
B.2. Energy Measures		
B.2.1. LEED Silver Requirement for New City Buildings > $3mil	*Supporting Measure*	
B.2.2. Window Film on the Civic Center	*Supporting Measure*	
B.2.3. LED Park Lights	-20	<1%
B.2.4. Energy Action Plan	-550	1%
B.3. Solid Waste and Recycling Measures		
B.3.1. Bay-Friendly Landscaping Policy	*Supporting Measure*	
Total Municipal Operations Measures	**-570**	**1%**
C. Public Outreach Programs		
C.1 Great Race for Clean Air	*Supporting Measure*	
C.2. Spare the Air Resource Team	*Supporting Measure*	
C.3. Work with Schools on Go Green Recycling & Composting	*Supporting Measure*	
C.4. AVI Educational Presentations	*Supporting Measure*	
C.5. Promote Bike to Work Day	*Supporting Measure*	
C.6. Outreach at Dublin Farmers Market	*Supporting Measure*	
Total Community-wide Measures	**-38,350**	
Total Municipal Operations Measures	**-570**	
Total Statewide Reduction	**- 63,460**	
Total Reductions	**102,380**	

VIII. Implementation, Monitoring and Future Steps

GHG emissions are an issue of growing concern for communities across the US and around the world. The City of Dublin has displayed great leadership and foresight in choosing to confront this issue now. By reducing the amount of GHG emissions emitted by the community, Dublin joins hundreds of other American cities in stemming GHG emissions and the impacts associated with it.

In addition to mitigating the effects of GHG emissions, the City of Dublin stands to benefit in many other ways from the proposed measures outlined in this report, including better public health, improved public spaces, economic growth, and long-term savings for property owners.

Achieving Dublin's reduction target will require both persistence and adaptability.

A. Implementation

Ensuring that the recommended measures translate from policy language into on-the-ground results is critical to the success of the CAP. Some actions will require inter-departmental or inter-agency cooperation and appropriate partnerships will be established accordingly. Other actions will require jurisdictional partners, businesses, and our community to take action.

As part of the implementation, the City shall identify which measures apply to different types of new development projects. A checklist has been developed which illustrates the reduction measures that would apply to new development in the city, including residential and commercial projects (refer to Appendix E). Identification of implementation steps and parties responsible for ensuring implementation of each action shall be included in approval documents for each project.

B. Monitoring

The City of Dublin's Environmental Services Division will work with various departments within the City to monitor the results that are achieved by the various CAP programs and policies. A few examples of the type of policies in the plan that will be monitored are highlighted below:

1) Construction of bicycle lanes—The Bikeways Master Plan update includes approximately 44.5 miles of proposed bike paths/bike lanes. The City will track the miles of bike lanes that are constructed each year.

2) Energy Upgrade California Program—This program establishes countywide building retrofit measures and specifications for energy efficiency, water and resource conservation, and indoor air quality and health. City staff will monitor the homes that participate in this program.

3) Construction & Demolition (C&D) Debris Ordinance—The City's existing C&D Ordinance requires that 100% of asphalt and concrete be recycled and a minimum of 50% of all other materials be recycled. Environmental Services Staff and the Building & Safety Division track the percentage of C&D debris that is recycled. The City's diversion rate has consistently been between 80% and 90% since 2005.

4) Citywide Diversion Goal—The City of Dublin has adopted a goal to divert 75% of waste from the landfill. The City of Dublin reports to CalRecycle on an annual basis on the percentages of waste diverted from the landfill. The City will continue to monitor its diversion rates and explore additional programs to help reach the 75% diversion goal.

5) Green Building Ordinance—The City's Green Building Ordinance requires residential projects over 20 units to reach 50 points on the GreenPoint Rated system. The Building

Division works with project developers at the entitlement and building permit stages to ensure that the minimum 50 points is achieved.

6) California Youth Energy Services (CYES) Program – The City of Dublin has partnered with Rising Sun Energy Center to promote energy conservation and sustainable living via a youth employment program, known as California Youth Energy Services (CYES). The CYES program trains and employs local youth to provide resource conservation audits and retrofits to local residences in the form of a Green House call. The City will monitor and track the number of homes that receive a Green House call and the energy efficiency and water conservation measures that are installed.

Monitoring results is critical to verifying that the various policies and programs within the City's CAP are achieving the anticipated GHG emissions reductions that have been anticipated.

C. Periodic Review

The City is committed to periodically conducting a review of the CAP to determine its progress in reducing GHG emissions within the city. Environmental Services Staff will conduct the periodic reviews. The process of conducting a periodic review will allow the City to demonstrate progress toward local emissions reduction targets and identify opportunities to integrate new or improved measures into the emissions reduction plan, including additional measures if necessary to meet the reduction target. The City of Dublin will review the CAP on an annual basis to verify that the various reduction measures are being implemented appropriately. Additionally, the City will re-inventory its emissions every five years.

D. Point of Control

Table 14 below lists the primary point of contact and locus of control for each individual reduction measure. Specifically, the relevant department within the city is highlighted, within which the implementation and ongoing activities will take place. Assigning and clarifying the responsible party is an important part of ensuring that the City achieves its goals as outlined and projected within the CAP.

TABLE 15 – PRIMARY DEPARTMENT RESPONSIBLE FOR REDUCTION MEASURES

Measure Number and Title	Department Responsible	Time Frame
A. Community-wide Measures		
A.1. Transportation and Land Use Measures		
A.1.1. Transit-Oriented Development	Community Development	2020
A.1.2. High-Density Development	Community Development	2020
A.1.3. Mixed-Use Development	Community Development	2020
A.1.4. Bicycle Parking Requirements	Public Works	Ongoing
A.1.5. Streetscape Master Plan	Public Works	Ongoing
A.1.6. Multi-Modal Map	Community Development	Ongoing
A.1.7. Electric and Plug In-Hybrid Charging Stations at the Library	City Manager's Office	Ongoing
A.1.8. General Plan Community Design and Sustainability Element	Community Development	Ongoing
A.1.9. Work with LAVTA to Improve Transit	Public Works	Ongoing
A.1.10. Bikeways Master Plan	Public Works	2020
A.1.11. West Dublin/Pleasanton BART Station	N/A	Ongoing
A.1.12. City Design Strategy	Community Development	Ongoing
A.2. Energy Measures		
A.2.1. Green Building Ordinance	Community Development	2020
A.2.2. Energy Upgrade California	City Manager's Office	Ongoing
A.2.3. Solar Conversion Programs	City Manager's Office	Ongoing
A.2.4. Reduce Solar Installation Permit Fee	Community Development	Ongoing
A.2.5. LED Streetlight Specifications for New Projects	Public Works	Ongoing
A.2.6. California Youth Energy Services Program	City Manager's Office	Evaluated annually
A.2.7. Implementation of Green Shamrock Program	City Manager's Office	Ongoing
A.2.8. Direct Commercial Energy Outreach	City Manager's office	Ongoing
A.2.9. Behavioral Energy Change	N/A	Ongoing
A.3. Solid Waste and Recycling Measures		
A.3.1. Construction and Demolition Debris Ordinance	Community Development / City Manager's Office	Ongoing
A.3.2. Citywide Diversion Goal of 75%	City Manager's Office	Ongoing
A.3.3. Tiered Rate Structure for Garbage and Recycling	City Manager's Office	Ongoing
A.3.4. Commercial Recycling Program	City Manager's Office	Ongoing
A.3.5. Commercial Food Waste Collection Program	City Manager's Office	Ongoing
A.3.6. Promote Commercial Recycling	City Manager's Office	Ongoing
A.3.7. Promote Multi-family Recycling	City Manager's Office	Ongoing
A.3.8. Curbside Residential Recycling Program	City Manager's Office	Ongoing
A.3.9. Curbside Organics Collection Program	City Manager's Office	Ongoing
A.3.10. Reusable Bag Ordinance	City Manager's Office	Ongoing
B. Municipal Operations Measures		
B.1. Transportation and Land Use Measures		
B.1.1. City Hybrid Vehicles	Public Works	Ongoing
B.1.2. Commute Alternative Program	City Manager's Office	Ongoing
B.1.3. Green Fleet Policy for City Vehicles	City Manager's Office	Ongoing
B.2. Energy Measures		
B.2.1. LEED Silver Requirement for New City Buildings > $3mil	Parks & Community Service	Ongoing
B.2.2. Window Film on the Civic Center	Public Works	Complete
B.2.3. LED Park Lights	Parks & Community Service	Complete
B.2.4. Energy Action Plan	City Manager's Office	2013
B.3. Solid Waste and Recycling Measures		
B.3.1. Bay-Friendly Landscaping Policy	Parks & Community Service	Ongoing
C. Public Outreach Programs		
C.1. Great Race for Clean Air	City Manager's Office	Ongoing
C.2. Spare the Air Resource Team	City Manager's Office	Ongoing
C.3. Work with Schools on Go Green Recycling and Composting	City Manager's Office	Ongoing
C.4. AVI Educational Presentations	City Manager's Office	Ongoing
C.5. Promote Bike to Work Day	Public Works	Ongoing
C.6. Outreach at the Farmers Market	City Manager's Office	Ongoing

