

# Town of Hillsborough

## Climate Action Plan



February 2010

Town of Hillsborough  
1600 Floribunda Avenue  
Hillsborough, CA 94010



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# Acknowledgments

## Sustainable Hillsborough Task Force

The following Sustainable Task Force members and Town staff contributed valuable time and important information for the completion of the Hillsborough Climate Action Plan:

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Christine Krolik, Sustainable Hillsborough Task Force Vice-Chair and Mayor  
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## Executive Summary

The Town of Hillsborough's Climate Action Plan serves as a guiding document to identify methods that the Town and community can implement to significantly reduce greenhouse gas (GHG) emissions. It is an important first step toward meeting the requirements of new California legislation, known as Assembly Bill 32, California's Global Warming Solutions Act of 2006. Assembly Bill 32 requires emissions to be reduced 15% below current levels (as measured in 2005) by the year 2020 and to be reduced by 80% by the year 2050 statewide.<sup>1</sup>

The Hillsborough City Council responded to Assembly Bill 32 by approving a resolution in 2008 and joined Local Governments for Sustainability (formerly known as ICLEI) to assist in expanding sustainable programs. The council also approved the development of an inventory of Hillsborough's baseline greenhouse gas emissions from municipal and community activities. The City Council recognized that government plays an important role in mitigating climate change and approved the formation of the Sustainable Hillsborough Task Force to develop Hillsborough's Climate Action Plan with facilitation from a sustainability consultant. The Task Force members included Councilmember Paul Regan (Task Force Chair), Mayor Christine Krolik, (Task Force Vice-Chair), architects, members from the building community, school district members and residents. The sustainability consultant wrote a Bay Area Air Quality Management District grant on behalf of the Town to fund the completion of the Climate Action Plan and for the development of new sustainable programs. In 2008 and the Town was awarded full funding of the grant.

Hillsborough's Climate Action Plan provides a comprehensive roadmap of programs that can be implemented to reduce emissions and increase sustainability. The Climate Action Plan includes the following components:

- ✧ Climate change impacts on Hillsborough and recent climate change legislation;
- ✧ Major sources and quantities of Hillsborough's emissions which constitute the baseline inventory;
- ✧ Hillsborough's emissions reduction target;
- ✧ Emission reduction program and policy recommendations;
- ✧ Implementation, funding and next steps;
- ✧ Recommendations for adaptation to climate change.

The Town of Hillsborough has control over several important decisions that impact emissions, including green building, energy efficiency, renewable energy, expansion of recycling/composting programs and transportation/land use issues. The Plan establishes a framework of action that the Town can implement and provides a statement of intent for priorities and policies. By the approval and implementation of the Climate Action Plan programs, Hillsborough can be a leader in emission reductions. The Climate Action Plan is presented for the City Council's consideration and approval. The approved Climate Action Plan's program recommendations will be brought forward individually to the City Council for their consideration.

<sup>1</sup> AB 32 directs the California Air Resources Board (CARB) to monitor and enforce GHG emission reductions. In 2010 and 2011, the CARB is to adopt enforceable regulations for GHG emission reductions. ( [www.arb.ca.gov](http://www.arb.ca.gov) )

Hillsborough's Climate Action Plan development is unique from other communities because the Task Force developed early emission reduction initiatives while the Climate Action Plan was under development. These early emission reduction initiatives were approved by the City Council and provide the Town with an advantage that can assist Hillsborough in meeting short and long term emission reduction targets. The Bay Area Air Quality Management District grant that was awarded to the Town assisted in funding the Climate Action Plan development, and, in development and implementation of early emission reduction initiatives. Through the collaborative efforts of the Sustainable Hillsborough Task Force, staff and by City Council approval, the following policies and programs were implemented in 2008 and 2009:

- ✓ Hillsborough's Residential Green Building Ordinance
- ✓ Hillsborough's Civic Green Building Policy
- ✓ Hillsborough's Municipal and Community Greenhouse Gas Inventory
- ✓ Solar Community Discount Program and the elimination of solar permit fees
- ✓ "Greening Your Hillsborough Home" Energy Efficiency and Water Conservation Workshops
- ✓ Sustainable Hillsborough Website and new "Green Corner" in Hillsborough Newsletter/Sustainable Education and Promotion Kiosk in Town Hall

### Hillsborough's Climate Action Plan Development Process

The method used to develop the Climate Action Plan follows the Five Milestone Process established by Local Governments for Sustainability. Figure 1 explains how the process works.

**Figure 1: Climate Action Plan Development Process**



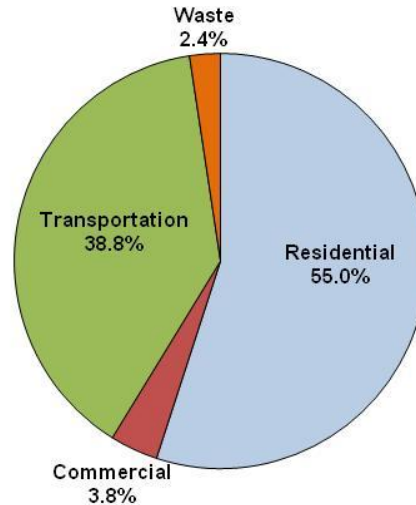
## Hillsborough's Community Greenhouse Gas Emissions Inventory

Hillsborough's Community Greenhouse Gas Emissions Inventory provides a baseline of emission levels against which future reductions can be measured. The analysis showed that the community of Hillsborough emitted approximately 82,724 metric tons of CO<sub>2</sub>e in the base year of 2005.

Hillsborough's Community Greenhouse Gas Inventory was developed using the Clean Air and Climate Protection (CACP) software developed by Local Governments for Sustainability. The CACP uses data on electricity and natural gas consumption, vehicle miles traveled (VMTs) and solid waste tonnage and converts it into carbon dioxide equivalents (CO<sub>2</sub>e), using specific coefficients according to fuel or waste types. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used.

Converting all greenhouse gas emissions to CO<sub>2</sub>e units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is 21 times more powerful than carbon dioxide on a per-weight basis in its capacity to trap heat, so the software converts one metric ton of methane emissions to 21 metric tons of carbon dioxide equivalents.

**Figure 2: 2005 Community GHG Emissions by Sector**



**Table 1: 2005 Community GHG Emissions by Sector**

Sector	CO <sub>2</sub> e (metric tons)	% of Total GHG
Residential	45,511	55.0
Commercial	3,106	3.8
Transportation	32,117	38.8
Waste	1,991	2.4
<b>Total</b>	<b>82,724</b>	<b>100</b>

As illustrated in *Table 1: 2005 Community GHG Emissions by Sector* and *Figure 2: 2005 Community GHG Emissions by Sector*, the residential sector includes residential electricity and natural gas consumption and accounted for the largest source of emissions at 55%. With a further analysis of the 55% emissions from the residential sector, 38% is from natural gas consumption and 17% is from electricity consumption. The second highest source of emissions

was transportation (includes highway and Hillsborough roadway travel) at 39%. These 2 sectors comprise 94% of total emissions in Hillsborough. There was a small amount from commercial accounts, 3.8%, that was primarily from the Hillsborough schools, the Country Club and municipal operations in Hillsborough. The landfilled waste sector accounted for approximately 3% of total emissions. Hillsborough's Community GHG Inventory provides an understanding of where the highest percentages of emissions originate in Hillsborough and enabled analysis of focused emission reduction strategies.

### Hillsborough's Greenhouse Gas Reduction Target

To maintain consistency with AB 32's emission reduction targets, the Task Force recommended that Hillsborough reduce emissions by 15% below current levels (as measured in 2005) by the year 2020 and 80% by the year 2050.<sup>2</sup> If the community of Hillsborough continues with the 2005 pattern of energy consumption, travel and waste generation, the emissions level is estimated to increase from 82,724 to 95,625 tons per year by 2020. Therefore, the percent change from "business-as-usual" in 2020 to 15% below 2005 levels is 26.5%.

**Figure 3: Hillsborough's "Business-As-Usual" Emissions Forecast for 2020**

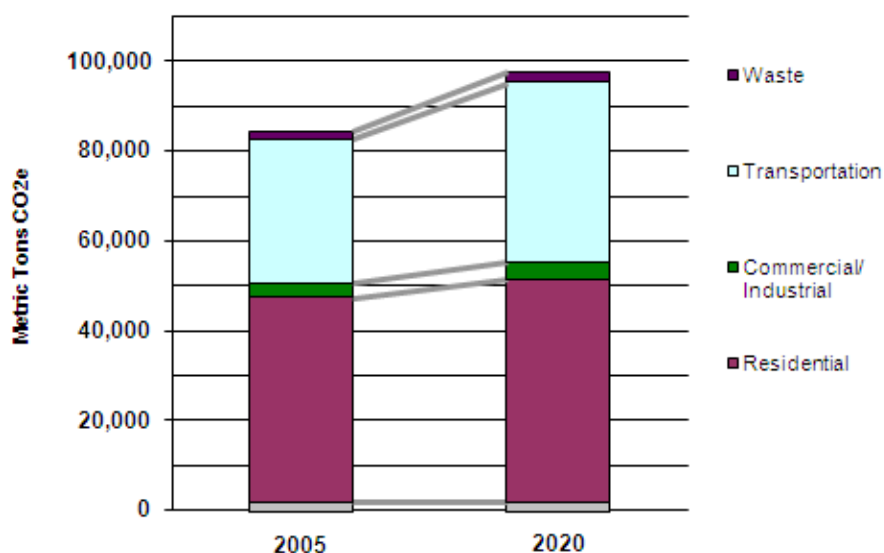


Figure 3: Hillsborough's "Business-As-Usual" Emissions Forecast for 2020 provides Hillsborough's baseline inventory and forecast for population, transportation and other activity in its "business-as-usual" emissions forecast for 2020. This table was created using the Association of Bay Area Governments data and emission forecast software provided by Local Governments for Sustainability.

<sup>2</sup> California Air Resources Board ([www.arb.ca.gov](http://www.arb.ca.gov))



*Table 2: Hillsborough's GHG Emissions and Reduction Targets* provides additional detail to illustrate Hillsborough's emission reduction target with the "business-as-usual" forecasts. Hillsborough would need to reduce a total of 25,309 tons to meet the 2020 target. Hillsborough would need to reduce emission by 2,531 tons per year to meet the 2020 target year. These reductions are challenging but are in line with the emission reduction targets of many Bay Area cities.

<b>Table 2: Hillsborough GHG Emissions and Reduction Targets</b>	<b>2005 Base Year</b>	<b>2020 "Business-as-Usual"<sup>3</sup></b>
<b>2005 Base Year Emissions (metric tons CO<sub>2</sub>e)</b>	<b>82,724</b>	<b>95,625</b>
<b>2020 Target Year Reduction (15% below 2005 levels)</b>	<b>70,316</b>	<b>70,316</b>
<b>Emissions Reductions Necessary to Meet Target</b>	<b>(12,409)</b>	<b>(25,309)</b>
<b>Required Percentage Emissions Reduction</b>	<b>15.0%</b>	<b>26.5%</b>
<b>Required Annual Emissions Reductions (2010-2020)</b>	<b>(1,241)</b>	<b>(2,531)</b>

*Table 3: GHG Reduction Targets* provides the interim GHG reduction targets that were established and recommended by the Sustainable Hillsborough Task Force. These interim GHG reduction targets can enable Hillsborough to monitor progress more frequently and ensure the Town is on track to meet the emissions reduction target in 2020.

<b>Table 3: GHG Reduction Targets</b>	<b>Percentage Emission Reduction from Base Year</b>	<b>Target Emissions (Metric Tons CO<sub>2</sub>e)</b>
<b>2005 Base Year</b>	<b>- - -</b>	<b>82,724</b>
<b>2012 Target Year</b>	<b>5%</b>	<b>78,588</b>
<b>2015 Target Year</b>	<b>10%</b>	<b>74,452</b>
<b>2020 Target Year</b>	<b>15%</b>	<b>70,316</b>

<sup>3</sup> Association of Bay Area Government (ABAG) 2020 Projections

## How Climate Change Impacts Hillsborough

The Intergovernmental Panel on Climate Change (IPCC), a panel of the world's leading experts on climate change,<sup>4</sup> has reported that global warming presents possible impacts to the environment, and has economic, health and social consequences for the global community. Potential impacts to Bay Area cities could include:

- ✧ Rising sea and San Francisco Bay levels and resulting impacts to coastal infrastructure (including San Francisco International Airport), due to increasing rates of polar snow and ice melt. Research estimates that the sea level rise could inundate the entire area east of the Bayshore Freeway by 2099;<sup>5</sup>
- ✧ Significant water shortages in the Bay Area's primary water supply from Hetch Hetchy Reservoir, due to a shrinking Sierra Nevada snowpack;
- ✧ Increased heat waves, flooding, extreme weather patterns and increased incidence of large wildfires;
- ✧ Serious public health impacts to elderly and young due to intensified heat waves, exacerbated local air pollution, a significant increase in "Spare the Air" days and an expanded range for infectious diseases;
- ✧ Negative impacts on wildlife, including significant species loss;

## How a Climate Action Plan Benefits Hillsborough

Benefits from the development of a Climate Action Plan go beyond emission reductions and include additional economic, public health, quality of life and environmental benefits. The following provides how the Hillsborough community benefits from climate protection programs.

### ***Economic Benefits***

- ✧ New programs that increase energy efficiency and water conservation can provide homeowners with 20% to 40% cost savings in energy.
- ✧ Homes built or remodeled using new green building standards result in homes that are more comfortable and have healthier indoor environments.
- ✧ Recent reports show that green buildings have increased real estate value and hold or rise in value versus traditional buildings.<sup>6</sup>

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<sup>4</sup> Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and the United Nations in 1988. It is comprised of the world's leading climate change experts and Nobel Prize winners who develop the most recent climate science findings every 5-7 years and present them to the world's political leaders.

<sup>5</sup> Fifth Annual California Climate Change Conference Sept. 2008.

<sup>6</sup> RICS Research March 2009, Berkeley, Calif.