IX. Relationship to the California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires the City to identify the significant environmental impacts of its discretionary actions and to avoid or mitigate those impacts, if feasible. Senate Bill 97 (2007) acknowledges that emissions from greenhouse gases (GHG) are an environmental issue that requires analysis under CEQA. When the City undertakes a discretionary action for a "project" under CEQA, such as approval of a proposed development project, plan, policy, or code change, the City will evaluate whether that action would result in a significant impact due to GHG emissions and climate change.

It is unclear if the adoption of the CAP is a "project" under CEQA. Since it is a plan to protect the environment and reduce environmental impacts (due to GHG emissions or climate change), it may not constitute a "project" or qualify for an exemption under CEQA. The overall purpose of the CAP is to reduce the impact that the community will have on GHG emissions and, therefore, reduce an impact on the environment. However, as with any proposal involving activities relating to development, implementation of the CAP theoretically could potentially result in adverse impacts on the physical environment. Therefore, an Initial Study and Negative Declaration have been prepared by the City pursuant to CEQA to evaluate whether there are any potential adverse environmental impacts of implementing the CAP. Because the CAP will have undergone environmental review under CEQA, and is intended to reduce GHG emissions and climate change impacts in Dublin, it may be relied upon to address the cumulative impacts for future projects consistent with the CAP.

This approach is consistent with CEQA Guidelines Section 15183.5, 15064, and 15130 and the BAAQMD CEQA Guidelines and Thresholds of Significance, which provide a means for jurisdictions to analyze and mitigate the significant effects of GHGs at a programmatic level by adopting a plan for the reduction of GHG emissions. Later, as individual projects are proposed that are consistent with the CAP, the project would be considered to have a less than significant impact (i.e., less than cumulatively considerable contribution) from GHG emissions and climate change.

When determining whether a proposed project is consistent with the CAP, City staff should consider the following:

- The extent to which the project supports or includes applicable strategies and measures, or advances the actions identified in the CAP.
- The consistency of the project with ABAG population growth projections as outlined in the One Bay Area Plan (Projections 2010), which are the basis of the CAP GHG emissions projections.
- The extent to which the project would interfere with implementation of CAP strategies, measures, or actions.

A project and its CEQA environmental review that relies on this CAP for its GHG emissions and climate change analysis must identify the specific CAP measures applicable to the project and how the project incorporates the measures. If the measures are not otherwise binding and enforceable, they must be incorporated as conditions of approval or mitigation measures applicable to the project.

If the City determines in its environmental review that the proposed project would not substantially comply with the CAP, the applicant could consider various methods for making the project consistent with the CAP, including but not limited to revising the project, incorporating alternative reduction measures beyond the reduction measures identified in the CAP (including offsets) to make the project's GHG emissions levels consistent with the CAP. The impact from

GHG emissions from a project may also be determined to be less than significant under CEQA through an alternative analysis using a standard of significance that is supported by substantial evidence, such as BAAQMD's numerical thresholds (less than 1,100 $MTCO_2e$ per year or 4.6 metric tons per service population (residents and employees) per year. A determination that a project does not substantially comply with the CAP shall not in and of itself provide substantial evidence that a project's impact from GHG emissions is a significant impact under CEQA. It only means that a project may not be able to rely on the CAP for a determination that the project's impact is less than significant due to GHG emissions and climate change (i.e., less than cumulatively considerable contribution to significant cumulative impact).

Appendix A: Acronyms and Abbreviations

AB	Assembly Bill
AB 32	Global Warming Solutions Act
ABAG	Association of Bay Area Governments
ACCPP	Alameda County Climate Protection Project
ADC	alternative daily cover
ARB	California Air Resources Board
AVI	Amador Valley Industries
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BAU	business-as-usual
CACP	Clean Air & Climate Protection
CAFÉ	Corporate Average Fuel Economy
CAP	Climate Action Plan
C&D	construction demolition debris
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CNG	compressed natural gas
CYES	California Youth Energy Services
DDSP	Downtown Dublin Specific Plan
DMC	Dublin Municipal Code
EAP	Energy Action Plan
EPA	Environmental Protection Agency
FTE	full-time equivalent
GHG	greenhouse gas(es)
ICLEI	International Council for Local Environmental Initiatives
IPCC	Intergovernmental Panel on Climate Change
LAVTA	Livermore Amador Valley Transit Authority
LCFS	Low-Carbon Fuel Standard

LED	light emitting diode
LEED	Leadership in Energy & Environmental Design
LGOP	local government operations protocol
LNG	liquefied natural gas
MT CO_2e	metric tons carbon dioxide equivalent
MTC	Metropolitan Transportation Commission
MMT	million metric tons
N_2O	nitrous oxide
PG&E	Pacific Gas and Electric
PUC	Public Utilities Commission
PV	photovoltaic
RPS	Renewable Portfolio Standard
SB	Senate Bill
TOD	transit oriented development
VMT	vehicle miles traveled
WARM	Waste Reduction Model

Appendix B: Discussion & Comparison of 2005 & 2010 GHG Emissions Inventory and Forecast

The City of Dublin's baseline emissions inventory was originally conducted by ICLEI in partnership with City staff. The City chose calendar year 2005 as its base year. The baseline inventory was completed and approved by the Dublin City Council in October 2008.

In order to fully gauge the City's GHG emissions reduction progress, an additional GHG Inventory was conducted using calendar year 2010 as the revised base year. The purpose of Appendix B is to provide a comparison of the 2005 and 2010 GHG emissions inventories and a discussion of the methods used.

1. New Sectors and Activities

Two new sectors were included in the 2010 inventory that were not a part of the 2005 inventory: 1) electricity emissions associated with water and wastewater, and 2) wastewater use and fugitive and process nitrous oxide (N_2O) and methane (CH_4) emissions associated with wastewater treatment. As shown in Table 1, combined, these new sectors accounted for about 1% of 2010 emissions. Additionally, several new sources and activities were considered and included as part of the transportation sector in the 2010 inventory, which includes electricity from buses, liquefied natural gas from buses, emissions from BART, and off-road emissions. These new sources and activities in the transportation sector comprise about 10% of the transportation sector.

Methods for calculating emissions from these sectors were not widely available in 2008, when the 2005 inventory was prepared, but are now published in the ICLEI Community Protocol.

TABLE 1: EMISSIONS FROM NEW SECTORS IN 2010

New Sectors in 2010 Community Inventory	Source / Activity	$MTCO_2e$
Wastewater treatment emissions	_____	565
Water and wastewater electricity emissions	_____	2,045
Transportation	Wheels and bus electricity	684
Transportation	Wheels and bus – liquefied natural gas (LNG)	25
Transportation	Bay Area Rapid Transit (BART) emissions	658
Transportation	Off-road and direct emissions	18,490

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

2. 2010 & 2005 Community GHG Emissions Inventory Comparison

Tables 2 and 3 below provide a comparison between the 2010 GHG emissions inventory and 2005 GHG emissions inventory.

TABLE 2: 2010 GHG EMISSIONS INVENTORY

2010 Community Emissions by Sector	$MTCO_2e$	Percent of Total CO_2e	Energy (MMBtu)	% of Total MMBTu
Residential - Electricity	20,449	6.2%	343,617	7.4%
Residential - Gas	35,517	10.8%	668,171	14.3%
Commercial/industrial - Electricity	37,994	11.6%	Unknown*	Unknown*
Commercial/industrial - Gas	22,104	6.7%	416,007	8.9%
Water & Wastewater Electricity	2,045	0.6%	34,364	0.7%
Transportation sector	204,151	62.2%	3,195,367	68.6%
Solid waste	5,330	1.6%	—	0.0%
Other – Wastewater Fugitive Emissions	565	0.2%	—	0.0%
TOTAL	328,155	100.0%	4,657,526	100%

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

* The commercial electricity data is not available due to PG&E privacy regulations

TABLE 3: REVISED 2005 GHG EMISSIONS INVENTORY

2005 Community Emissions by Sector	$MTCO_2e$	Percent of Total CO_2e	Energy (MMBtu)	% of Total MMBTu
Residential - Electricity	20,368	6.6%	310,729	5.9%
Residential - Gas	30,785	10.0%	575,888	11.0%
Commercial/industrial - Electricity	40,528	13.1%	618,303	11.8%
Commercial/industrial - Gas	19,672	6.4%	367,999	7.0%
Water & Wastewater Electricity	——	0.0%	——	0.0%
Transportation sector	189,763	61.4%	3,364,409	64.2%
Solid waste	7,807	2.5%	——	0.0%
Other – Wastewater Fugitive Emissions	——	0.0%	——	0.0%
TOTAL	308,923	100%	5,237,328	100%

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

There were a total of 22,467 $MTCO_2e$ that were reported in 2010, but not included in the 2005 inventory. The $MTCO_2e$ included in the 2010 inventory that was not included in the 2005 inventory includes the following sectors: water & wastewater electricity (2,045 $MTCO_2e$), wastewater fugitive emissions (565 $MTCO_2e$), wheels bus (709 $MTCO_2e$), BART (658 $MTCO_2e$) and off-road transportation (18,490).

It became evident that continuing to use the original emissions inventory completed for baseline year 2005 was problematic for several reasons, and, therefore, the determination was made to switch to 2010 as the baseline year. Switching to 2010 as the baseline is a better choice for the following reasons:

- Community activities that affect GHG emissions have changed considerably since 2005 due to increased awareness of sustainability, as well as to a downturn in the economy. Examples of the changes include a decrease in vehicle miles traveled, an increase in the number of people who purchase hybrid and electric vehicles, an increase in the number of residents and businesses

participating in the City's organics collection program, an increase in the number of residents and businesses installing PV, etc.

- Numerous efficiency improvements have occurred in electric equipment, vehicles, and other devices, resulting in lower emissions per use.
- The 2010 inventory contains additional subsectors and activities not accounted for in the 2005 inventory (e.g., water emissions, wastewater emissions, BART emissions). A 2010 emissions inventory is therefore more complete and accurate.
- The shift from the base year from 2005 to 2010 enables the City to more fully capture community emissions and to employ more aggressive calculation methodologies not present in 2005, thereby, producing a more precise GHG reduction goal.

The new sources that are accounted for in the 2010 inventory represent 6.85% of the 2010 GHG emissions inventory. If these new sources are removed from the inventory, then the 2010 inventory would be 305,688 $MTCO_2e$, which is slightly less than the 2005 GHG emissions inventory (308,923 $MTCO_2e$). Therefore, if the City were to continue to use the 2005 inventory as the baseline year, it would create a situation where the community emissions would actually be understated and imprecise progress would be reported in the City's efforts to reduce GHG emissions within the community.

Finally, it is also important to note that between 2005 and 2010 the City's population increased 21%. During the 5-year period, the City experienced substantial growth in population; nevertheless, community emissions are not increasing. Thus, community emissions are decreasing on a per capita basis, which is a significant effort for a community experiencing such growth.

3. Community Inventory Summary

Table 4 summarizes changes to methodologies between the 2005 and 2010 inventories. The following conclusions summarize findings in comparing the two community inventories.

- New sectors accounted for less than 1% of the unadjusted inventory in 2010.
- New sources of emissions in the transportation sector accounted for about 10% of total unadjusted transportation emissions in 2010.
- While residential electricity use increased by more than 10%, residential electricity emissions increased by less than 1% because PG&E had a lower emissions factor in 2010 (i.e., adjustments to power supply sources resulted in fewer emissions).
- While the emissions factor for natural gas decreased slightly (<1%), overall residential natural gas emissions grew by 15%, and overall commercial natural gas emissions grew by 12%. On a per service population per capita, overall natural gas use deceased by 2.3%.
- PG&E reported direct access emissions in 2010, but did not report direct access kilowatt-hour (kWh) use. In 2005, PG&E reported direct access kWh usage and the resulting emissions were calculated.
- Rather than using a 2010 N_2O and CH_4 emissions factor for electricity, the inventory uses a five-year average for these factors. This was not the case in 2005.
- Transportation vehicle miles traveled (VMT) decreased by approximately 4%, while emissions decreased by almost 8% - signaling that a higher percentage of vehicles in 2010 were either lighter duty or more efficient than their 2005 counterparts.
- Community waste tonnage decreased by 43%. This decrease may result from both City measures to reduce waste and from the economic downturn experienced during this time frame.

TABLE 4: SUMMARY OF COMMUNITY METHOD CHANGES

Sector	Source	Method Changed?	If So, How?
Residential	Electricity	No	
Residential	Natural gas	No	
Commercial and industrial	Electricity	Yes	• 2010 commercial and industrial electricity emissions are calculated by PG&E • 2005 direct access electricity based on state averages
Commercial and industrial	Natural gas	No	
Water and wastewater	Water and wastewater	New	
Transportation	Gasoline	Yes	• 2005 data was updated using the MTC trip generation model • 2005 data could not be broken out into the same categories as 2010 • Greater uncertainty within 2005 data
Transportation	Diesel	Yes	• 2005 data was updated using the MTC trip generation model • 2005 data could not be broken out into the same categories as 2010 • Greater uncertainty within 2005 data •
Transportation	Wheel and bus electricity	New	
Transportation	Wheel and bus – LNG	New	
Transportation	BART emissions	New	
Transportation	Off-road and direct emissions	New	
Waste	Waste disposed	Yes	• Alternative daily cover (ADC) itemized separately in 2005 • Waste characterization varies for each year
Wastewater treatment	Treatment emissions	New	

4. Methods

The following sections describe the methods used to adjust and compare the 2005 and 2010 community inventories by sector.

Residential, Commercial, and Industrial Energy

Calculation Methods

Calculation methods for electricity use in the commercial and industrial sectors changed between 2005 and 2010. In 2005, the amount of kWh from industrial and direct access use was reported by PG&E and

emissions were calculated using California grid average coefficients reported in table G.7 of the Local Government Operations Protocol (LGOP). In 2010, PG&E did not provide industrial and direct access usage, but instead directly reported the amount of CO_2, N_2O, and CH_4 emitted as a result of power generated to serve these sectors. Direct access electricity use is unknown for 2010, and therefore is bundled with industrial/commercial use.

Calculation methods for residential electricity remained consistent between 2005 and 2010. In both inventories, PG&E reported residential electricity use, and emissions were calculated using utility-specific CO_2 factors and California grid average factors for N_2O and CH_4 published in the LGOP.

Natural gas calculation methods remained consistent across both inventory years.

Emission Factors and Activity Data

Table 5 highlights changes in emissions factors and activity data for residential, commercial, and industrial electricity use between 2005 and 2010. Electricity (Residential & Commercial/Industrial) CO_2 emissions factors changed from 489.16 lbs/MWh to 445.0 lbs/MWh in 2010, a 9% reduction in emissions for every unit of electricity used. The decline in PG&E's emissions from delivered electricity from 2005 to 2010 was owed, in large part, to an increase in the amount of zero- and low-emitting electricity in its power portfolio and the expanded use of cleaner fossil-fueled electricity, including two new natural gas-fired plants that PG&E brought into service in 2010.

TABLE 5: CHANGES IN RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL SECTORS

Sector	% Change in $MTCO_2e$	% Change in Activity Data (MMBtu)	% Change in Emissions Factors
Residential electricity	<1%	11%	-9%
Commercial and industrial electricity	-6%	-2%	-5%
Residential natural gas	15%	16%	-1%
Commercial and industrial natural gas	12%	13%	-1%

Residential electricity use increased by about 11%, which is why Dublin experienced a small increase in emissions from residential electricity (less than 1%). Residential N_2O and CH_4 emissions factors varied slightly between these two years, mostly because the calculation methods changed. The 2005 California grid average factors for N_2O and CH_4, provided by the California Energy Commission (CEC) and published in the LGOP, were used for 2005. When both N_2O and CH_4 are included, there is a total emissions factor reduction of 9.21%. In 2010, CEC numbers were used to generate a five-year average for N_2O and CH_4. This five-year average yielded a very small change in the emissions factor (1%).