***Public Health and Quality of Life Benefits***

- ✧ Climate protection programs can improve air quality and can decrease negative health impacts such as asthma.
- ✧ Regional climate protection programs can create opportunities for healthier lifestyles by providing more public transportation, bicycling and walking opportunities. The American Public Transportation Association reported in March 2009 that public transportation ridership had reached its highest level in 52 years.<sup>7</sup>

**Development of Program and Policy Recommendations**

Hillsborough's Climate Action Plan recommendations were developed in a collaborative process by the Sustainable Hillsborough Task Force, Town staff and the environmental consultant. The final recommendations were selected because they focus on the higher impact emission reduction programs that can cost-effectively reduce emissions and assist Hillsborough to meet the emissions reduction target of 15% below 2005 levels by 2020. In developing these recommendations, the Task Force was keenly aware of the revenue and staff resources challenges facing the Town. The Sustainable Hillsborough Task Force reviewed the draft program and policy recommendations presented by the environmental consultant and staff and discussed several modifications that were incorporated into the Climate Action Plan. To guide the program and policy recommendations, these four major strategies were selected:

- ✧ Energy efficiency, water conservation and green building
- ✧ Education and promotion
- ✧ Waste reduction and recycling
- ✧ Municipal operations

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<sup>7</sup> <http://www.washingtonpost.com/wp-dyn/content/article/2009/03/08/AR2009030801960.html>

The Climate Action Plan was developed in a phased approach for implementation. The first phase, *Phase 1: High-Impact GHG Reduction Programs for Implementation Prior to 2012* provides recommendations that can be implemented in the near term to begin the necessary reductions in emissions. The second phase, *Phase 2: GHG Reduction Programs for Implementation 2012 to 2020*, has been developed for implementation beyond 2012. The phased approach is recommended to enable the Phase 1 an opportunity to significantly reduce emissions and allow the Town to monitor the effectiveness of these programs.

The Town should complete subsequent community and municipal GHG emission inventories similar to the 2005 inventories. The results of these emissions inventories will provide an important status on progress toward the 2020 emission reduction target. It's recommended that these inventories be completed periodically to monitor progress.

### **Energy Efficiency, Water Conservation and Green Building**

Hillsborough's Climate Action Plan has a considerable focus on residential energy efficiency because it provides the fastest and most economical means to reduce emissions and has the added advantage of providing residents cost savings. Since the majority of Hillsborough homes were built prior to the adoption of the California Title 24 Energy Code<sup>8</sup>, these homes have significant potential to increase energy efficiency. The California Public Utility Commission's 2008 Strategic Plan calls for new net zero energy homes and a 40% improvement of the existing home stock by 2020. Typically, homes can increase energy efficiency 30% to 40%<sup>9</sup>, and reduce water consumption by 20% with comprehensive energy and water efficiency upgrades. These efficiencies can provide Hillsborough residents the added incentive of reducing energy and water costs.

There is several water conservation programs included in the Climate Action Plan. These programs can reduce emissions as well as assist Hillsborough in meeting the necessary water reduction levels that have been announced in October 2009 by the San Francisco Public Utilities Commission.<sup>10</sup>

#### **New Weekly Recycling Programs Reduce Emissions**

Hillsborough's new recycling; organics and garbage collection program begins January 1, 2011. City Council approved weekly collection of single stream recyclables and food/organics collection on December 14, 2009. This action can significantly assist Hillsborough in meeting emission reductions.

### **Education and Promotion Programs**

Engaging and educating the Hillsborough Community is critical to the success of the Climate Action Plan. Therefore, there are Climate Action Program recommendations that include new recognition programs, leverage community groups to expand sustainability efforts, expanding the partnership with the Hillsborough Unified School District to promote energy efficiency, water conservation, and solar/renewable programs within the parent /residential community.

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<sup>8</sup> Hillsborough Housing Element 2009

<sup>9</sup> California Public Utilities Commission 2008 Strategic Plan

<sup>10</sup> The San Francisco Public Utilities Commission froze the total water available to its member agencies at 184 million gallons per day (mgd) through 2018.

Additionally, a part-time Sustainability Coordinator is recommended to assist in developing and coordinating the new Climate Action Programs in collaboration with Town staff. Staff will review several options including the sharing of this type of position with other agencies.

### **Waste Reduction and Recycling Programs**

Hillsborough disposed of 4,597 tons of waste to landfill in 2008, and Hillsborough's community GHG inventory showed that approximately 2.4% of emissions were from landfilled solid waste. Though this percentage of emissions may seem like a small percentage, the actual emissions from waste decomposing at landfills are significantly more potent than carbon dioxide. As waste from landfills decomposes, methane gas is released, which is 21 times more potent than carbon dioxide (CO<sub>2</sub>). For this reason, the solid waste sector has strong potential to provide GHG emission reductions. Hillsborough has significant policy control over solid waste, recycling and composting decisions for the community. Implementing the new recycling and composting programs that will become available in January 2011 provides the single largest emissions reduction program for Hillsborough.

### **Municipal Operations Programs**

The Town of Hillsborough's Public Works, Building and Planning departments are to be commended for their successful implementation of sustainable programs already underway. The Climate Action Program recommendations include expanding the Sustainable Purchasing Policy to include a replacement program for fuel-efficient vehicles for the Town's fleet. Additionally, the Plan recommends that new sustainable goals and policies be included in Hillsborough's General Plan revisions.

## Summary of Phase 1: Recommendations for Implementation Prior to 2012

The following table includes a summary of Phase 1 recommendations and includes estimated greenhouse gas emissions per year after implementation. Estimated costs for these programs are included in the Implementation Plan.

	<b>GHG Reduction Program Recommendation<sup>11</sup></b>	<b>GHG Reduction Tons / Year</b>
<b>1</b>	<b>Consider a Residential Energy Conservation Policy for multi-phased outreach programs to increase energy efficiency and water conservation.</b> <ul style="list-style-type: none"> <li>• Develop Incentive program to increase number of residents who complete Professional Home Energy Assessments; Develop recognition program for residents who complete home energy/water efficiency upgrades</li> <li>• Develop “Residential Energy and Water Efficiency Checklist” in conjunction with promotion of rebates from PG&amp;E/other organizations</li> <li>• Expand Partnership with Hillsborough School District for Climate Action Outreach and Competitive Programs</li> <li>• Leverage Hillsborough Communications Committee or develop Hillsborough Green Community Group to educate community on climate action programs</li> <li>• Review options for a part-time Sustainability Coordinator that will assist with implementation of climate action programs</li> </ul>	113
<b>2</b>	<b>Consider Participation in the “Energy Efficiency and Renewable Financing Program” for residents (participation in regional program)</b>	261
<b>3</b>	<b>Consider increasing the increasing number of required GreenPoints in Residential Green Building Ordinance (Standards of Compliance)</b>	GHG reductions based on new requirements
<b>4</b>	<b>Adopt Water Conservation Ordinance required by state law, AB 1881 and consider water conservation programs</b>	50
<b>5</b>	<b>Research new technologies for graywater systems/Consider expanded graywater systems permitting on pilot basis</b>	3
<b>6</b>	<b>Encourage landscape/irrigation professionals to participate in Landscape Irrigation Conservation Workshops</b>	5
<b>7</b>	<b>Consider adding a Mobile Water Flushing Filtration Unit for water conservation</b>	5
<b>8</b>	<b>Consider expanding Landscape Irrigation Conservation Program (provide ‘water budget’ for resident education)</b>	30
<b>9</b>	<b>Provide new residential recycling service that includes:</b> <ul style="list-style-type: none"> <li>a) Weekly “Single stream” recycling collection service</li> <li>b) Weekly collection of organics/food</li> </ul>	1,670

<sup>11</sup> GHG reduction estimates were developed using the Climate and Air Pollution Planning Assistant<sup>11</sup> (CAPPA) software developed by ICLEI.

	<b>GHG Reduction Program Recommendation<sup>11</sup></b>	<b>GHG Reduction Tons / Year</b>
<b>10</b>	<b>Review options towards achieving a Community-wide diversion rate of 75% measured diversion by 2015.</b>	Emissions reduction dependent on %age diversion
<b>11</b>	<b>Consider expansion of Hillsborough's current Sustainable Purchasing Policy to include a replacement program for fuel-efficient vehicles within the Town's fleet</b>	60
<b>12</b>	<b>Consider amending the General Plan to further enhance sustainable policies and goals</b>	included
	<b>TOTAL</b>	<b>2,197</b>

### Summary of Phase 2: Recommendations for Implementation 2012 to 2020

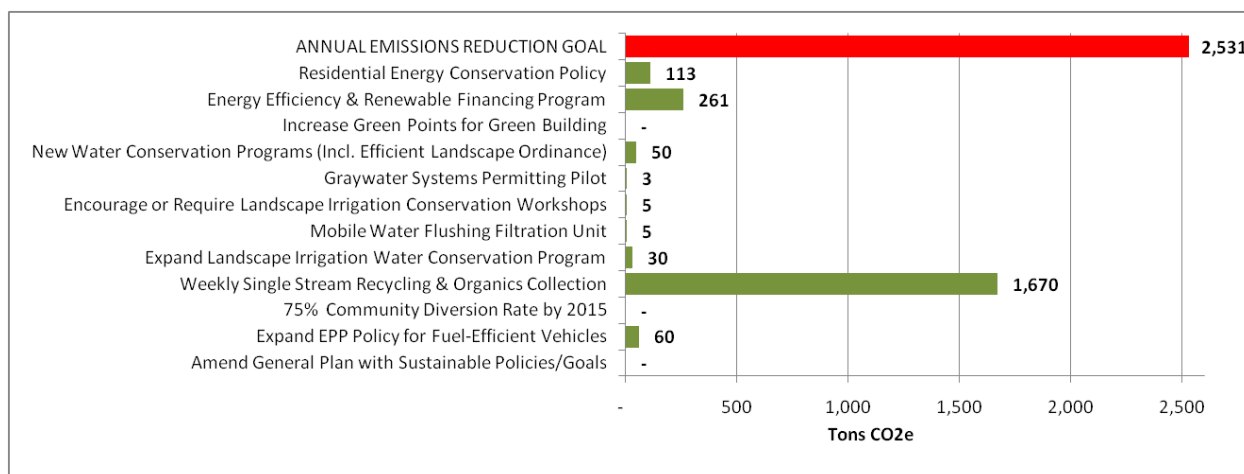
	<b>GHG Reduction Program Recommendation</b>	<b>GHG Reduction Tons / Year</b>
<b>1</b>	<b>Consider adoption of an Ordinance to improve energy-efficiency, water-conservation standards in existing homes with consideration to costs</b>	571
<b>2</b>	<b>Consider modifying residential water rate structure to further implement financial disincentives for high irrigation water use.</b>	TBD
<b>3</b>	<b>Consider further expansion of graywater systems with new construction or major remodels to include graywater/dual plumbing.</b>	TBD
<b>4</b>	<b>Implement methods to expand solar/renewable-energy generation. Consider expanding financial incentives to increase installation of solar or other renewable energy projects.</b>	327
	<b>TOTAL</b>	<b>898</b>

### Estimated GHG Reduction from Phase 1 and Phase 2: GHG Reduction Recommendations

The program recommendations in Phase 1 and Phase 2 have been analyzed to determine their GHG reduction potential using the Climate and Air Pollution Planning Assistant (CAPPA) developed by Local Governments for Sustainability. As mentioned earlier in this section, Hillsborough needs to reduce a total of 25,309 tons or 2,531 tons per year to meet the 2020 target. By implementing the program recommended in Phase 1, Hillsborough would realize an estimated emission reduction of 2,197 tons per year. By implementation of the programs recommended in Phase 2, Hillsborough would begin to reduce an estimated 898 tons per year.

Figure 4: Phase 1 Measures - Estimated Annual GHG Reductions provides an illustration of the Phase 1 recommendations estimated emission reductions.

**Figure 4: Phase 1 Measures - Estimated Annual GHG Reductions**



### Achieving AB 32 Greenhouse Gas Reduction Target

Table 4: Hillsborough GHG Emissions & Reduction Targets reviews Hillsborough's emissions reductions necessary to meet the AB 32 target.

<b>Table 4: Hillsborough GHG Emissions &amp; Reduction Targets</b>	<b>2005 Base Year</b>	<b>2020 "Business-as-Usual"<sup>12</sup></b>
<b>2005 Base Year Emissions (metric tons CO<sub>2</sub>e)</b>	82,724	95,625
<b>2020 Target Year Reduction (15% below 2005 levels)</b>	70,316	70,316
<b>Emissions Reductions Necessary to Meet Target</b>	(12,409)	(25,309)
<b>Required Percentage Emissions Reduction</b>	15.0%	26.5%
<b>Required Annual Emissions Reductions (2010-2020)</b>	(1,241)	(2,531)

<sup>12</sup> Association of Bay Area Government (ABAG) 2020 Projections



Table 5 shows Hillsborough's GHG emission reductions resulting from the implementation of the programs recommended in Phase 1 and Phase 2.

<b>Table 5: Hillsborough's GHG Reduction Target Analysis Under Phase 1 and Phase 2 Recommendations</b>	<b>Metric Tons CO<sub>2</sub>e</b>
<b>2020 "Business-as-Usual" Emissions</b>	95,625
<b>2020 Reduction Target (15% below 2005 levels)</b>	70,316
<b>Total Emissions Reductions Necessary to Meet Target</b>	(25,309)
<b>Required Annual Emissions Reductions (2010-2020)</b>	(2,531)
<b>Annual Reductions from Phase 1 Recommendations</b>	(2,197)
<b>Annual Reductions from Phase 2 Recommendations</b>	(898)
<b>Total Phase 1 and Phase 2 Annual Reductions</b>	(3,095)

By implementation of the programs and policies in Phase 1 and Phase 2 of the Climate Action Plan, the current analysis shows that Hillsborough would be within the necessary range to meet the 2020 reduction target.

There are current state initiatives and programs such as SB 375 that focus on transportation and energy generation that will reduce emissions and assist Hillsborough in meeting AB 32 reduction targets. These state initiatives are further discussed in the "Achieving AB 32 Greenhouse Gas Reduction Target" section of this document.

## Implementation and Funding

Hillsborough's Climate Action Plan should be considered as a starting point to reduce greenhouse gas emissions by 15% below 2005 levels by 2020 and by 80% below 2005 levels by 2050. The Plan establishes a framework of action that the Town and community can implement and provides a statement of intent for priorities and policies. The Climate Action Plan is presented for the City Council's consideration and approval. The approved Climate Action Plan's program recommendations will be brought forward individually to the City Council for their consideration.

One of the major barriers to implementing climate action programs is lack of available funds and staff resources. Currently, there are multiple grant and loan programs through federal, state and regional programs that could assist in funding emission reduction programs. One example is the "Energy Efficiency and Conservation Grant" federal program from the U.S. Department of Energy<sup>13</sup> (American Recovery and Reinvestment Act of 2009). To implement the programs, the Town could consider the use of a combination of grant funds, use a portion of current staff resources and Town funds to begin reducing emissions in the near term. It is recommended that sustainable programs be implemented and expanded at Town departments where feasible.

An essential element of the Climate Action Plan is the dedication of a part-time Sustainability Coordinator (or staff) that would provide the critical function of implementation of sustainable programs, coordination with staff, monitoring of greenhouse gas reduction progress and promotion and education. Hillsborough's Climate Action Plan should be viewed as a living

<sup>13</sup> [www.energy.ca.gov/recovery](http://www.energy.ca.gov/recovery)

document and programs should be revised as new technologies emerge and as new regional, state and federal policies evolve

Once the Climate Action Plan program implementation begins, an essential component is monitoring Hillsborough's progress toward the 2020 target. Progress should be reassessed periodically by completing a GHG emissions inventory to ensure that Hillsborough is on track to meet the interim target years of 2012 and 2015 as well as for the 2020 target.

It is also recommended that the approved Climate Action Plan program and policies are included in Hillsborough's General Plan revisions. The approved Climate Action Plan policies should be made consistent in the associated Elements of the General Plan and the Town should also include climate change adaptation measures and policies in the General Plan updates.

According to the International Panel on Climate Change (IPCC) climate change is already occurring and that current goals should be to first slow and then reverse emissions to avert more serious impacts in the future. It is recommended that the Town prepare itself for the increasing challenges that climate change can bring that include shrinking water supplies, rising temperatures, rising bay levels and increased public health issues for the elderly and young. It is recommended that the Town participate in regional efforts for climate change adaptation.

## I. Background

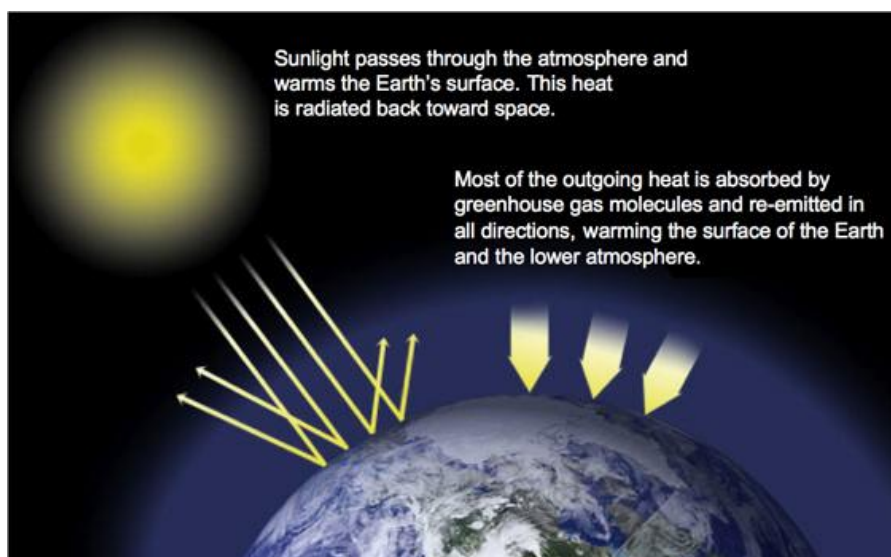
The Town of Hillsborough recognized the potential issues associated with climate change and joined Local Governments for Sustainability (formerly known as ICLEI) in 2008. The Town also directed the development of an inventory of Hillsborough's baseline of greenhouse gas emissions from municipal operations and from the community. The City Council authorized the Mayor to sign the United States Mayor's Climate Protection Agreement and recognized that government plays an important role in mitigating the impacts of climate change, and directed the formation of the Sustainable Hillsborough Task Force to develop Hillsborough's Climate Action Plan. The Council also directed the Task Force to concurrently implement a set of early greenhouse gas reduction initiatives while the Climate Action Plan was under development. The Town of Hillsborough's Climate Action Plan serves as a guiding document to identify methods that the Town and community can implement to significantly reduce emissions. The Bay Area Air Quality Management District grant was awarded in 2008 to the Town of Hillsborough to fund the Climate Action Plan and to implement early greenhouse gas reduction initiatives. Hillsborough is to be commended for already implementing some climate protection initiatives; however, much work remains to meet the challenging emissions reduction targets established under AB 32.

### Climate Change Impacts

During the past 100 years, average temperatures have risen more than 1 degree Fahrenheit worldwide. A 1 degree change is unusual in the earth's history because the global average temperature is stable over long periods of time. Small changes in temperature correspond to enormous changes in the environment. For example, at the end of the last ice age, when the United States was covered by more than 3,000 feet of ice, average global temperatures were only 5 to 9 degrees cooler than today.<sup>14</sup> Twelve of the last 13 years have been the hottest since recording began in 1850, and the existing and anticipated effects of climate change are hard to ignore.

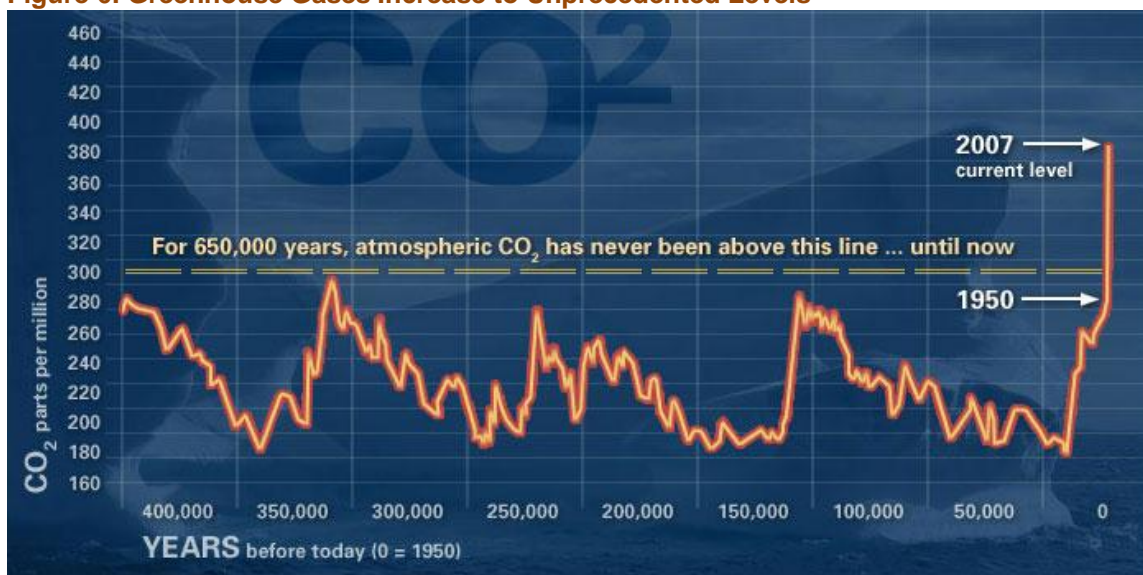
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<sup>14</sup> Summary for Policymakers, Intergovernmental Panel on Climate Change 2007 Synthesis report, [www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr\\_spm.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf)

**Figure 5: The Greenhouse Effect**

Source: NASA

Causes of climate change, in certain scientific studies, have been attributed to the burning of fossil fuels to drive cars and generate electricity in homes and businesses; these release carbon dioxide (CO<sub>2</sub>) and other gases into the atmosphere. This activity disrupts the balance in the “thermal blanket” of gases that exist naturally in the atmosphere and enable the earth to support life. These additional greenhouse gases trap in heat that would otherwise escape into space. Importantly, once in the earth’s atmosphere, these heat-trapping emissions can persist for about 100 years.

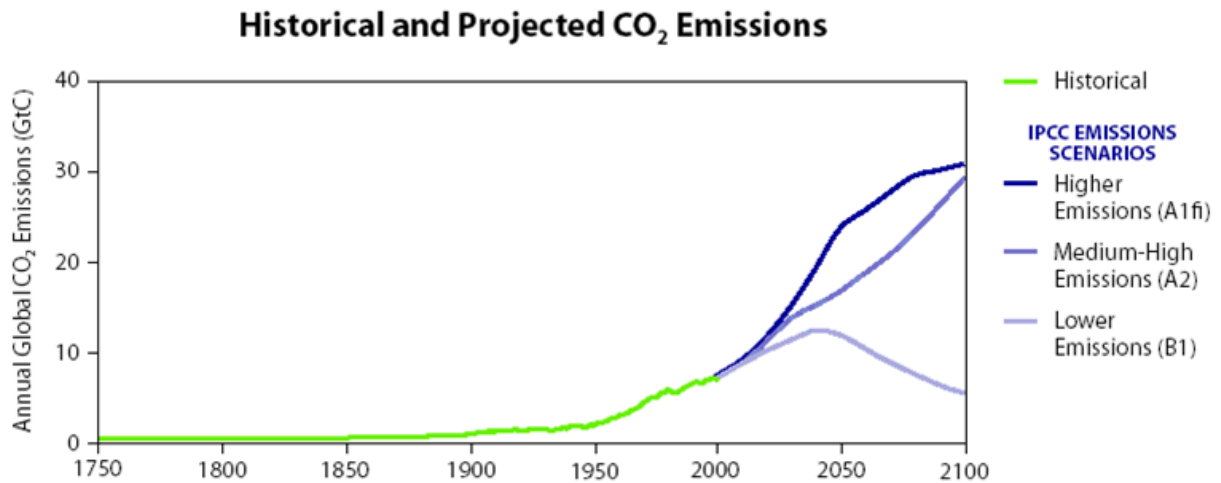
**Figure 6: Greenhouse Gases Increase to Unprecedented Levels**

Source: NOAA

Figure 6 shows that carbon dioxide level increases have never been as high as they have reached in 2007 in the past 650,000 years. The most notable increase shows a remarkable increase in CO<sub>2</sub> levels since the early 1900s. A concentration of greenhouse gases (CO<sub>2</sub>) in the

atmosphere has increased more than 30 percent above pre-industrial levels and by 70 percent between 1970 and 2004.<sup>15</sup> If left unchecked, by the end of the century CO<sub>2</sub> concentrations could reach levels three times higher than pre-industrial times, causing climate change that threatens public health, the economy, and the environment.<sup>16</sup>

**Figure 7: Worldwide Historical and Projected CO<sub>2</sub> Emissions**



Source: Intergovernmental Panel on Climate Change 2007

“Climate change” refers to all aspects of climate, including disruptions to weather patterns that include shrinking of glaciers, accelerated sea level rise, more intense heat waves, shifts in animal and plant ranges, and changes in the timing of plant reproduction.<sup>17</sup> In California and western North America, a changing climate is evident. During the past 50 years, the region has experienced warmer winter and spring temperatures, reduced spring snow levels in mountains and earlier snowpack melt.

## Hillsborough and Climate Change

Hillsborough and other California municipalities may see an estimated increase of 3.0 to 5.6 Fahrenheit by the end of the century<sup>18</sup>. This climate change will have widespread economic, social and environmental consequences for the region that include:

**Rising Sea Levels.** Sea levels could rise up to three feet by the end of the century and could inundate the entire area east of the Bayshore Freeway by 2099 if levees are not built or existing flood control structures are comprised.<sup>19</sup> Sea-level rise could inundate the Bay Area’s transportation infrastructure, including San Francisco International Airport and neighboring

<sup>15</sup> Summary for Policymakers, Intergovernmental Panel on Climate Change 2007 Synthesis report, [www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr\\_spm.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf)

<sup>16</sup> Our Changing Climate: Assessing the Risks to California, [www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF](http://www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF)

<sup>17</sup> National Aeronautics and Space Administration, [climate.jpl.nasa.gov/effects/](http://climate.jpl.nasa.gov/effects/). May 2009.

<sup>18</sup> [www.energy.ca.gov/2006publications/CEC-500-2006-077.PDF](http://www.energy.ca.gov/2006publications/CEC-500-2006-077.PDF)

<sup>19</sup> Knowles, Noah. “Protecting Vulnerability to Inundation Due to Sea Level Rise in the San Francisco Bay and Delta.” Fifth Annual California Climate Change Conference. Sept, 2008. [www.climatechange.ca.gov/events/2008\\_conference/presentations/2008-09-09/Noah\\_Knowles.pdf](http://www.climatechange.ca.gov/events/2008_conference/presentations/2008-09-09/Noah_Knowles.pdf)

communities. A sea-level rise of 1 foot would result in “100-year” flood events occurring on average every 10 years.<sup>20</sup>

**Extreme Weather Patterns.** The region could potentially experience intensification of heat waves and extreme weather conditions which pose serious health risks. The heat wave that occurred in California in July 2006 was the longest on record since 1948 and resulted in approximately 140 heat-related deaths.<sup>21</sup>

**Deteriorating Public Health.** The region would see an expansion in the range of infectious diseases, increased wildfires and increased air pollution in the Bay Area that will impact the elderly and young.

**Decreasing Fresh Water Supply.** Rising temperatures compounded by decreases in precipitation could severely reduce spring snowpack in the Sierra Nevada. The Sierra Nevada snowpack is projected to be reduced by at least 25 percent by 2050<sup>22</sup> and will pose severe water supply challenges for California, including the Hetch-Hetchy system on which Hillsborough relies. Additionally, California may see longer drought periods and decreased groundwater levels. Higher frequency and severity of extreme flooding is also expected. Water supplies are also at risk from rising sea levels and saltwater intrusion, which will degrade groundwater aquifers and wetlands.

**Stresses to the Food Supply.** Numerous stresses on California’s \$30 billion dollar agriculture industry are expected that include crop growth changes and pest and disease outbreaks which will reduce the quantity and quality of agricultural products available.

**Reductions in Hydropower Generation.** Even if California’s population remains unchanged, high temperatures will likely increase electricity demand by an estimated 20 percent. At the same time, diminished snow melt flowing will decrease the potential for hydropower production, which comprises about 15 percent of California’s electricity production. An earlier snowmelt and increased precipitation in the form of rain rather than snow will also stress the system by necessitating greater spillage from high elevations from hydropower reservoirs and creating a mismatch between energy supply and demand.