Natural gas emissions from the residential sector changed, roughly in line with a 16% increase in natural gas use. Total emissions increased by slightly less than 16% due to a small change in the emissions rate for natural gas. Commercial and industrial electricity emissions factors decreased about 5% from 2005 to 2010, demonstrating that a significant amount of power came from direct access. Direct access has a higher emissions rate than other types of PG&E power. Coupled with an almost 2% reduction in electricity use, the commercial and industrial sectors experienced a total reduction of 6% from 2005 to 2010.

The 2005 inventory used California grid average factors for CO_2, N_2O, and CH_4 provided by the CEC and contained in the LGOP for direct access electricity. A PG&E CO_2 factor was used for all other commercial electricity use. In 2010, commercial and industrial emissions were reported by PG&E.

In a compromise between the communities that wanted to complete GHG inventories, PG&E agreed to report commercial and industrial GHG emissions in one lump sum—thereby eliminating the need to estimate direct access power. Although PG&E's method for reporting GHGs is less transparent, PG&E used emissions factors in line with typical calculation methods. Along with PG&E's 2010 third-party verified emissions factor for CO_2 of 445.0 lbs CO_2/MWh, PG&E applied a California grid average set of coefficients from the CEC for N_2O and CH_4 emissions.

Commercial and industrial natural gas emissions factors changed slightly (less than 1%) while natural gas use in the commercial and industrial sector increased by about 13%. Due to this slight decrease in emissions rates, total commercial and industrial natural gas emissions increased by 12%.

Transportation Sector

New Emission Sources

The transportation sector of the 2010 GHG inventory contained several additional sources: electricity from buses, liquefied natural gas from buses, emissions from BART and off-road emissions. These new sources accounted for 19,857 $MTCO_2e$ in 2010, approximately 10% of transportation emissions.

Calculation Methods

The older, unrevised 2005 inventory used data publically available from the California Department of Transportation (Caltrans) Highway Performance Monitoring System (HPMS), which tracks all VMT in Dublin on state highways and local roads using on-site car counts. Newer traffic models from the MTC assign Dublin 50% of the VMT from trips that begin or end in the jurisdiction and 100% of the VMT from trips that begin and end in the jurisdiction. Trip generation models are preferred within the Community Protocol, and were used to update both the 2005 inventory and the 2010 inventory.

2010 activity data for electric buses and LNG buses was provided by StopWaste and the Livermore Amador Valley Transit Authority (LAVTA). Data on these sources were not available for 2005.

Emissions Factors and Activity Data

Table 6 highlights changes in emissions factors and activity data for the transportation sectors between 2005 and 2010.

TABLE 6: CHANGES IN VEHICLE MILES TRAVELED AND EMISSIONS

Year	VMT	% Change in VMT	$MTCO_2e$	% Change in $MTCO_2e$
Passenger Vehicles				
2010	297,941,277	-4%	125,916	-3%
2005	310,410,506		129,789	
Heavy Trucks				
2010	35,996,970	-7%	54,425	-2%
2005	38,699,058		55,731	
Buses				
2010	2,348,599	-7%	4,662	-10%
2005	2,514,588		4,244	

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

Solid Waste

New Emission Sources

The 2005 inventory itemized ADC while the 2010 inventory did not. In 2005, most ADC was inorganic and non-methane producing, and as a result ADC contributed very little to $MTCO_2e$ emissions. Non-methane-producing ADC was used throughout Alameda County in 2010 due to the countywide ban on organics being used as ADC at the landfill.

Calculation Methods

The calculation methods for waste in 2005 largely mirrored those used in 2010. In both years, CACP was used; however, default values for waste characterization varied. CACP uses default emissions factors for waste that are separated into five component parts: paper products, food waste, plant debris, wood/textiles, and all other waste. All tonnage listed in the "all other" category is assumed not to produce methane.

Table 7 identifies the waste characterization values within the 2005 and 2010 inventories. The inventories used separate statewide waste characterization studies to determine how much of the total community waste was paper, food, plant debris, wood textiles, or other. The 2005 inventory used a waste characterization study from 2000, while the 2010 inventory used a waste characterization study from 2008; the composition of waste disposed changed between the two inventory years.

TABLE 7: WASTE CHARACTERIZATION

Waste Type	2005	2010
Food	11%	22%
Paper	22%	25%
Plant	5%	4%
Wood/Textile	24%	19%
All Other	38%	30%
Total	100%	100%

Emission Factors and Activity Data

Methane emissions factors for each type of waste remained constant in CACP for both 2005 and 2010.

5. Municipal Inventory Comparison Summary

Comparison Between 2005 and 2010 Inventories

With all emissions included, including new sources, the government operations inventory increased by 50% from 2005 to 2010. New sectors and sources accounted for 36% of the new emissions. If new sectors and sources are removed from the 2010 inventory to enable a direct comparison for each sector, emissions increased 32% overall from 2005 to 2010, as shown in Table 8.

TABLE 8: ADJUSTED 2005 AND 2010 GOVERNMENT OPERATIONS EMISSIONS

Sectors	2005			2010		
	$MTCO_2e$	Activity Data	Units	$MTCO_2e$	Activity Data	Units
Building electricity	482	2,155,608	kWh	521	2,566,566	kWh
Building natural gas	289	54,293	therms	269	50,604	therms
Streetlights and traffic signals	484	2,161,474	kWh	548	2,696,580	kWh
Water delivery facilities	22	98,086	kWh	12	58,036	kWh
Vehicle fleet	283	394,574	VMT	687	998,604	VMT
Waste	7	33	tons	49	195	tons
Total	1,567			2,086		

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

Three sectors accounted for most of the increase in emissions after the 2010 adjustment: streetlights and traffic signals, vehicle fleet, and waste. The increase in streetlights and traffic signals roughly correlates with the 21% increase in population that Dublin experienced in the same five-year period. Emissions in the building electricity and water delivery sectors declined, but were offset by increases in other sectors. Electricity use in buildings increased (19%), but reduced emissions per unit in this sector result primarily from lower PG&E emissions factors. Emissions factors for water electricity similarly declined, but lower energy demand (41%) accounted for most of the change in these emissions.

6. New Sectors and Sources in Municipal GHG emissions inventory

As shown in Table 9, two new sectors, and two new vehicle fleet sources, were included in the 2010 government operations inventories that were not a part of the revised 2005 inventory: compressed natural gas (CNG), off-road gasoline, employee commute, and mobile source refrigerants. Together, these new sectors and sources contributed 280 $MTCO_2e$ in 2010, about 12% of the total unadjusted 2010 inventory.

TABLE 9: NEW GOVERNMENT OPERATIONS SOURCES IN 2010

Sector	Source	Emissions ($MTCO_2e$)	Percent of Total Emissions from Sector
Vehicle Fleet (waste hauler)	CNG	21	3%
Vehicle Fleet (contracted maintenance – MCE)	Diesel & Gas	205	30%
Employee commute	Gasoline & Ethanol	249	100%
Mobile source refrigerants	HFC-134a 236cb 43-10mee	8	100%

Note: $MTCO_2e$ = metric tons of carbon dioxide equivalent emissions

The following conclusions summarize findings in comparing the two government operations inventories between 2005 and 2010.

- New sectors and sources contributed 483 $MTCO_2e$ in 2010, accounting for 21% of 2010 emissions.
- With no adjustments, emissions increased by 50% between 2005 and 2010. This increase is due in large part to the 2010 inventory being a more complete and thorough inventory. For instance, the

2005 inventory did not include emissions from the vehicle fleet used by contractors (MCE) and the City's waste hauler.

- After adjusting the 2010 inventory so that only sources and sectors that are common between 2005 and 2010 are included, 2010 emissions increased by 19%. This increase is explained largely in part by the 2010 inventory being a more complete and thorough than the 2005 inventory.
- Building electricity emissions increased by 8% from 2005 to 2010 while corresponding electricity use increased by 19%. This is explained by a change in PG&E's electricity emissions factor (9%) over this time period. Additionally, the City added several new facilities and parks between 2005 and 2010.
- Building natural gas use declined by 7% from 2005 to 2010, with a proportional reduction in emissions.
- Electricity used for streetlights and traffic signals increased by 25%, but corresponding emissions increased by only 13%, due to a 9% reduction in the emissions factor associated with PG&E's power mix.
- Waste emissions increased by 600% due to an increase in waste disposed (491%). As a percentage of total emissions, waste increased from less than 1% in 2005 to approximately 2% in 2010. The 2005 data for waste analysis was incomplete. The 2010 data was estimated using container size, number of pick-ups and estimate fullness based on input from the City's waste hauler (AVI).