**Impacts on Future Generations.** Because most greenhouse gas emissions persist in the atmosphere for decades or centuries, decisions made today could greatly influence the climate of future generations and the quality of life they experience will depend on how rapidly we act to reduce these emissions.<sup>23</sup>

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<sup>20</sup> Our Changing Climate: Assessing the Risks to California, [www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF](http://www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF)

<sup>21</sup> Climate Action Team, Draft Biennial Report, March 2009, [www.energy.ca.gov/2009publications/CAT-1000-2009-003/CAT-1000-2009-003-D.PDF](http://www.energy.ca.gov/2009publications/CAT-1000-2009-003/CAT-1000-2009-003-D.PDF). May 2009.

<sup>22</sup> Scenarios of Climate Change in California: An Overview. Final report from California Energy Commission, Public Interest Energy Research (PIER) Program, California Climate Change Center, publication No. CEC-500-2005-186-SF, posted: February 27, 2006

<sup>23</sup> Our Changing Climate: Assessing the Risks to California, [www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF](http://www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF)



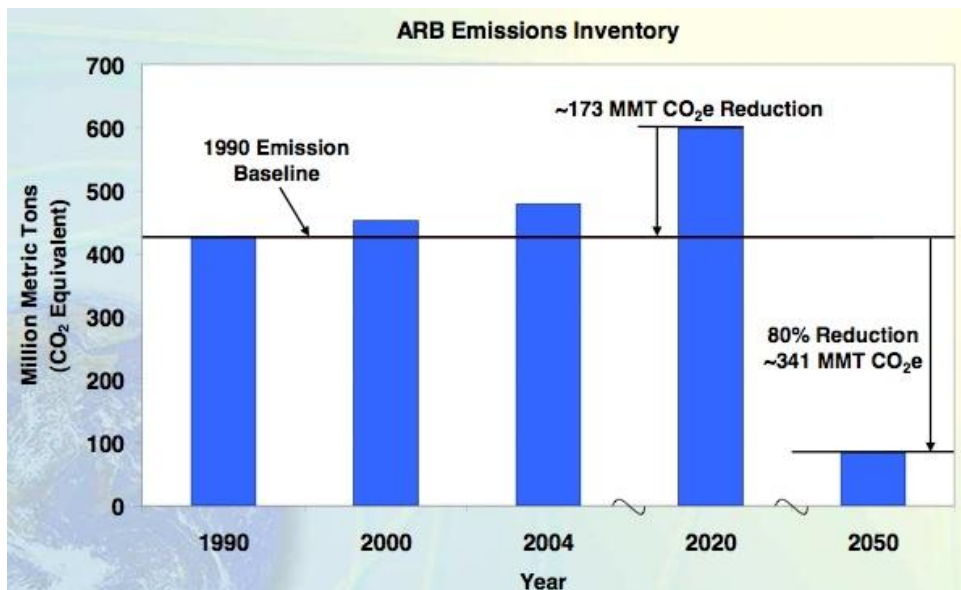
## Initiatives to Reduce Climate Change

The increasing severity of climate change impacts illustrates the importance of reducing emissions to limit further climate change. California continues to show leadership in confronting the problem of climate change. The following are recent initiatives to reduce emissions:

**Executive Order S-05-05.** In June 2005, Executive Order S-05-05 was signed by Governor Schwarzenegger to establish progressive GHG emission reduction targets for California and to require biennial science assessment reports on climate change impacts. The Order established the following goals of reducing emissions to:

- ✧ 2000 levels by 2010
- ✧ 1990 levels by 2020 (approximately 15 percent below today's levels)
- ✧ 80% below 1990 levels by 2050

**Figure 8: California's Emissions Inventory**



Source: California Air Resources Board

**Assembly Bill 32.** The California legislature adopted the California Global Warming Solutions Act of 2006 (AB 32) and the California Air Resources Board (CARB) was tasked as the lead agency to develop regulatory and market mechanisms to reduce emissions. CARB's Scoping Plan, approved in December 2008, provides a comprehensive set of actions designed to reduce overall emissions, improve the environment, reduce California's dependence on oil, diversify its energy sources, save energy, create new jobs and enhance public health. The reduction measures in the Scoping Plan will be further developed over the next several years and be in place by 2012.

**California Attorney General Litigation.** In 2007 the State of California filed a lawsuit against San Bernardino County, claiming that the county's 2007 update of its general plan violated the California Environmental Quality Act (CEQA) by failing to evaluate and disclose "the reasonably foreseeable effects" of the General Plan update on global warming, air quality and other state resources. The county's settlement with the state is significant because it requires a California

agency for the first time to inventory historical, current and projected emissions, and to develop an emissions reduction target and reduction measures.<sup>24</sup>

In September 2008 the state Attorney General reached a similar settlement agreement with the City of Stockton and the Sierra Club under which Stockton is required to adopt a Climate Action Plan designed to reduce sprawl and increase infill development, promote public transit and encourage more energy-efficient buildings.

**Senate Bill 97.** In response to the Attorney General's actions and in recognition that AB 32 did not discuss how greenhouse gases should be addressed in CEQA documents, the legislature enacted SB 97 in 2007. SB 97 requires the Governor's Office of Planning and Research to prepare CEQA guidelines for the mitigation of emissions, including effects associated with transportation or energy consumption. The California Air Resources Board must certify and adopt the guidelines by January 1, 2010.

**Executive Order S-13-08.** Governor Schwarzenegger's 2008 Climate Adaptation and Sea Level Rise Planning Directive included four key actions: 1) initiate California's first statewide climate change adaptation strategy that will assess the state's expected climate change impacts, identify where California is most vulnerable and recommend climate adaptation policies by early 2009; 2) request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California to inform state planning and development efforts; 3) issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects; and 4) initiate a report on critical existing and planned infrastructure projects vulnerable to sea level rise.

**Senate Bill 375.** SB 375, passed in 2008, links transportation funding to land use planning. It requires the California Air Resources Board to set regional GHG reduction targets intended to reduce suburban sprawl and the associated vehicle miles traveled. If regions develop integrated land use, housing and transportation plans that meet the SB 375 targets, new projects in these regions can be relieved of certain review requirements of the California Environmental Quality Act. The targets apply to the regions in the state covered by the 18 metropolitan planning organizations.

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<sup>24</sup> California Office of the Attorney General, "California Environmental Quality Act," [www.ag.ca.gov/globalwarming/ceqa.php](http://www.ag.ca.gov/globalwarming/ceqa.php). Accessed May 2008.



## II. Hillsborough's Community and Municipal Greenhouse Gas Emission Inventory

### Hillsborough's Community Greenhouse Gas Inventory

Hillsborough's Community Greenhouse Gas emissions Inventory provides a baseline of emission levels against which future reductions can be measured. The analysis showed that the community of Hillsborough emitted approximately 82,724 metric tons of CO<sub>2</sub>e in the base year of 2005.

Hillsborough's Community Greenhouse Gas Inventory was developed using the Clean Air and Climate Protection (CACP) software developed by Local Governments for Sustainability (ICLEI), which uses data on electricity and natural gas consumption, vehicle miles traveled (VMTs) and solid waste tonnage and converts it into carbon dioxide equivalents (CO<sub>2</sub>e), using specific coefficients according to fuel or waste types. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used.

Converting all greenhouse gas emissions to CO<sub>2</sub>e units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is 21 times more powerful than carbon dioxide on a per-weight basis in its capacity to trap heat, so the software converts one metric ton of methane emissions to 21 metric tons of carbon dioxide equivalents.

Figure 9: 2005 Community GHG Emissions by Sector

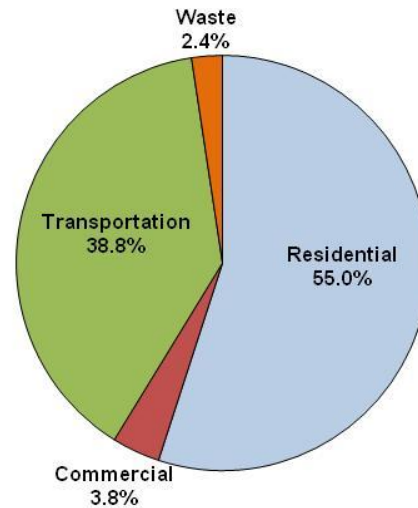


Table 6: 2005 Community GHG Emissions by Sector

Sector	CO <sub>2</sub> e (metric tons)	% of Total GHG
Residential	45,511	55.0
Commercial	3,106	3.8
Transportation	32,117	38.8
Waste	1,991	2.4
<b>Total</b>	<b>82,724</b>	<b>100</b>

As illustrated in Table 7, the residential sector (residential electricity and natural gas consumption) accounted for the largest source of emissions at 55%. Of the 55% residential sector, 38% is from natural gas consumption and 17% is from electricity consumption. The

second highest source of emissions was transportation at 39%; these two largest sectors comprise 94% of total emissions. There was a small amount from commercial accounts, 3.8%, that was primarily from the Hillsborough schools, the Country Club, and municipal operations in Hillsborough. The landfilled waste sector accounted for 2.4% of total emissions. Table 7 illustrates the source sectors and provides detail of the sector and fuel types consumed within each sector. Use of residential natural gas (residential heating and cooking) accounted for 38% and residential electricity accounted for 17% with gasoline consumption at 33%. These sectors were the largest sources of greenhouse gas emissions in Hillsborough. These were followed by the burning of diesel fuel in the transportation sector which resulted in approximately 6% of emissions and the release of methane and CO<sub>2</sub> from landfilled waste material which resulted in less than 3% of total emissions.

**Table 7: GHG Emissions by Sector and Fuel Type**

Sector and Fuel Type	CO <sub>2</sub> e (metric tons)	% of Total GHG
<b>Residential Sector</b>		
Electricity	14,253	17.2
Natural Gas	31,258	37.8
<b>Commercial Sector</b>		
Electricity	2,233	2.7
Natural Gas	873	1.1
<b>Transportation Sector</b>		
Diesel	5,224	6.3
Gasoline	26,893	32.5
<b>Waste Sector</b>		
Food Waste	363	0.4
Paper Products	1,094	1.3
Plant Debris	244	0.3
Wood or Textiles	290	0.4
<b>Total</b>	<b>82,724</b>	<b>100.0</b>

Hillsborough's Community GHG Inventory provides an understanding of where the highest percentages of emissions originate in Hillsborough and enabled analysis of focused emission reduction strategies.

## Transportation

As with other San Francisco Bay Area cities, travel by motorized vehicles, measured by vehicle miles traveled (VMT), produces a significant percentage of emissions. A total of 38.8% of total emissions were a result of transportation within Hillsborough's borders. Approximately 72% of the emissions in the transportation sector (or 27.9% of total emissions) came from VMT on Town roads. Because Hillsborough has two heavily traveled State Highways (280 and 82) within its borders, approximately 11% of the greenhouse gas emissions in the transportation sector are

attributed to highway travel. Hillsborough's City Council has concerns that the Town is currently held responsible for the greenhouse gas emissions from the transportation sector, most notably, from the highway emissions from State Highways 280 and 82 that fall within the Town borders. The Town is concerned because it does not possess policy control over drivers or vehicles that travel this portion of Highway 280 and 82 nor the resulting greenhouse gas emissions.

**Table 8: GHG Emissions by Road Type**

Sector	CO <sub>2</sub> e (metric tons)	% of Total GHG
State Highway VMT	9,053	10.9
Town Roads VMT	23,064	27.9
<b>Total</b>	<b>32,117</b>	<b>38.8</b>

## Waste

The emissions from waste generated by Hillsborough residents and schools that was landfilled in other locations in 2005 emitted 1,991 metric tons of CO<sub>2</sub>e, accounting for 2.4% of the Town's total emissions. Waste characterization studies by the California Integrated Waste Management Board were used to allocate shares of waste types to the total organic waste tonnage in the Town's waste stream. Emissions factors developed by Local Governments for Sustainability (ICLEI) were applied to the waste types to determine total emissions from the sector.

## Base Year

Providing for a meaningful and consistent comparison of emissions over time required setting a base year with which to compare current and future emissions. 1990 is the base year established by AB 32. AB 32 sets the goal of reducing emissions to 1990 levels by 2020 and to 80% below 1990 levels by 2050. However, emissions data from 1990 is often prohibitively difficult or impossible to collect. Using this method would involve the use of unreliable "back-casting" (where we would calculate 1990 levels based on current emission levels and adjust for 1990 population and job statistics consumption.) This method is very unreliable because it doesn't take into account consumption and efficiency changes and uses older undependable information. Local Governments for Sustainability support the decision for Hillsborough and other municipalities to use the baseline year of 2005 for the purposes of establishing a baseline greenhouse gas inventory.<sup>25</sup> Therefore, Hillsborough uses the calendar year 2005 as the base year because it is reasonable to expect that accurate records of key emission sources exist for that year in sufficient detail to conduct an accurate inventory. Using 2005 as a base year is consistent with the base years being used by other Bay Area cities in their greenhouse gas inventories.

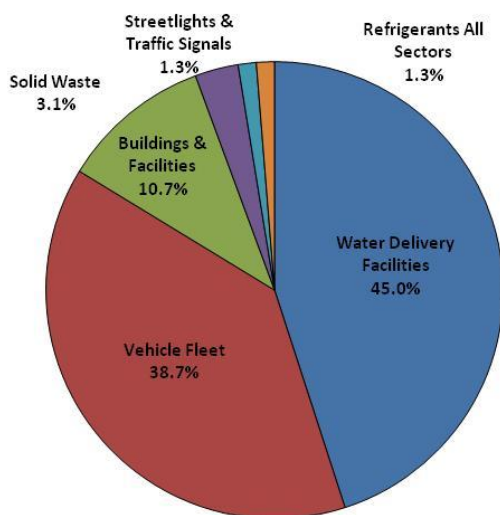
<sup>25</sup> The goal of 15% below 2005 levels by 2020 has been confirmed by the California Attorney General and the California Air Resources Board to be equivalent to reducing emissions to 1990 levels by 2020 as outlined in AB 32.

## Hillsborough's Municipal Greenhouse Emissions Inventory

### Summary of Municipal Emissions by Sector

Figure 10: GHG Emissions by Sector shows that water delivery facilities were the largest municipal emitters in Hillsborough, resulting in 528 metric tons CO<sub>2</sub>e or 45% of total in 2005. Emissions from the vehicle fleet produced the second highest quantity of emissions, resulting in 454 metric tons of CO<sub>2</sub>e. Hillsborough's buildings and facilities produced 125 metric tons of CO<sub>2</sub>e of total emissions. The remainder of emissions came from solid waste, refrigerants, and streetlights and traffic signals.