7. Methods

The following sections describe the methods used to adjust and compare the 2005 and 2010 government operations inventories by sector.

Building Energy (Electricity and Natural Gas)

New Emission Sources

PG&E provided standard reports for both years.

Calculation Methods

Calculation methods for building electricity and natural gas were consistent in each inventory year.

Emissions Factors and Activity Data

Electricity emissions per kWh decreased by about 9% between 2005 and 2010. Natural gas emissions factors remained constant. Utility-specific and year-specific CO_2 emission factors came from PG&E while California grid average N_2O and CH_4 year-specific factors were provided by the CEC and reported in the LGOP and were used for each inventory.

The amount of electricity used by the City government increased by approximately 19% from 2005 to 2010.

Natural gas use declined by 7% between 2005 and 2010. The amount of natural gas used in individual buildings varies; however, a roughly constant natural gas usage is anticipated, since natural gas was only used at the facilities considered in both inventories.

Streetlights and Traffic Signals

New Emission Sources

PG&E provided standard reports for both years.

Calculation Methods

Calculation methods for streetlight electricity were consistent in each inventory year.

Emission Factors and Activity Data

Electricity emissions per kWh decreased by about 9% between 2005 and 2010. Utility-specific and year-specific CO_2 emission factors came from PG&E while California grid average N_2O and CH_4 year-specific factors provided by the CEC and reported in the LGOP were used for each inventory.

Vehicle Fleet

New Emission Sources

The 2010 inventory included emissions from the City's contracted waste hauler and maintenance services and gasoline vehicles, which were not included in 2005. These additional sources contributed 10% to total 2010 vehicle fleet emissions.

Calculation Methods

Calculation methods were similar for both inventory years. CACP was used to calculate emissions, and in some cases, used a default fuel efficiency to convert fuel use to VMT by vehicle type.

Emissions Factors and Activity Data

Activity data (VMT) changed by 153% between 2005 and 2010—more than any other sector but waste. Along with a few new fuel types and vehicle fleet categories, contracted City services for waste and maintenance services were included in the 2010 inventory, which were left out of the 2005 inventory. VMT from staff reimbursements and emissions from waste hauling are also new in the 2010 inventory.

Waste

New Emission Sources

Methods are consistent between 2005 and 2010.

Calculation Methods

Waste calculations were completed using CACP after total waste was organized into waste types. Data-gathering processes were improved for the 2010 GHG inventory. Staff has concluded that the data gathering methods were incomplete for 2005, which resulted in the numbers being underreported for that year.

Emission Factors and Activity Data

Emission factors for waste remained constant between 2005 and 2010.

8. Community Forecast Indicators

The original forecast estimates 2020 emissions in four categories: residential energy use, commercial/industrial energy use, on-road transportation, and solid waste. Emissions from municipal operations were not forecasted, and were included as part of these categories (i.e., commercial/industrial energy use includes GHG emissions from energy use at City-owned buildings). These emissions were calculated using three indicators: population, employment, and statewide VMT. Population was used to forecast residential energy use and solid waste; employment was used to forecast commercial/industrial energy use; and statewide VMT was used to forecast transportation emissions. For example, using Association of Bay Area Governments (ABAG) population estimates for 2005 and projections for 2020, the original forecast assumed that population would grow at 3.04%, compounded annually. Thus, GHG emissions from residential energy use were projected to grow at the same rate.

Using employment to forecast commercial/industrial energy use allows for an accurate projection that is also simple to replicate, assuming no substantial change in the types of commercial and industrial activities occurring in Dublin. For other sectors, the updated forecast uses different indicators than does the original forecast, as discussed below.

For residential energy use, the number of households is used rather than population. Residential energy use tends to be more strongly linked to the number of homes in a community, rather than how many people live in a home. For example, it takes about as much energy to heat a house with one resident as a house with five residents, and a television uses the same amount of electricity regardless of how many people are watching it. While population growth rates and numbers of households tend to be similar, using households is generally more accurate.

The original forecast used statewide VMT forecasts, assuming a high fuel-cost scenario. Given considerable differences in driving patterns throughout the state, statewide trends may not apply to Dublin. While 2020 VMT forecasts specifically calculated for Dublin would be the most accurate indicator, these figures were not available at time of writing. Therefore, VMT growth projections for Alameda County, as calculated by the MTC, were used.

Population is not an ideal indicator to forecast changes in the amount of solid waste generated and disposed in landfills, as it would omit solid waste from commercial and industrial activities. A better indicator is service population (the sum of the number of residents and the number of employees in Dublin). Using service population allows the forecast to include changes in solid waste generated from both residential and nonresidential sources.

The updated inventory also includes two sectors that were not part of the original inventory: emissions from wastewater treatment, and indirect electricity emissions from water and wastewater. These activities vary with both population and employment, making service population an appropriate indicator.

Additionally, four activities were added to the transportation sector: wheel and bus electricity use, wheel and bus liquefied natural gas (LNG) use, travel on the BART system, and direct off-road emissions. VMT is an appropriate indicator for wheel and bus electricity and LNG use, as these on-road activities generally correlate to the amount of traffic generated by residential and employment uses. Projected ridership for individual BART stations is not available; therefore, the expected increase in BART system-wide ridership was used to forecast BART emissions. Direct off-road emissions occurring as part of construction activities and through use of landscaping/gardening equipment can be modeled using anticipated household growth.

Appendix C: Transit Oriented Development Memo

FEHR & PEERS
TRANSPORTATION CONSULTANTS

MEMORANDUM

Date: July 30, 2009

To: Jaimee Bourgeois, City of Dublin

From: Kathrin Tellez and Rob Rees, Fehr & Peers

Subject: ***City of Dublin Transit Oriented Development Transportation Impact Fee Assessment***

WC08-2606

Fehr & Peers has reviewed data from a variety of sources to develop a likely range of vehicle trip reductions for transit-oriented residential development (TOD) adjacent to the Bay Area Rapid Transit (BART) stations in the City of Dublin. Research indicates that developments adjacent to transit service such as BART can expect to experience a reduction in vehicle trips, especially for commute trips. Further vehicle trip reductions may be possible if the residential locations are located within walking distance of retail/service amenities or employment centers.

Residents of TODs tend to have a higher transit mode share than the remainder of the City as they tend to have fewer cars per person, are more likely to be single and without children, and cite location to transit as a factor for choosing the TOD residential location. The following presents the background that requires agencies to consider fee reductions for transit-oriented residential development, the relevant research summary, and our recommendations for potential trip reduction percentages to use in assessing traffic impact fees for TODs.

> **Recommendation –** Fehr & Peers suggests a reduction in vehicle trips of 25 percent for multi-family residential developments located in a mixed-use environment within a barrier-free half mile walk of a BART station

BACKGROUND

Assembly Bill 3005 requires local agencies to set impact fees for transit-oriented housing proportional to their vehicular traffic impacts. The bill attempts to account for the observed reduction in vehicle traffic associated with development that is mixed-use and within proximity of transit. The required impact fee re-assessment applies to housing developments that meet all of the following criteria:

1. located within one-half mile of a transit station
2. direct access between the housing development and the transit station along a barrier-free walkable pathway not exceeding one-half mile in length
3. located within a half mile of convenience retail uses, including a store that sells food
4. provides either the minimum number of parking spaces required by local ordinance or no more than one on-site parking space for zero to two bedroom units and two on-site spaces for three or more bedroom units, whichever is less.

Traffic Impact Fees can be reduced at the discretion of a local jurisdiction even if not all the above criteria are satisfied.

The new housing developments within proximity of the Dublin/Pleasanton Station have the potential to meet these criteria. Figure 1 shows the one-half mile walkshed around the Dublin/Pleasanton BART station based on current and proposed street configuration. Further walkshed coverage could be achieved for parcels east of Dougherty Road, between Dublin Boulevard and I-580 with connections to the Iron Horse Trail.