**Figure 10: GHG Emissions by Sector**



This inventory uses a national standard developed and adopted by the California Air Resources Board (ARB) in conjunction with Local Governments for Sustainability, the California Climate Action Registry, and The Climate Registry. This Local Government Operations Protocol (LGOP) provides standard accounting principles, boundaries, quantification methods and procedures for reporting greenhouse gas emissions from local government operations.

**Table 9: Hillsborough's Municipal GHG Emissions by Sector**

Sector	CO <sub>2</sub> e (tons)	% of Total GHG
Water Delivery Facilities	528	45.0
Vehicle Fleet	454	38.7
Buildings and Facilities	125	10.7
Solid Waste	36	3.1
Streetlights & Traffic Signals	15	1.2
Refrigerants All Sectors	15	1.3
<b>Total</b>	<b>1,173</b>	<b>100</b>

## Summary by Resource

**Table 10: Municipal GHG Emissions by Fuel / Material Resource**

Table 10: Municipal GHG Emissions by Fuel / Material Resource provides a summary of Hillsborough's municipal operations and 2005 greenhouse gas emissions by fuel type and material. This data is useful because it provides the specific resources and materials (gasoline, diesel, electricity, natural gas, solid waste, etc.) whose use and generation directly result in the release of greenhouse gases.

**Table 10: Municipal GHG Emissions by Fuel / Material Resource**

Resource	CO <sub>2</sub> e (metric tons)	% of Total GHG
Electricity	634	54.1
Gasoline	359	30.6
Diesel	94	8.0
Waste (Methane)	36	3.1
Natural Gas	34	2.9
Refrigerants	15	1.3
<b>Total</b>	<b>1,173</b>	<b>100</b>

## Sector Analyses

### Water and Wastewater Transport

Largely due to topography, water and wastewater transport results in the largest amount of emissions for the Town due to the electricity required for pumping. In 2005, the operation of

Hillsborough water transport equipment produced approximately 528 metric tons of CO<sub>2</sub>e or 45% of total emissions.

### Vehicle Fleet and Mobile Equipment

The majority of local governments use vehicles and other mobile equipment as an integral part of their daily operations—from maintenance trucks to police cruisers and fire trucks. In addition, vehicles with air conditioning or refrigeration equipment use refrigerants that can leak from the vehicle. Emissions from vehicles and mobile equipment compose a significant portion of emissions within most local governments. In 2005, emissions from fuel burning by the vehicle fleet and mobile equipment were 454 tons or 38.7 percent of total emissions. Leaked refrigerant from vehicle air conditioning systems resulted in 14 tons of emissions. Additional analysis can be performed to identify vehicle emissions by department.

### Buildings and Other Facilities

Hillsborough's facilities include Town Hall and Administration, Corporation Yard (Public Works), Finance Department, Police Department and two fire stations<sup>26</sup> and contribute to greenhouse gas emissions in two major ways. Facilities consume electricity, natural gas and diesel (for backup generators). In addition, fire suppression, air conditioning, and refrigeration equipment in buildings can emit hydrofluorocarbons (HFCs) and other emissions when these systems leak refrigerants or fire suppressants. Hillsborough's facilities produced at least 125 metric tons of CO<sub>2</sub>e from electricity, natural gas and diesel consumption. Table 11 depicts 2005 emissions by facility/department. Of total facility emissions, 73% came from the consumption of electricity and 27% came from the combustion of natural gas.

**Table 11: GHG Emissions by Building / Facility**

Buildings and Facilities	CO <sub>2</sub> e from Electricity (metric tons)	CO <sub>2</sub> e from Natural Gas (metric tons)	% of Emissions from Facilities
Fire Department	19	29	38.1%
Police Department	38	0	30.2%
Public Works Department	16	5	16.7%
Town Hall	19	0	15.1%
<b>Total</b>	<b>92</b>	<b>34</b>	

### Streetlights, Traffic Signals, and Other Public Lighting

Compared to many cities Hillsborough operates very few streetlights and a relatively limited amount of public lighting. Electricity consumed in the operation of this infrastructure generated 1.2% of government emissions, producing approximately 15 metric tons CO<sub>2</sub>e in 2005.

<sup>26</sup> The two fire stations were included in this inventory though part of a Joint Powers Authority.

**Municipal-generated Generated Solid Waste**

Typical sources of waste include paper and food waste from offices and facilities, construction waste and plant debris. Estimating emissions from waste generated by government operations is an important component of a comprehensive emissions inventory. Estimated waste disposed by government facilities in 2005 will cumulatively produce 36 metric tons of CO<sub>2</sub>e in the form of methane gas or 3.1% of emissions.

### III. Achieving AB 32 Emissions Reduction Target

To maintain consistency with AB 32's emission reduction targets, the Sustainable Hillsborough Task Force recommended that Hillsborough reduce emissions by 15% below current levels (as measured in 2005) by the year 2020 and 80% by the year 2050.<sup>27</sup> If the community of Hillsborough continues with the 2005 pattern of energy consumption, travel and waste generation, the emissions level is estimated to increase from 82,724 to 95,625 tons per year by 2020. Therefore, the percent change from "business-as-usual" in 2020 to 15% below 2005 levels is 26.5%.

Figure 11 provides Hillsborough's baseline inventory and forecast for population, transportation and other activity in its "business-as-usual" emissions forecast for 2020. This table was created using the Association of Bay Area Governments data and emission forecast software provided by Local Governments for Sustainability.

**Figure 11: "Business-As-Usual" Emissions Forecast for 2020**

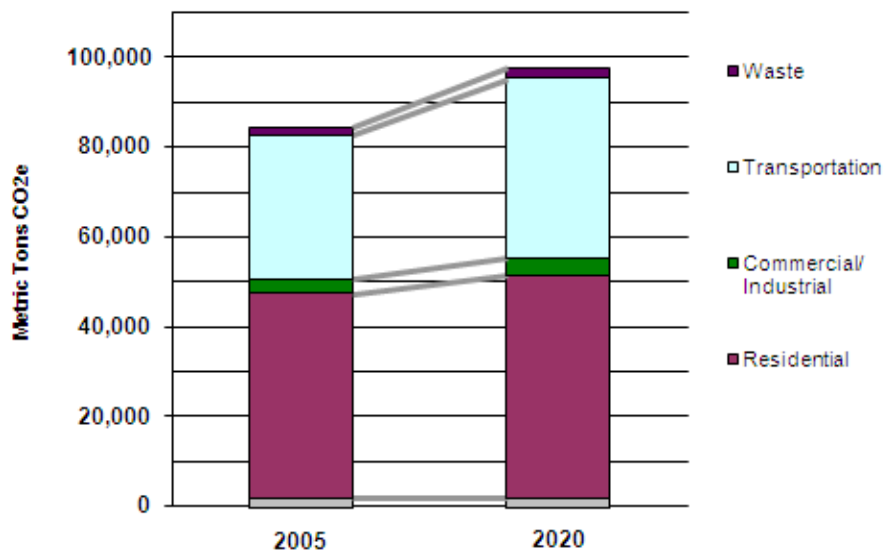


Table 12: Hillsborough GHG Emissions and Reduction Targets provides additional detail to illustrate Hillsborough's emission reduction target with the "business-as-usual" forecasts. Hillsborough would need to reduce a total of 25,309 tons to meet the 2020 target. Hillsborough would need to reduce emission by 2,531 tons per year to meet the 2020 target year. These reductions are challenging but are in line with the emission reduction targets of many Bay Area cities.

<sup>27</sup> California Air Resources Board ([www.arb.ca.gov](http://www.arb.ca.gov))



**Table 12: Hillsborough GHG Emissions and Reduction Targets**

	2005 Base Year	2020 “Business-as-Usual” <sup>28</sup>
<b>2005 Base Year Emissions (metric tons CO<sub>2</sub>e)</b>	<b>82,724</b>	<b>95,625</b>
<b>2020 Target Year Reduction (15% below 2005 levels)</b>	<b>70,316</b>	<b>70,316</b>
<b>Emissions Reductions Necessary to Meet Target</b>	<b>(12,409)</b>	<b>(25,309)</b>
<b>Required Percentage Emissions Reduction</b>	<b>15.0%</b>	<b>26.5%</b>
<b>Required Annual Emissions Reductions (2010-2020)</b>	<b>(1,241)</b>	<b>(2,531)</b>

Table 13: GHG Reduction Targets provides the interim GHG reduction targets that were established and recommended by the Sustainable Hillsborough Task Force. These interim GHG reduction targets can enable Hillsborough to monitor progress more frequently and ensure the Town is on track to meet the emissions reduction target in 2020.

**Table 13: GHG Reduction Targets**

	Percentage Emission Reduction from Base Year	Target Emissions (Metric Tons CO <sub>2</sub> e)
<b>2005 Base Year</b>	<b>- - -</b>	<b>82,724</b>
<b>2012 Target Year</b>	<b>5%</b>	<b>78,588</b>
<b>2015 Target Year</b>	<b>10%</b>	<b>74,452</b>
<b>2020 Target Year</b>	<b>15%</b>	<b>70,316</b>

## New State and Federal Initiatives Assist in Emission Reductions

New state and federal initiatives could assist the Town in meeting AB 32 reduction targets. Hillsborough has limited ability to control decisions that impact the transportation sector, which is responsible for 39% of emissions. New state and federal initiatives and programs that focus on transportation and energy generation can assist Hillsborough in meeting AB 32 reduction targets.

### Transportation Initiatives

**AB 1493 (Pavley).** The California Air Resources Board adopted regulations that created increasingly stringent standards in 2004 to reduce global warming emissions from cars and light trucks between 2009 and 2016. The Environmental Protection Agency is expected to allow California to move forward with these new requirements in 2009 or 2010 as outlined in AB 1493 after being challenged by federal and state courts. The AB 32 Scoping Plan estimated that the state’s emissions will be reduced by an estimated 5.5% by 2020 resulting from AB 1493.

<sup>28</sup> Association of Bay Area Government (ABAG) 2020 Projections

**Senate Bill 375.** This legislation reduces emissions by linking transportation funding to land use planning. It requires the Metropolitan Planning Organizations to create sustainable communities strategies in their regional transportation plans to reduce vehicle miles traveled and sprawl. If regions develop integrated land use, housing and transportation plans that meet the SB 375 targets, new projects in these regions can be relieved of certain review requirements of the California Environmental Quality Act. The AB 32 Scoping Plan estimated that the state's emissions will be reduced by an estimated 1% by 2020 as a result of SB 375.

### Energy Initiatives

The State of California's Renewable Energy Portfolio Standard (RPS) requires electricity providers to increase the portion of the energy that comes from renewable sources to 20% by 2010 and by 33% by 2020. These State and regional initiatives can provide Hillsborough with additional reductions in emissions by the year 2020.<sup>29</sup>



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<sup>29</sup> AB 32 Scoping Plan released December 2008, [www.arb.ca.gov](http://www.arb.ca.gov)

## IV. Climate Action Plan Program and Policy Recommendations

The development of the Hillsborough Climate Action Plan occurred over several months and began with the environmental consultant and staff discussing several alternatives of emission reduction strategies that were discussed, evaluated and modified by Town staff. These draft program and policy recommendations focused on the most cost effective emission reduction strategies that would enable Hillsborough to meet the emissions reduction target. The Sustainable Hillsborough Task Force reviewed the draft program and policy recommendations and discussed several modifications that were incorporated into the Climate Action Plan. The Task Force approved the final draft in December 2009 for City Council consideration. To guide the program and policy recommendations, these four major strategies were selected:

- ✧ Energy efficiency, water conservation and green building
- ✧ Waste reduction and recycling
- ✧ Education and promotion
- ✧ Municipal operations

The Climate Action Plan was developed in a phased approach for implementation with two phases. The first *Phase 1: High-Impact GHG Reduction Programs for Implementation Prior to 2012* provides the Town with recommendations that can be implemented in the near term to begin the necessary reductions in emissions. The second phase, *Phase 2: GHG Reduction Programs for Implementation 2012 to 2020*, has been developed for implementation beyond 2012. The phased approach is recommended to enable the Phase 1 (lower cost, higher impact programs) an opportunity to significantly reduce emissions and allow the Town to monitor the effectiveness of these programs.

The California Global Warming Solutions Act of 2006 (AB 32) Scoping Plan directs local jurisdictions to develop Climate Action Plans and set greenhouse gas emissions targets.

The Town would complete subsequent GHG inventories and evaluate emission reduction achievements for the interim goal years of 2012 and 2015. In the event the 2012 and 2015 emission reductions are not achieved, the more mandatory Phase 2 programs would be assessed for implementation. These Phase 2 programs for implementation after 2012 have more mandatory requirements, would include additional costs and staff resources and would achieve additional emission reductions to enable Hillsborough to meet the emission reduction target for 2020.

Program recommendations for both phases include an estimated timeline for implementation, estimated costs, resulting emissions reduction estimates and personnel required for implementation. This phased approach is recommended to assist the Town in achieving the AB 32 GHG emission reductions target.

## Policies and Programs

The specific program and policy recommendations are described in the following format:

**Description.** A brief description of the program or policy recommendation and a list of the associated benefits and co-benefits.

**Goals.** Defined goals for the recommended are outlined.

**Components.** A list of specific requirements and components recommended for implementation.

**Annual Estimated GHG Reduction.** The estimated emissions reduction from the recommendation (provided in metric tons of CO<sub>2</sub> equivalent) on an annual basis.

**Cost Estimates.** An estimate of the initial costs to the Town to implement the program and other cost data are included in the Implementation Plan. These costs are for reference and are based on current research of programs in other jurisdictions and available case studies. The estimates are non-amortized approximations of first-year costs. Most of the costs involve staff time and materials.

**Potential Funding Sources.** A list of potential funding sources that may be used for implementation of the recommendation.

**Responsible Personnel.** A list of recommended personnel that could implement the recommendation.

**Municipal Examples.** A list of other cities that have implemented this recommendation or have included this recommendation in their Climate Action Plan.

## Phase 1: Greenhouse Gas Reduction Programs for Implementation Prior to 2012

The *Phase 1: High Impact GHG Reduction Programs for consideration and possible implementation* to provide the Town with recommendations that can be implemented in the near term to begin the necessary reductions in emissions.

### Energy Efficiency, Water Conservation and Green Building Recommendations

Energy efficiency is considered the “low hanging fruit” of Climate Action Plans because it provides the fastest and most economical means to reduce emissions and has the added advantage of cost savings to residents. Hillsborough has the advantage of having considerable policy and program control over the largest source of emissions, with over 55% of emissions originating from the residential energy sector. Hillsborough’s GHG Community inventory showed that of the 55% from the residential sector, 17% is from electricity and 38% is from natural gas consumption. There is a primary focus on residential energy efficiency strategies to significantly reduce emissions in Hillsborough’s Climate Action Plan. The majority of Hillsborough homes

were built prior to the adoption of the California Title 24 Energy Code<sup>30</sup> and these homes have significant potential to increase energy efficiency. The California Public Utility Commission's 2008 Strategic Plan calls for new net zero energy homes and a 40% improvement of the existing home stock by 2020. The household energy use per capita in Hillsborough is approximately three times higher than the average energy use per household in San Mateo County<sup>31</sup>. Typically, homes can increase energy efficiency 30% to 40%,<sup>32</sup> and reduce water consumption by 20% with comprehensive energy and water efficiency upgrades and these efficiencies can provide Hillsborough residents the added incentive of reducing energy and water costs.

- 1 Consider adoption of a Residential Energy Conservation Policy to develop a multi-phased energy efficiency and water conservation outreach and education program. This program is designed to institute behavioral changes toward energy and water consumption and provide cost savings to Hillsborough residents.**

***Goal: Increase residential energy efficiency by 40% and reduce water consumption by 20% to meet AB 32 emission reduction target.***

***Components:***

- A. Provide an Incentive and Recognition Program for residents to complete Professional Home Energy Assessments and complete energy and water efficiency upgrades.**

A professional Home Energy Assessment provides an onsite analysis of home energy usage and a customized report of priority actions for energy and water savings.

The home audit is the first step in identifying opportunities for home energy and water efficiency that can include adding insulation in attics and walls, upgrading to high efficiency heating systems, installation of weather stripping/caulking, installing high efficiency pool pumps and installing low-flow toilets for water conservation. Professional audits typically range in costs from \$200 to \$800 and the Sustainability Coordinator could provide promotion and education and can monitor results. Once the recommended energy and water upgrades are completed residents can experience realize average annual energy savings of \$1100 to \$1700<sup>33</sup>.

<sup>30</sup> Hillsborough Housing Element 2009

<sup>31</sup> 2009 Sustainable San Mateo County Indicators Report and Pacific Gas and Electric Company

<sup>32</sup> California Public Utilities Commission 2008 Strategic Plan

<sup>33</sup> Data from Bay Area Professional Energy Audit company June, 2009

Home energy audits and retrofits have the highest potential for achieving the greatest amount of emission reductions.<sup>34</sup> This recommendation is a best practice recommended by the League of California Cities and the Cities for Climate Protection. The National Association of Home Builders states that home energy audits and retrofits create jobs and tax revenues.<sup>35</sup> Additionally, the *Residential Energy and Water Efficiency Checklist* program highlights easy and low-cost options to increase home energy and water efficiency and can provide residents with reduced energy and water utility bills. Minimal upgrades, such as converting to CFLs, weatherizing, insulating and caulking, can have a significant impact on energy consumption and a significant payback for residents.

Incentive programs can include financial incentives or recognition for homeowners who achieve significant energy and water savings. The recognition program can include providing achievement certificates for residents that have achieved documented significant energy and water savings. Resources will be provided to include a list of certified home energy audit professionals through Residential Energy Services Network<sup>36</sup> (RESNET) that provides comprehensive and uniform home energy audits. RESNET and other resources can be promoted by the Sustainable Coordinator. Successful case studies with resulting cost savings can be provided on the Sustainable Hillsborough website to provide motivation to other residents to complete energy and water efficiency upgrades.

**B. Provide a “Residential Energy and Water Efficiency Checklist” in conjunction with education/promotion of financial rebates from PG&E and other organizations.**

This Checklist is an action list of lower cost, higher impact steps residents can easily implement to reduce energy and water consumption. Residents can receive PG&E financial rebates for energy efficiency upgrades such as upgrading to more efficient appliances, more efficient pool pumps and motors and adding insulation<sup>37</sup>. The list would be included on the Sustainable Hillsborough website, promoted in the Hillsborough Quarterly Newsletter and promoted through email to the ‘Sustainable Hillsborough’ list. The Sustainable Coordinator would promote, update and provide resources for residents. Homes that were built prior to the Title 24 Energy Code typically do not have attic or wall insulation, have outdated HVAC equipment and have high flow (3+gallons per flush (gpf) toilets and other energy and water inefficiencies. Simple, low cost actions can help residents save energy costs. The *Residential Energy and Water-Efficiency Checklists* would be added to the Sustainable Hillsborough Web site and educating community groups about them. The Checklist could include the following:

- ✓ Install minimum R-30 or higher ceiling insulation
- ✓ Install minimum R-12 or higher water heater insulation
- ✓ Install toilets with a maximum of 1.6 gallons per flush, sink aerators with a maximum 2.2. gallons per minute and showerheads with 2.5 gallons per minute
- ✓ Install weather stripping on all exterior doors
- ✓ Install damper or door/closure in fireplaces

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<sup>34</sup> California Air Resources Board Scoping Plan, December 2008

<sup>35</sup> National Association of Home Builders, May 2009 Presentation, “Investing in our Community-Home Energy Retrofit Program”

<sup>36</sup> Residential Energy Services Network [www.natresnet.org](http://www.natresnet.org)

<sup>37</sup> <http://www.pge.com/myhome/saveenergymoney/rebates/>

- ✓ Install CFLs, LEDs or other high-efficiency lighting in a minimum of 75% of fixtures
- ✓ Replace inefficient pool pumps and motors

**C. Establish Partnership with Hillsborough School District to complete Climate Action Outreach and Competition Programs**

The Town of Hillsborough will need the involvement from the entire community to achieve the AB 32 emission reduction targets and establishing a School District partnership can leverage resources of other successful models in the Bay Area. The Sustainability Coordinator or other Hillsborough representative can coordinate with the district to introduce successful campaigns used in other jurisdictions. The Town can help provide outreach and education with a minimum of cost and staff resources and help promote winners of climate action campaigns at City Council meeting, Sustainable Hillsborough website or the Quarterly Newsletter. The partnership could involve friendly competition between schools on achieving energy efficiency at home where each participating home would complete easy energy and water efficiency actions. The school partnership could also include a campaign similar to the Cool the Earth Program that is underway in Redwood City. Cool the Earth is an award-winning climate change program that uses a student-driven model to inspire families to conserve. It is a parent/volunteer run program that has focuses on kindergarten through eighth grade classes. Students are provided with action books outlining 20 no or low cost ways that their family can reduce carbon emissions. There are friendly competitions as to which school or grade had the most families take the most carbon-reducing actions. The cumulative results are displayed to provide tangible and inspiring results from the collective efforts of the schools.

Additional campaigns can include:

- ✧ Low-Carbon Diet Campaign: How to Lose 5000 Pounds in 30 Days
- ✧ Energy Efficiency Competition and Campaign
- ✧ Increase school energy efficiency and fund installation of solar
- ✧ DriveLess Campaign
- ✧ Take the 10-Gallon Challenge Campaign
- ✧ Carpooling campaign

**D. Leverage Hillsborough Communications Committee or a Hillsborough Green community group to promote and educate the community about climate action programs.**

The Hillsborough Communications Committee or a Hillsborough Green community group could provide important education and promotion of climate protection programs and potentially use the outreach avenues already established by the Communications Committee. The Sustainability Coordinator could facilitate and provide resources. Hillsborough Green could:

- ✧ Coordinate Bi-Annual Green Workshops with Expert Speakers at Town Hall
- ✧ Hold Annual Community Solar Discount Program



- ✧ Work with San Mateo County Association of Realtors (SAMCAR) to help educate new homeowners of benefits of energy/water efficiency
- ✧ Coordinate sustainable home events that promote cost effective energy and water conservation ideas
- ✧ Provide Status Report to Community on Hillsborough's Achievement of Emission Reductions

**E. Review possibilities for a part-time Sustainability Coordinator to implement climate action programs.**

The Sustainability Coordinator would fill the essential role of implementing the climate action programs and coordinate sustainability projects with Town staff, the Communications Committee or Hillsborough Green Committee and the School District. The coordinator could review grant opportunities,, write grant applications and leverage current regional resources for Hillsborough. The coordinator can provide periodic progress reports on program implementation and progress toward GHG emission reductions. It is envisioned that the position of the Sustainability Coordinator could be a shared resource with another city or possibly a regional position shared by San Mateo County agencies to coordinate programs and Town staff could augment these sustainable efforts:

- ✧ Promotion and Education Campaign coordination
- ✧ Professional Home Energy Audit Program
- ✧ Residential Energy and Water Efficiency Checklist
- ✧ Solar and Energy Efficiency Financing Program (promotion and education)
- ✧ Hillsborough Green coordination

**Annual Estimated GHG Reduction.** Greenhouse gas emission reductions 113 tons

**Potential Funding Sources.** Grant funds, garbage franchise fee, General Fund

**Potential Responsible Personnel.** Sustainability Coordinator, Planning and Building to augment outreach efforts, City Manager's Office.

**2**

**Research and consider participation in new regional Energy Efficiency and Renewable Financing Program**

**Goal: Increase residential energy efficiency by 40% and reduce water consumption by 20% by 2020 to meet AB 32 emission reduction target.**



This program would involve research and consideration of participating in a regional program through the Residential Energy Action Program and the CaliforniaFirst program. New legislation, AB 811, allows cities and counties to allow property owners to finance the up-front costs for energy efficiency and renewable energy improvements through their property tax bill. The financing program would allow Hillsborough residents with a method to complete energy-efficiency upgrades and or install solar with a minimal upfront cost. This program can reduce one of the biggest barriers of energy efficiency and or solar upgrades, as cited by homeowners.

Hillsborough would benefit by participation in a new regional program that is currently under development, called CaliforniaFirst program that could be available in 2010. If Hillsborough chooses to participate in the regional program, residents would have the choice to install energy-efficiency and or renewable energy upgrades with minimal upfront costs. The CaliforniaFirst (regional group) would provide the financing mechanism to enable residents to finance permanent fixture energy efficiency, clean energy projects, solar panel installation, insulation, and energy-efficient heating system upgrades to lighting systems. Through the financing program, repayment is made by assessments on participating property owners' annual tax bills over a 20-year period. If the property is sold, the new owner takes over the assessment that continues on the property's tax bill.

This Climate Action Plan recommendation is a valuable compliment to residential energy efficiency policy recommendation because many residents could use these programs in a complimentary fashion. To illustrate, residents could already have completed the home energy assessment and would know the best energy efficiency methods to employ.

This program would be similar to the efforts of cities that have already implemented energy efficiency and renewable financing programs, such as Palm Desert, Sonoma, San Francisco, Solano Beach, Berkeley and San Diego.



**Annual Estimated GHG Reduction.** 261 tons

**Cost Estimates.** TBD

**Potential Funding.** Grant funds

**Responsible Personnel.** Finance Director and finance staff, City Manager's office, Sustainability Coordinator.

**Municipal Examples.** Palm Desert, Sonoma, San Diego, Solano Beach, San Francisco and Berkeley and Boulder, Colo.,

### 3 Review Effectiveness of Hillsborough's Residential Green Building Ordinance for new construction/ major remodel projects and consider increasing the number of required GreenPoints<sup>38</sup>.

<sup>38</sup> GreenPoints are credits for inclusion of specific green measures in the GreenPoint Checklist through the regional Build it Green program.

The Hillsborough City Council approved the adoption of the current Residential Green Building Ordinance that became effective July 1, 2009. By adoption of this new ordinance, new homes and major remodels are required to meet a minimum number of GreenPoints as outlined in the Ordinance's Standards of Compliance. These green building requirements minimize the use of energy, water and other natural resources and provide a healthier indoor environment. "Green Building" is defined as a whole-systems approach to the design and construction of buildings that reduces the environmental impacts of buildings. As a result, new Hillsborough homes and major remodels can be 36% more energy efficient than non-green homes.

The review of the current ordinance can involve consideration of requiring additional green measures or points to be included in their project. Qualified raters or staff would continue to be used to ensure compliance. One example of new requirements could include that all new major landscape projects require that new landscaping include a certain percentage of drought tolerant plantings.



The Home Builders Association of Northern California, the Association of Bay Area Governments and the Air Resources Board have endorsed the Build it Green program.

The State of California also completed an in-depth analysis of the cost benefits of green building and concluded that green buildings have a financial upside that exceeds the cost by a factor of 10 to one.<sup>39</sup> Recent reports show that green buildings have increased real estate value and hold or rise in value versus traditional buildings.<sup>40</sup>

As a member of Build It Green, Hillsborough already has access to training and resources that can assist the Town in reviewing the current ordinance and consider alternatives to increase the effectiveness of the ordinance. Staff and/or consultants could provide modifications to the ordinance for council's consideration.

**Annual Estimated GHG Reduction.** TBD based on new GreenPoint requirements.

**Potential Funding Source.** Permit fees and or General Fund.

**Responsible Personnel.** Building and Planning staff and the City Attorney.

#### 4 Adopt Water Conservation Ordinance per state law, AB 1881 and water conservation programs

**Goal: Reduce water consumption by 20% by 2020**

**Benefits.** Hillsborough used approximately 3.8 million of gallons of water per day in 2009 and a significant portion can be largely attributed to outdoor water use. Water requires energy for transport, treatment and distribution. Hillsborough uses significantly more water than neighboring jurisdictions due in part to its larger lot sizes<sup>41</sup>. Adoption of new water conservation

<sup>39</sup> The Costs and Financial Benefits of Green Building, [www.usgbc.org/docs/news/](http://www.usgbc.org/docs/news/)

<sup>40</sup> RICS Research, "Doing Well By Doing Good? An Analysis of the Financial Performance of Green Office Buildings in the USA," Piet Eichholtz and Nils Kok, Maastricht University, Netherlands; John Quigley, University of California, Berkeley, United States of America, April 2008. [http://repositories.cdlib.org/iber/bphup/working\\_papers/W08-001/](http://repositories.cdlib.org/iber/bphup/working_papers/W08-001/)

<sup>41</sup> Bay Area Water Supply and Conservation Agency for FY2006-07, Sustainable San Mateo County 2009

programs can assist the Town and be an effective response to the growing concerns of drought and the required long-term reduction in water usage.