RESEARCH SUMMARY

Project trip generation refers to the process for estimating the number of trips generated by a development site or area. Typically, only vehicle trips are calculated, but trips can also occur by walking, bicycling, or taking transit. Trip generation estimates for residential projects are typically calculated based on the number of dwelling units within that development. Vehicle estimates of the total traffic entering and exiting the project driveways are typically calculated for the AM peak hour, the PM peak hour and for an average weekday.

For projects that contain a mixture of uses, such as retail and office, it is reasonable to expect that some vehicle trips at the project driveways would not occur because people within the project choose to walk from one use to another within the site. For projects that are located near transit stops, it is also reasonable to consider that some trips will occur on modes other than the automobile such as walking or transit.

The combination of internal trips (those which begin and end within the project site and do not add any new trips to the external roadway network) and external trips using alternate modes accounts for the total vehicle trip reduction.

Typical Trip Generation Methods

Vehicle trip generation rates presented in the Institute of Transportation Engineers' (ITE) publication *Trip Generation, 8th Edition,* presents rates for a variety of land uses, including residential. The *Trip Generation Handbook* (March 2004), also presents guidance to estimate the number of trips that remain internal to a site based on the balance of land uses within the site. The ITE trip generation rates were developed based on surveys of mostly stand-alone suburban locations with minimal transit usage. Rates presented in *Trip Generation* can be a good indicator of the total number of trips that could be generated by a development, but does not account for the travel mode, such as walking, bicycling or transit.

Recent Research Summary

A recent article published by Cervero and Arrington[1] compared the trip generating rates used in the *Trip Generation Handbook* with observed trip generation from 17 residential TODs located within proximity to rail stations throughout the United States. Two TODs listed in the study, Park Regency and Wayside Plaza, are located near the Pleasant Hill BART station and would likely have similar trip generating characteristics as TODs constructed in Dublin. The trip reduction from standard ITE rates at the Pleasant Hill sites was 35 percent on a daily basis, 39 percent during the AM peak hour and 38 percent during the PM peak hour. It should be noted that the Pleasant Hill BART station is ½ mile from a convenience grocery store and almost 1 mile from a full service grocery store. There are barriers to walking to those grocery uses from the BART station area, including Treat Boulevard (a six lane arterial) and I-680 (a ten lane freeway).

[1] Journal of Public Transportation, Vol. 11, No. 3, 2008

Using the 2000 Bay Area Transportation Survey (BATS), Fehr & Peers compared the number of automobile trips taken by residents within a ½ mile radius of non-downtown BART stations in the East Bay with those in the surrounding region to determine the effect that BART proximity had on mode choice. The survey shows that households within ½ mile of select East Bay BART Stations (Excludes downtown stations at 12th Street, 19th Street, Downtown Berkeley, and Walnut Creek; but includes all other stations, such as Concord, Pleasant Hill, Pittsburg/Bay Point, Richmond, San Leandro, and Castro Valley) have a 25 percent transit mode share on a daily basis. The BATS data also shows that the transit mode share for residents living within ½ to one mile of a BART station is 16 percent.

Trip reductions for the East Bay BART station survey data and the two Pleasant Hill Station TODs are fairly similar, with the higher trip reductions at Pleasant Hill likely due to the rise in fuel price, which occurred between the two survey periods, and the higher density of development and subsequent lower automobile ownership found at Pleasant Hill Station compared to the rest of the BART system in the East Bay.

Research presented in *Effects of TOD on Housing, Parking, and Travel,* TCRP Report 128, states that TOD commuters typically use transit up to five times more than other commuters in the region and the mode share for TOD can be up to 50 percent. In 1990, the commute transit mode share in the City of Dublin was 2 percent according to the Census. The commute share increased to 5.4 percent by 2000, with the opening of the Dublin/Pleasanton BART station in 1997. The transit mode share has likely increased since 2000 due to increased congestion on the Interstate 580 corridor and increased fuel prices.

CONCLUSIONS AND RECOMMENDATIONS

The goals outlined in AB 3005 may be difficult for a single residential project to achieve as they rely on factors outside the realm of an individual project, principally the requirement that retail uses, including a food serving business, are located within proximity to the new development. While it is shown that a mixture of uses does contribute to trip reductions, the significance of this factor is somewhat negligible during the AM and PM peak hours, the time of the greatest burden on the transportation infrastructure, because the many trips at this time are work-related. This is evidenced by the large trip reduction from standard ITE rates for developments around the Pleasant Hill BART station, although food serving uses are at least ½ mile for convenience grocery and almost 1 mile for a full service grocery store, with barriers to walking/biking.

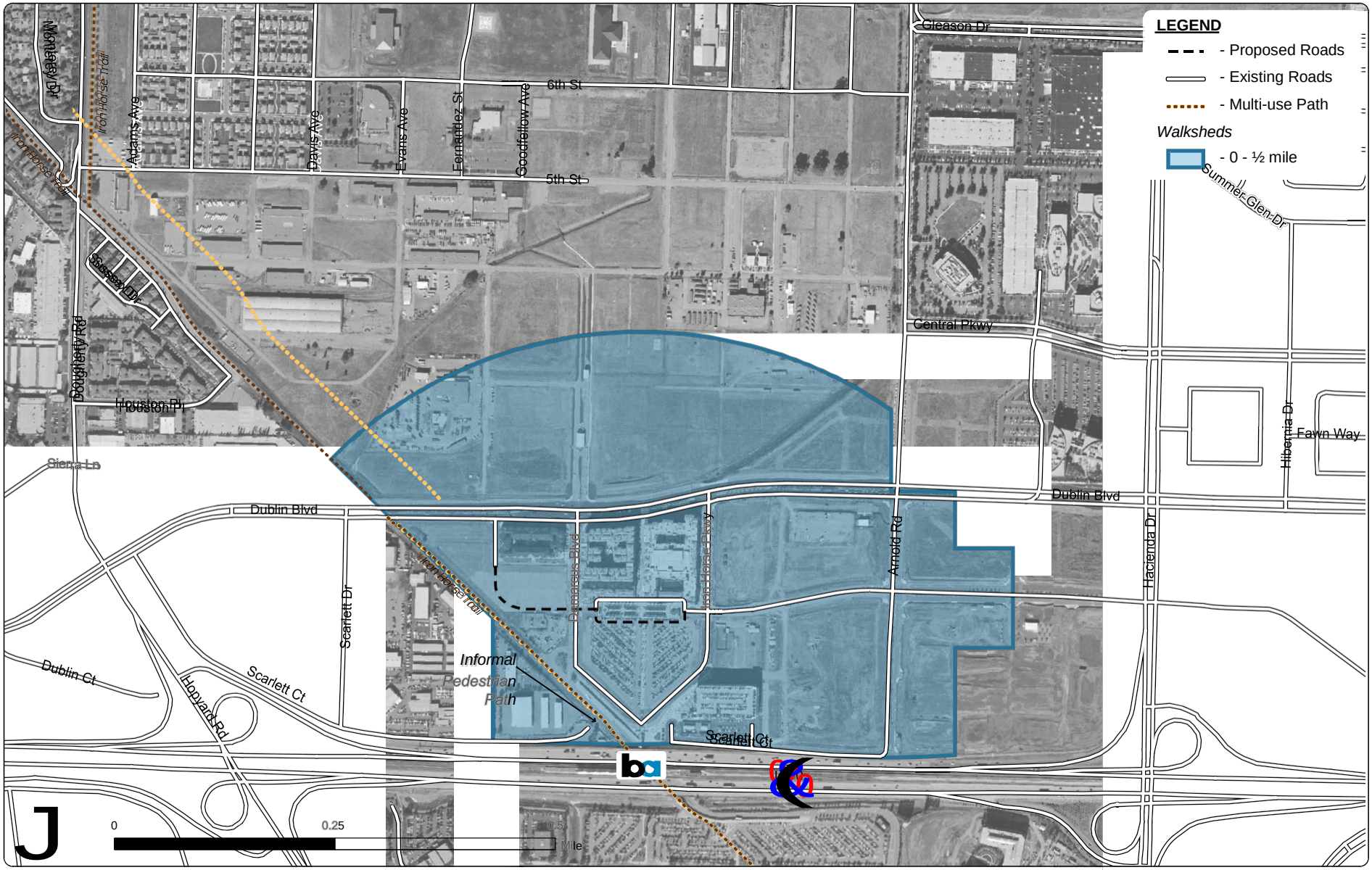
The requirements for parking in AB 3005 permit development to use the minimum parking requirements allowed within local ordinances. The current parking ratios for residential development within the Transit Center are 1.5 spaces per unit, which is less than the parking ratios for non-transit oriented development in Dublin (two parking spaces per dwelling unit for rental apartment uses and 1.5 spaces per dwelling unit for one bedroom condominiums and 2.5 spaces for 2+ bedroom condominiums). The parking supply level recommended in AB 3005 would allow no more than one on-site parking space for zero to two bedroom units and two on-site spaces for three or more bedroom units.

The literature review of TOD sites suggests that vehicle trip reductions can range from 25% (using BATS data) to 35% (using Pleasant Hill station area data), and even as high as 50% (according to TCRP Report 128). Factors influencing these rates likely include gas prices, parking availability, and relative development density/type in the area. The Pleasant Hill TOD area is well established and over time residents have developed travel patterns that reduce vehicle trips, while the Dublin TODs are fairly new in comparison.

Fehr & Peers expects that as the Dublin TOD areas fully develop and become established that vehicle trip reductions approaching those measured in Pleasant Hill will occur. Until that time, we recommend that a more conservative estimate of trip reduction be used. Thus, Fehr & Peers recommends a reduction in vehicle trips of 25 percent for multi-family residential developments located within a half mile walk, but south of Dublin Boulevard, of the Dublin-Pleasanton BART station, where the parking supply is limited. This reduction would correlate to a 25 percent reduction in transportation impact fees for development located. The 25 percent reduction zone is cut-off at Dublin Boulevard as this roadway is a major impediment to pedestrian travel.

As the Dublin TODs become more established with a greater mixture of uses and area plans such as the Bicycle Master Plan are implemented, this reduction can be reconsidered. However, there are alternative mode improvements included in the transportation impact fee programs and further reductions to the fees could impede the ability of the City from fully developing the non-motorized transportation network and providing other transit amenities.

This completes our assessment of trip reduction percentages for multi-family residential developments within proximity of a BART station within the City of Dublin. Please let me know if you have any questions.

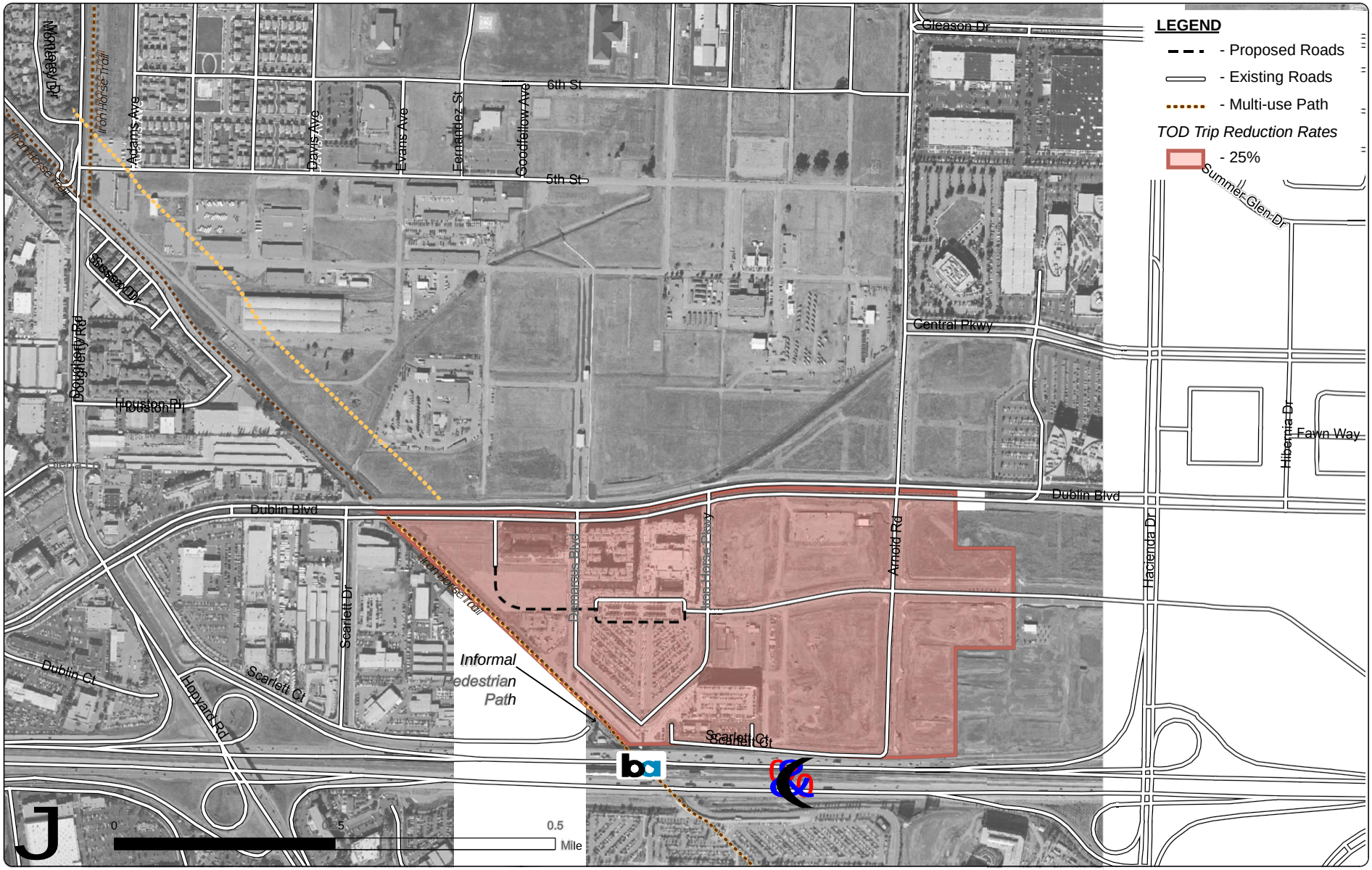


Dublin TOD Transportation Impact Fee Assessment

FEHR & PEERS
TRANSPORTATION CONSULTANTS
July 2009
WC08-2606_Walksheds

DUBLIN-PLEASANTON STATION WALKSHEDS

FIGURE 1



Dublin TOD Transportation Impact Fee Assessment

FEHR & PEERS
TRANSPORTATION CONSULTANTS
July 2009
WC08-2606_TripReduxZones

AUTOMOBILE TRIP REDUCTION ZONES FOR RESIDENTIAL TODs

FIGURE 2

Appendix D: Emissions Reduction Calculations and Assumptions

Local Measures:

Local Measure		2020 Reduction ($MTCO_2e$)	% of 2020 Local Reductions	Assumptions	Data Sources
Transportation and Land Use Measures					
A.1.1 A.1.2 A.1.3	Transit-oriented, high-density, and mixed-use development	8,380	22%	25% reduction in per-household VMT for each new transit-oriented unit	Communication with City staff Downtown Dublin Specific Plan City of Dublin 2009 – 2014 Housing Element Fehr & Peers (2009)
A.1.4 A.1.10	Bicycle parking requirements and Bikeways Master Plan	950	2%	0.625% reduction in VMT from bicycle parking	California Air Pollution Control Officers Association: *Quantifying Greenhouse Gas Mitigation Measures*
A.1.5	Streetscape Master Plan	1,530	4%	1% reduction in VMT from the creation of a Streetscape Master Plan	Urban Land Institute: *Growing Cooler*. ISBN: 978-0-87420-082-2. Washington, DC (2008)
A.1.6	Multimodal map	1,140	3%	0.75% reduction in VMT from a multimodal map	Center for Clean Air Policy: *CCAP Transportation Emissions Guidebook*
A.1.7	Electric vehicle (EV) charging station at the library	90	<1%	0.33 kWh per EV mile. Increase in EV adoption of 860% by 2020.	Communication with City staff Idaho National Laboratory: *Comparing Energy Costs per Mile for Electric and Gasoline-Fueled Vehicles*