The Town is a member of the Bay Area Water Supply and Conservation Agency (“BAWSCA”). In October 2008, the San Francisco Public Utilities Commission informed BAWSCA that it froze the total water available to its member agencies at 184 million gallons per day (“mgd”) through 2018<sup>42</sup>. The Town participated in the development of BAWSCA’s Water Conservation Implementation Plan (“WCIP”). The goal of the WCIP was to identify cost-effective water conservation measures to save 10 million gallons per day (mgd) by 2018. These five new water conservation measures were added to the 32 measures developed in 2004:

- ✧ New Landscape Water Efficiency Ordinance
- ✧ High-efficiency Toilet (HET) Rebate Program
- ✧ Education/ Training Program for Residential Landscape Water Use Efficiency
- ✧ High-efficiency Washing Machine (HEW) Rebates
- ✧ New Building Indoor Water Efficiency Regulations

The WCIP Final Report was finalized in September 2009 and included specific water conservation measures and goals. Hillsborough’s participation in meeting the 2004 and 2009 water conservation programs and goals will require the Town to conserve an estimated 390,000 gallons per day by 2018. Hillsborough 20% water reduction is estimated at estimated 780,000 gallons per day.

Of the new water conservation recommendations listed, the Landscape Water Efficiency Ordinance/Regulations is required by Assembly Bill 1881. California requires cities to adopt ordinances by January 2010..

The Bay Area Water Supply and Conservation Agency (“BAWSCA”) has completed a model ordinance for its member agencies to consider for approval. BAWSCA has estimated that regional water consumption would need to be reduced by 20% by 2020 which is in line with the AB 32 water reduction estimation.

#### **Water Conservation Saves Money and Reduces Emissions**

According to the Local Government Commission, “the Town of Windsor is saving about 275 million gallons of drinking water a year by irrigating 400 acres of golf course, vineyard, parks, pasture and fodder croplands with recycled water.” An estimated 1,057 tons of CO<sub>2</sub>e is avoided each year through this water reclamation and reuse effort.

**Annual Estimated GHG Reduction.** 50

**Potential Funding Source.** Water rates

**Responsible Personnel.** Public Works, Sustainability Coordinator

<sup>42</sup> As a result of this “Interim Supply Limitation”, member agencies must save an additional 10 mgd of water by 2018 in order to meet projected customer needs. This is in addition to the 23 mgd of water savings, through water conservation and water recycling efforts, which member agencies committed to in 2004.

## 5 Research new technologies for graywater systems and consider expanding permitting for graywater systems on a pilot basis.

**Benefits.** Graywater is water that has been used in a home (from sinks, washers or showers) and reused on site for landscape irrigation with the use of dual-plumbing. The California Building Standards Commission approved new graywater codes on August 4, 2009.<sup>43</sup> The new codes allow for simpler, more inexpensive graywater systems in residences.

The original graywater plumbing code was developed in 1991-1992 and was very restrictive. The Department of Housing and Community Development was given the authority to develop a new code that went into effect August 4, 2009. The same standard will be adopted in the 2010 code (with potential new amendments).

A three bedroom home typically generates about 260 gallons per day or 94,900 gallons per year. With the newly approved graywater code changes, residents and building professionals could choose to install dual-plumbing as a safe alternative and reduce water usage for landscaping.

Several cities have already provided begun to pilot graywater systems. For example, the City of Santa Monica has developed “A Guide to Building a Graywater Systems in Santa Monica” (9/8/09) and has developed expanded web content to increase graywater use. The Town could consider using the Santa Monica program as a model and expand outreach, education and permit approval for proper use of graywater systems.

**Annual Estimated GHG Reduction.** 3 tons

**Potential Funding Source.** Permit fees.

**Responsible Personnel.** Public Works, Planning, Building

**Municipal Examples.** Santa Monica and Oakland

## 6 Encourage landscape/irrigation professionals to participate in Landscape Irrigation Conservation Workshops (includes design, maintenance, operation, landscape).

**Goal: Increase water conservation by 20% by 2020 to meet AB 32 emission reduction target**

Many Town residents depend upon landscape and irrigation service professionals to install, maintain and repair their landscapes and irrigation systems. Educating these professionals about the Town’s need to increase outdoor water conservation is an important step in improving irrigation efficiency throughout the Town. As part of its Irrigation Conservation Program, the Town hosts an annual, voluntary Irrigation Conservation Workshop each spring. The Workshop is designed to educate landscape and irrigation professionals who work in Hillsborough about irrigation conservation best management practices. The Workshop is conducted by an Irrigation Conservation Professional, and introduces participants to the Town’s Irrigation Conservation

<sup>43</sup> [http://hcd.ca.gov/codes/shl/Preface\\_ET\\_Emergency\\_Graywater.pdf](http://hcd.ca.gov/codes/shl/Preface_ET_Emergency_Graywater.pdf)

Program, irrigation conservation best management practices and new irrigation conservation technologies. Workshops also focus on water conservation achieved through appropriate landscape design and maintenance of systems to eliminate water waste. There has been an average of 25 participants per workshop.

The Town could provide incentives to increase participation in this program, maintain a list of certified irrigation conservation professionals and educating residents and building professionals on the need to build and maintain water efficient landscapes and irrigation systems will reduce outdoor water use.

**Annual Estimated GHG Reduction:** 5 tons

**Potential Funding source:** Water Rates

**Responsible Personnel:** Public Works

## 7 Consider adding a Mobile Water Flushing Filtration Unit

**Benefits.** The Town of Hillsborough's Water Department flushes water from hydrants as part of its normal water system maintenance procedures. The Water Department flushes an estimated 10 million gallons from its hydrants each year in order to improve water quality, clean water lines and test fire flows. These flushing activities are necessary to maintain public health and safety. All flushed water currently flows from the hydrants onto the streets and gutters and into storm drains.

In 2008, the Town submitted a \$300,000 forgivable loan application to the Water Board's Clean Water State Revolving Fund Program to purchase a Mobile Water Filtration Unit. The Filtration unit captures and filters water down to one micron and injects the water back into the Town's water system. The Water Board approved the Town's application in summer 2009. The Town is currently working with the Department of Public Health to demonstrate the equipment. If the Department of Public Health approves the equipment, the Town would anticipate receiving the Mobile Flushing Equipment in January 2011. Approximately 90% of typically flushed water would be captured, filtered and injected back into the Town's water system by this equipment if procured.

**Annual Estimated GHG Reduction:** 5 tons

**Potential Funding source:** Water Rates

**Responsible Personnel:** Public Works

## 8 Consider expanding Landscape Irrigation Conservation Program

The Town's Public Works launched a voluntary landscape irrigation conservation program in coordination with the Bay Area Water Supply and Conservation Agency in 2007. The 3 year Program effort has two elements: a water budget report and an irrigation conservation field visit. In Element 1, the Town's most significant water users (schools, parks and select residents)



receive a bi-monthly report which shows actual irrigation water usage compared to “budgeted” use (calculated using landscape area, weather data and other factors).

In Element 2, participants receiving water budget reports also receive a field visit by an irrigation conservation specialist. The Specialist inspects the participant’s irrigation systems and schedules, and the participant receives a report summarizing recommendations to reduce water consumption. Water use for participants is tracked and monitored over time to measure the program’s efficacy. The Program has thus far targeted approximately 150 of the Town’s most significant irrigation sites for a 3 year cost of \$93,000.

As part of the Program expansion effort in 2010, the Town would provide water budgets to all of its 4,300 residences. The report will be included with residents’ bi-monthly water bills and will graphically compare residents’ actual water use to their estimated water budget. Based on historical and overall BAWSCA Program impact (an average 10% reduction in water use by report recipients), this will result in an estimated overall water reduction of at least 5% in residential water usage. The Town will also use the reports to continue to identify and offer irrigation conservation field visits to the residences with the highest conservation potential. This will result in additional reduction in residential water use.

**Annual Estimated GHG Reduction:** 30 tons

**Potential Funding source:** Water Rates

**Responsible Personnel:** Public Works

### **Waste Reduction and Recycling**

Hillsborough disposed of 4,597 tons of waste to landfill in 2008, and Hillsborough’s community GHG inventory showed that approximately 2.4% of emissions were from solid waste. Though this percentage of emissions may seem like a small percentage, the actual emissions from waste decomposing at landfills are significantly more potent than carbon dioxide. As waste from landfills decomposes, methane gas is released, which is 21 times more potent than carbon dioxide (CO<sub>2</sub>). Hillsborough has direct policy control over solid waste, recycling and composting decisions, and can consider new and expanded recycling and composting programs as they become available to Hillsborough residents. For this reason, the solid waste sector has strong potential to provide GHG emission reductions for Hillsborough.

- 9 Provide new residential recycling service that includes:**

  - a) Weekly “Single stream” recycling collection service**
  - b) Weekly collection of organics/food collection**

The new recycling programs would provide the single largest reduction in greenhouse gas emissions for Hillsborough. The new programs will become available to Hillsborough residents in January 2011 and provide one of the most cost-effective methods to significantly reduce emissions. New upgraded services include providing “single stream recycling” in which all paper, containers, cardboard and plastic recyclables go into one container and don’t require any sorting by residents. New wheeled containers are provided to residents for easier movement

and placement at the curbside. Additional services include an “organics collection” that allows all food discards to be added to the current yard waste collection program.

Hillsborough residents, as a member of the South Bayside Waste Management Authority, would receive the outreach and education campaign materials as part of the new services provided. The analysis provided by the solid waste joint powers authority, the South Bayside Waste Management Authority, showed that the new single stream recycling program can increase diversion of this sector by an estimated 30%, and analysis also showed that the new food and organics collection program can increase diversion of this sector by 20%. Studies show that increasing convenience of recycling for residents can significantly increase diversion rates and can assist residents in reducing the garbage generated to landfill. On December 14, 2009, the City Council approved the new services to include the weekly collection of recyclables and organics/food for Hillsborough.

Additional co-benefits include extending the life of the landfill, resource conservation, and significant energy savings from resource recycling.

Hillsborough’s current measured diversion rate is 59<sup>44</sup>% and approval by the City Council for weekly recycling and organics collection could increase the diversion to approximately 70%.

**Annual Estimated GHG Reduction.** 1,670 tons

**Potential Funding Source.** Garbage fees

**Responsible Personnel.** Public Works

**Municipal Examples.** Most Bay Area cities have single stream recycling services. San Francisco, San Jose and San Carlos currently have food and organics collection and all twelve of the SBWMA cities have approved food and organics collections beginning in January 2011.



## 10 Review options toward achieving a Community-wide diversion rate of 75% measured diversion by 2015.

Hillsborough has significant control over solid waste, recycling and composting decisions and can take advantage of the new and expanded recycling and composting programs as they become available. The new recycling programs and policies in the Climate Action Plan can greatly reduce waste to landfill, save energy and air pollution and extend the life of the landfill that saves the City in long-term solid waste costs. Adopting a goal to increase diversion to 75% (instead of the current 50% waste reduction target) can assist in highlighting the importance of residents, schools and the few commercial accounts to maximize their recycling programs. Increasing diversion provides more recycling revenue and extends the life of the landfill. The Sustainability Coordinator could use a model Recycling Policy adopted by other jurisdictions and work with the Town staff to determine a potential alternative diversion percentage and or

<sup>44</sup> 2008 Management Information Systems Report for Town of Hillsborough, Allied Waste Systems April 2009

target year. Several cities have “Zero-Waste policies” that include the cities of Palo Alto, Oakland and San Jose.

**Annual Estimated GHG Reduction.** Emission reductions cannot be determined at this time.

**Potential Funding Source.** Garbage fees.

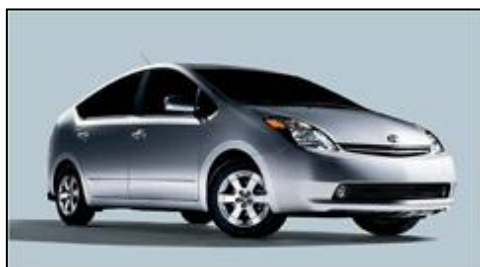
**Responsible Personnel.** Public Works and Sustainability Coordinator.

**Municipal Examples.** All Alameda County Cities (75% by 2010), Palo Alto (73% by 2011), San Jose (75% by 2013).

## Municipal Programs

The Town of Hillsborough is to be commended for the work already completed in energy and water efficiency. The goal of the Climate Action Plan’s municipal section is to expand on the productive programs already underway

### 11 Consider expanding Hillsborough’s current Sustainable Purchasing Policy to include a replacement program for fuel-efficient vehicles the Town’s fleet.



**Benefits.** The Town has already adopted an Environmental Purchasing Policy that encourages the purchase of sustainable products that minimize environmental impacts. Buying sustainable products saves energy and conserves water, thereby reducing the Town’s contributions to greenhouse gas emissions. This program would encourage the Town to purchase fuel-efficient vehicles for the fleet replacement.

**Annual Estimated GHG Reduction.** Greenhouse gas emissions cannot be determined at this time.

**Potential Funding Source.** TBD.

**Responsible Personnel.** Public Works, Police, Fire, Building, Planning

**Municipal Examples.** San Carlos, San Jose, San Francisco.

### 12 Amend the General Plan to enhance Sustainable policies and goals



**Benefits.** The General Plan can include sustainable policies and goals in the General Plan elements and can also review the General Plan to ensure that there are no conflicting policies that would limit sustainable practices. Any conflicts that are identified could be modified to encourage rather than discourage sustainability.

**Annual Estimated GHG Reduction.** Greenhouse gas emissions cannot be determined at this time.

**Potential Funding Source.** General Fund.

**Responsible Personnel.** Planning

**Municipal Examples.** San Carlos, San Jose, San Francisco.

The Green Vehicle Guide found at [www.epa.gov/greenvehicles](http://www.epa.gov/greenvehicles) is for cities considering the purchase of new vehicles. The guide is updated annually, and staff can receive fuel economy and emissions data for all new vehicles. The [www.coolfleets.com](http://www.coolfleets.com) Web site provides a cost/value analysis to assist in determining the "best value" for vehicle selection decisions.

### Summary of *Phase 1: Recommendations for Implementation Prior to 2012*

The following table includes a summary of Phase 1 recommendations and includes estimated greenhouse gas emissions per year after implementation. Please note the estimated initial costs are included in the Implementation Plan.