Local Measure		2020 Reduction ($MTCO_2e$)	% of 2020 Local Reductions	Assumptions	Data Sources
					California Energy Commission: *California Energy Demand 2012 – 2022 Final Forecast*
A.1.8	General Plan Community Design and Sustainability Element	Supportive			
A.1.9	Work with Livermore Amador Valley Transit (LAVTA) to improve transit and implement Bus Rapid Transit (BRT)	1,210	3%	1% improvement in transit, resulting in a 0.5% reduction in VMT. 1 BRT route out of 17 in the LAVTA system	Center for Clean Air Policy: *CCAP Transportation Emissions Guidebook* Livermore Amador Valley Transit Authority: *Rapid, Local, and Express Routes*
A.1.11	West Dublin/Pleasanton BART Station	10,980	28%	13% increase in BART ridership by 2020	BART: *April 2013 Monthly Ridership Report* BART: *Carbon Calculator* BART: *Greenhouse Gas Inventory* BART: *Short-Range Transit Plan & Capital Improvement Program*
A.1.12	City Design Strategy	Supportive			
Energy Measures					
A.2.1	Green Building Ordinance	1,110	3%	15% improvement over Title 24 standards from building to GreenPoint or LEED.	Communication with City staff California Air Pollution Control Officers Association: *Quantifying Greenhouse Gas Mitigation Measures* City of Dublin 2009 – 2014 Housing Element

Local Measure		2020 Reduction ($MTCO_2e$)	% of 2020 Local Reductions	Assumptions	Data Sources
A.2.2	Energy Upgrade California	1,610	4%	7% participation rate. 40% reduction in energy use for participating households	California Public Utilities Commission. Energy Upgrade California: Alameda County
A.2.3 A.2.4	Rooftop solar	9,180	24%	5% city-wide participation rate	Communication with City staff National Renewable Energy Laboratory: *PVWatts Grid Data Calculator*
A.2.5	LED streetlight specifications for new projects	Existing LEDs - Included in B.2.3 Future LEDs - Supportive			
A.2.6	California Youth Energy Services Program	80	<1%	5% participation rate 5% reduction in electricity use and 1.5% reduction in natural gas use for participating households	Rising Sun Energy Center: *California Youth Energy Services*
A.2.7	Green Shamrock Program	Supportive			
A.2.8	Direct Commercial Energy Outreach	640	2%		Communications with City staff East Bay Energy Watch: *Activity Report (2010 – 2012 Program Cycle), City of Dublin, CA*
A.2.9	Behavioral Energy Change	180	<1%	10% participation rate. 2.5% reduction in electricity and natural gas use among participating households	Bonneville Power Administration: *Residential Behavior-Based Energy Efficiency Program Profiles*
Solid Waste and Recycling Measures					
A.3.1 A.3.2 A.3.3 A.3.4 A.3.5 A.3.6 A.3.7 A.3.8 A.3.9 A.3.10	Increased waste diversion rate	1,270	3%		Communication with City staff

Local Measure		2020 Reduction ($MTCO_2e$)	% of 2020 Local Reductions	Assumptions	Data Sources
Municipal Operations Transportation and Land Use Measures					
B.1.1	City hybrid vehicles	Supportive			
B.1.2	Commute alternative program	Supportive-			
B.1.3	Green Fleet Policy for City vehicles	Supportive-			
Municipal Operations Energy Measures					
B.2.1	LEED Silver requirement for new City buildings over $3 million	Supportive-			
B.2.2	Window film on the Civic Center	Supportive-			
B.2.3	LED park lights	20	<1%	LEDs use 20% of the energy as metal halide bulbs. Lights are on 365 days a year for an average of 12 hours.	Communication with City staff Pacific Gas and Electric Company: *Analysis of Standard Options for Metal Halide Lamps and Fixtures* California Energy Commission's Public Interest Energy Research Program: *Bi-level LED Post Top Luminaires*
B.2.4	Adopted municipal energy action plan	550	1%		City of Dublin Municipal Energy Action Plan
Municipal Operations Solid Waste and Recycling Measures					
B.3.1	Bay-friendly landscaping policy	Supportive-			
Public Outreach Programs					
C.1	Great Race for Clean Air	Supportive-			
C.2	Walk n' Roll to School	Supportive-			
C.3	Work with schools on "Go Green" recycling and composting	Supportive-			
C.4	AVI waste reduction educational programs	Supportive-			
C.5	Promote bike to work day	Supportive-			
C.6	Outreach at Dublin Farmer's Market	Supportive-			
Total		**38,920**	**100%**		

State Measures:

State Measure		2020 Reduction ($MTCO_2e$)	Assumptions	Data Sources
State Climate Change Planning				
A.1	California Global Warming Solutions Act (AB 32)	Supportive		
A.2	Executive Order S-13-08 and the California Climate Adaptation Strategy	Supportive		
A.3	Senate Bill 732 – California Strategic Growth Council	Supportive		
Energy				
B.1	Senate Bill 1078, Senate Bill 107, and Executive Order S-14-08 – Renewables Portfolio Standard	7,720	28% of electricity from renewable sources in 2020	California Public Utilities Commission: *2009 Percent RPS Implementation Analysis – Interim Report* California Public Utilities Commission: *California Renewable Portfolio Standard*
B.2	Executive Order S-20-04 – Energy Efficiency in State Buildings	Supportive		
B.3	California Building Code, Title 24 – Energy Efficiency Standards	2,600	Future updates to Title 24 achieve 70% of the energy savings from the 2008 standards	California Energy Commission: *Impact Analysis – 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings* California Energy Commission: *2009 California Residential Appliance Saturation Study*
Transportation and Land Use				
C.1 C.2	Assembly Bill 1493 – Vehicle Fuel Efficiency (Pavley) Standards, and Executive Order S-01-07 – Low Carbon Fuel Standard	53,140	Full implementation of the Pavley standards. 10% reduction in carbon intensity from the Low Carbon Fuel Standard	California Air Resources Board: *Emissions Factor 2011 Model Software* California Air Resources Board: *Clean Car Standards* California Air Resources Board: *Pavley I and Low Carbon Fuel Standard Postprocessor Version 1.0*
C.3	Senate Bill 375	Supportive		
Total		**63,460**		

Appendix E: Applicability of GHG Emissions Reduction Measures to New Development

Measure Number and Title	Residential	Commercial
A. Community-wide Measures		
A.1. Transportation and Land Use Measures		
A.1.1. Transit-Oriented Development [1]	X	
A.1.2. High-Density Development	X	
A.1.3. Mixed-Use Development	X	
A.1.4. Bicycle Parking Requirements [2]	X	X
A.1.5. Streetscape Master Plan	X	X
A.1.6. Multi-Modal Map		
A.1.7. Electric and Plug In-Hybrid Charging Stations at the Library		
A.1.8. General Plan Community Design and Sustainability Element	X	X
A.1.9. Work with LAVTA to Improve Transit [3]	X	X
A.1.10. Bikeways Master Plan		
A.1.11. West Dublin/Pleasanton BART Station		
A.1.12. City Design Strategy [4]	X	X
A.2. Energy Measures		
A.2.1. Green Building Ordinance [5]	X	
A.2.2. Energy Upgrade California		
A.2.3. Solar Conversion Programs		
A.2.4. Reduce Solar Installation Permit Fee		
A.2.5. LED Streetlight Specifications for New Projects	X	X
A.2.6. California Youth Energy Services Program		
A.2.7. Implementation of Green Shamrock Program		
A.2.8. Direct Commercial Energy Outreach		
A.2.9. Behavioral Energy Change		
A.3. Solid Waste and Recycling Measures		
A.3.1. Construction and Demolition Debris Ordinance	X	X
A.3.2. Citywide Diversion Goal of 75%		
A.3.3. Tiered Rate Structure for Garbage and Recycling		
A.3.4. Commercial Recycling Program		
A.3.5. Commercial Food Waste Collection Program		
A.3.6. Promote Commercial Recycling		
A.3.7. Promote Multi-family Recycling		
A.3.8. Curbside Residential Recycling Program		
A.3.9. Curbside Organics Collection Program		
A.3.10. Reusable Bag Ordinance		

[1] - The location of future transit-oriented development, high density development and mixed-use developments projects has been planned for by the City through the General Plan, various Specific Plans and zoning.

[2] – The bicycle parking requirement for residential projects applies only to multi-family complexes.

[3] – Through the entitlement process, the Applicant will work with LAVTA to determine if a bus stop is required along the frontage of the project site.

[4] – The City Design Strategy applies to new residential and commercial projects when a General Plan or Specific Plan Amendment is required.

[5] - The Green Building Ordinance applies to residential projects with 20 or more units.