	GHG Reduction Program Recommendation <sup>45</sup>	GHG Reduction Tons / Year
1	<b>Consider a Residential Energy Conservation Policy for multi-phased outreach programs to increase energy efficiency and water conservation.</b> <ul style="list-style-type: none"> <li>• Develop Incentive program to increase number of residents who complete Professional Home Energy Assessments; Develop recognition program for residents who complete home energy/water efficiency upgrades</li> <li>• Develop “Residential Energy and Water Efficiency Checklist” in conjunction with promotion of rebates from PG&amp;E/other organizations</li> <li>• Expand Partnership with Hillsborough School District for Climate Action Outreach and Competitive Programs</li> <li>• Leverage Hillsborough Communications Committee or develop Hillsborough Green Community Group to educate community on climate action programs</li> <li>• Review options for part-time Sustainability Coordinator to assist with implementation of the climate action programs</li> </ul>	113
2	<b>Consider Participation in the “Energy Efficiency and Renewable Financing Program” for residents (participation in regional program)</b>	261
3	<b>Consider increasing the increasing number of required GreenPoints<sup>46</sup> in Residential Green Building Ordinance (Standards of Compliance)</b>	GHG reductions based on new requirements
4	<b>Adopt Implement New Water Conservation Ordinance as required by state law, AB 1881 and water conservation programs</b>	50
5	<b>Research new technologies for graywater systems/Consider expanded graywater systems permitting on pilot basis.</b>	3
6	<b>Encourage landscape/irrigation professionals to participate in Landscape Irrigation Conservation Workshops</b>	5
7	<b>Consider adding a Mobile Water Flushing Filtration Unit for water conservation</b>	5
8	<b>Consider expanding Landscape Irrigation Conservation Program (provide ‘water budget’ for resident education)</b>	30

<sup>45</sup> GHG reduction estimates were developed using the Climate and Air Pollution Planning Assistant<sup>45</sup> (CAPPA) software developed by ICLEI.

<sup>46</sup> GreenPoints are credits for inclusion of specific green measures in the GreenPoint Checklist through the regional Build it Green program.

	GHG Reduction Program Recommendation <sup>45</sup>	GHG Reduction Tons / Year
9	Provide new residential recycling service that includes: c) Weekly “Single stream” recycling collection service d) Weekly collection of organics/food	1,670
10	Review options toward achieving a Community-wide diversion rate of 75% measured diversion by 2015.	Emissions reduction dependent on %age diversion
11	Consider expanding Hillsborough’s current Sustainable Purchasing Policy to include a replacement program for fuel-efficient vehicles within the Town’s fleet	60
12	Amend the General Plan to enhance Sustainable policies and goals	included
	<b>TOTAL</b>	<b>2,197</b>

## Phase 2: Greenhouse Gas Reduction Programs for Implementation 2012-2020

The *Phase 2: High Impact GHG Reduction Programs for Implementation 2012 to 2020* provide the Town with additional recommendations if the 2012 and 2015 interim emission reduction goals are not achieved. These Phase 2 programs leverage the education and voluntary components from Phase 1 programs. The second phase of program recommendations is *Phase 2: GHG Reduction Programs for Implementation 2012 to 2020*. Several of the recommendations in Phase 2 include mandatory requirements and capitalize on the voluntary compliance period of Phase 1 programs.

### 1 Consider adoption of an Ordinance to improve energy efficiency and water conservation standards in existing homes with consideration to costs

Most Hillsborough homes were built prior to 1980 and the adoption of California’s Title 24 energy code. As a result most homes have potential to increase energy and water efficiency by 20-40%. The newly approved Residential Green Building Ordinance will enable new construction and major remodels to be more energy efficient, however, the vast majority of homes would continue to be relatively inefficient if the homeowners had not completed energy or water upgrades.

A Residential Energy Conservation Ordinance responds to this issue by focusing on the energy and water efficiency of the existing stock of Hillsborough homes. This program could be implemented to leverage the education and promotion of residential energy efficiency that was implemented in Phase 1. The program could require homes that have a transfer of title (or other trigger method) to complete a minimum number of energy and water efficiency standards.

Hillsborough could choose to use the model that other cities use from Build it Green’s Existing Home Rating System that launched in July 2008. The program provides valuable data such as water savings, energy savings and provides a climate calculator to quantify the tons of

emissions reduced from the project. The Existing Home Rating System uses a checklist similar to the Residential Green Building Ordinance and quantifies credits in energy efficiency, resource conservation, indoor air quality, water conservation and community. The program is compatible with the national rating systems from the Building Performance Institute (BPI) and HERS. Example of pre-1980 home can achieve a 37% energy efficiency increase with the Green Existing Home program. The Town could require that residential properties that are sold or have transferred title meet minimum energy and water conservation. An example could be requiring such upgrades as listed below.

These types of programs are underway in other Bay Area cities and require certification by an independent third party to verify that the minimum energy and water efficiency standards have been met. The Town could alternatively choose to require minimum energy and water standards for the 'Existing Home GreenPoint Checklist':

The Checklist could include these requirements (as an example):

- ✓ Install minimum R-30 or higher ceiling insulation
- ✓ Install minimum R-12 or higher water heater insulation
- ✓ Install toilets with a maximum of 1.6 gallons per flush, sink aerators with a maximum 2.2 gallons per minute and showerheads with 2.5 gallons per minute
- ✓ Install weather stripping on all exterior doors
- ✓ Install damper or door/closure on fireplaces
- ✓ Install CFLs, LEDs or other high-efficiency lighting in a minimum of 75% of fixtures

A task force could be formed to choose the best method to employ this program and it is highly recommended that an education and promotion program precede any mandatory program. The Task Force could choose the parameters of the program, what minimum requirements should be implemented and how the program would be enforced. Qualified raters and or staff could be used to ensure compliance similar to the procedures used in the Residential Green Building Ordinance.

**Annual Estimated GHG Reduction.** 571.

**Potential Funding Source.** Permit fees and or General Fund.

**Responsible Personnel.** Building and Planning staff and the City Attorney.

**Municipal Examples.** San Francisco, Berkeley.

## 2 Consider modifying residential water rate structure to further implement financial disincentives for high irrigation water use

**Goal:** Increase water conservation by 20% by 2020 to meet AB 32 emission reduction target

**Benefits.** Hillsborough used approximately 3.8 million of gallons of water per day in 2009 and a significant portion can be largely attributed to outdoor water use. Water requires energy for transport, treatment and distribution. Hillsborough uses significantly more water than



neighboring jurisdictions and a recent report showed that Hillsborough uses up to three times more water per capita when compared to the average San Mateo County jurisdiction<sup>47</sup>. Adoption of new water conservation programs can assist the Town and be an effective response to the growing concerns of drought and the required long-term reduction in water usage.

In the event that residential landscape and irrigation use continues to increase and water reduction levels are not met, a program could be developed to modify the current rate structure to provide more disincentives for high landscape water use. Use best practices from other successful communities that modified their rate structure.

Hillsborough's participation in meeting the 2004 and 2009 water conservation programs and goals will require the Town to conserve an estimated 390,000 gallons per day by 2018. Hillsborough 20% water reduction is estimated at estimated 780,000 gallons per day.

**Annual Estimated GHG Reduction.** TBD.

**Potential Funding Source.** Water rates.

**Responsible Personnel.** Finance, Public Works

### 3 Consider expansion of graywater systems and encourage new construction or major remodels to include graywater/dual plumbing

**Goal: Increase water conservation by 20% by 2020 to meet AB 32 emission reduction target**

**Benefits.** This new program could benefit from the promotion and education of graywater systems in Phase 1 and can include encouraging or requiring graywater dual plumbing for new construction or major remodels. Adoption of new water conservation programs can assist the Town and be an effective response to the growing concerns of drought and the required long-term reduction in water usage. Hillsborough's participation in meeting the 2004 and 2009 water conservation programs and goals will require the Town to conserve an estimated 390,000 gallons per day by 2018. Hillsborough 20% water reduction is estimated at estimated 780,000 gallons per day.

**Annual Estimated GHG Reduction.** TBD.

**Potential Funding Source.** Permit fees

**Responsible Personnel.** Planning and Building

<sup>47</sup> Bay Area Water Supply and Conservation Agency for FY2006-07, Sustainable San Mateo County 2009

**4 Consider implementing methods to expand solar/renewable-energy generation. Consider expanding financial incentives to increase installation of solar or other renewable energy projects.**

The new 2009 federal tax credit of 30% in addition to state incentives has made the installation of solar more cost-effective than ever before. Hillsborough residents can especially benefit from solar and or other renewable energy systems due to California's tiered rate system where residents with high electricity usage pay higher costs on the tiered structure. The California Public Utility Commission's 2008 Strategic Plan calls for new net zero energy homes and a 40% improvement of the existing home stock by 2020. The household energy use per capita in Hillsborough is approximately three times higher than the average energy use per household in San Mateo County<sup>48</sup>

The Town could lead by example by installing solar or other renewable that generates clean and nonpolluting energy and has no negative by-products. The California Energy Commission provides rebates for the installation of renewable energy systems and wind turbine generation systems. New technological advances in wind technology have made wind generation cost-effective.

The benefits of solar include lower energy bills, insulation from increasing energy costs and an increased value of homes.<sup>49</sup> Solar energy is clean and nonpolluting and has no negative by-products. A typical solar installation on a three- bedroom home saves 82,000 pounds of greenhouse gas emissions over 15 years. The California Energy Commission provides rebates for the installation of renewable energy systems in homes and includes rebates for small wind turbine generation systems. The current rebate is \$4.50 per watt or 50% of the system cost, whichever is less. New technological advances in wind technology have made wind generation cost-effective.

***Annual Estimated GHG Reduction.*** 327 tons

***Potential Funding Source.*** TBD.

***Responsible Personnel.*** City Manager

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<sup>48</sup> 2009 Sustainable San Mateo County Indicators Report and Pacific Gas and Electric Company

<sup>49</sup> Appraisal Institute Survey

## Summary of Phase 2: Recommendations for Implementation 2012 to 2020

	GHG Reduction Recommendation	GHG Reduction Tons / Year
1	Consider adoption of an Ordinance to improve energy-efficiency and water-conservation standards in existing homes with consideration to costs	571
2	Consider modifying residential water rate structure to further implement financial disincentives for high irrigation water use.	TBD
3	Consider expansion of graywater systems and encourage new construction or major remodels to include graywater/dual plumbing.	TBD
4	Consider implementing methods to expand solar/renewable-energy generation. Consider expanding financial incentives to increase installation of solar or other renewable energy projects.	327
	<b>TOTAL</b>	<b>898</b>

## Estimated GHG Reduction from Phase 1 and Phase 2: GHG Reduction Recommendations

The program recommendations in Phase 1 and Phase 2 have been analyzed to determine their GHG reduction potential using the Climate and Air Pollution Planning Assistant (CAPPA) developed by Local Governments for Sustainability. As mentioned earlier in this section, Hillsborough needs to reduce a total of 25,309 tons or 2,531 tons per year to meet the 2020 target. By implementing the program recommended in Phase 1, Hillsborough would realize an estimated emission reduction of 2,197 tons per year. By implementation of the programs recommended in Phase 2, Hillsborough would begin to reduce an estimated 898 tons per year.

## Achieving AB 32 Greenhouse Gas Reduction Target

Table 14: Hillsborough GHG Emissions & Reduction Targets reviews Hillsborough's emissions reductions necessary to meet the AB 32 target.

<b>Table 14: Hillsborough GHG Emissions &amp; Reduction Targets</b>	<b>2005 Base Year</b>	<b>2020 "Business-as-Usual"<sup>50</sup></b>
<b>2005 Base Year Emissions (metric tons CO<sub>2</sub>e)</b>	82,725	95,625
<b>2020 Target Year Reduction (15% below 2005 levels)</b>	70,316	70,316
<b>Emissions Reductions Necessary to Meet Target</b>	(12,409)	(25,309)
<b>Required Percentage Emissions Reduction</b>	15.0%	26.5%
<b>Required Annual Emissions Reductions (2010-2020)</b>	(1,241)	(2,531)

<sup>50</sup> Association of Bay Area Government (ABAG) 2020 Projections



Table 15 shows Hillsborough's GHG emission reductions resulting from the implementation of the programs recommended in Phase 1 and Phase 2.

<b>Table 15: Hillsborough's GHG Reduction Target Analysis Under Phase 1 and Phase 2 Recommendations</b>	<b>Metric Tons CO<sub>2</sub>e</b>
<b>2020 "Business-as-Usual" Emissions</b>	95,625
<b>2020 Reduction Target (15% below 2005 levels)</b>	70,316
<b>Total Emissions Reductions Necessary to Meet Target</b>	(25,309)
<b>Required Annual Emissions Reductions (2010-2020)</b>	(2,531)
<b>Annual Reductions from Phase 1 Recommendations</b>	(2,197)
<b>Annual Reductions from Phase 2 Recommendations</b>	(898)
<b>Total Phase 1 and Phase 2 Annual Reductions</b>	(3,095)

By implementation of the programs and policies in Phase 1 and Phase 2 of the Climate Action Plan, the current analysis shows that Hillsborough would be within the necessary range to meet the 2020 reduction target. The new state and federal initiatives that focus on transportation and energy generation that will reduce emissions and assist Hillsborough in meeting AB 32 reduction targets.

## V. Implementation, Funding and Next Steps

Hillsborough's Climate Action Plan establishes a framework of action that the Town and community can implement to meet emission reduction targets and provides a statement of intent for priorities and policies. The Climate Action Plan is presented for the City Council's consideration and approval. The approved Climate Action Plan's program recommendations will be brought forward individually to the City Council for their consideration.

One of the major barriers to implementing climate action programs is lack of available funds and staff resources. Currently, there are multiple grant and loan programs through federal, state and regional programs that could assist in funding emission reduction programs. One example is the "Energy Efficiency and Conservation Grant" federal program from the U.S. Department of Energy<sup>51</sup> (American Recovery and Reinvestment Act of 2009). To implement the programs, the Town could use a combination of grant funds, a portion of current staff resources and leverage regional resources to begin reducing emissions in the near term. The Town could also consider a slight increase in the garbage franchise fee to provide funding for a portion of the sustainable programs. It is recommended that the Town continue to explore methods to incorporate climate protection programs into existing workloads at Town departments. An important element of the Climate Action Plan is the dedication of a part-time Sustainability Coordinator or staff that would facilitate the implementation of programs, coordinate with staff, provide promotion and education for the community, and monitor greenhouse gas reduction progress.

Once program implementation begins, an essential component is monitoring Hillsborough's progress toward the 2020 target. Progress should be reassessed approximately every two years using Hillsborough's community GHG inventory to ensure that Hillsborough is on track to meet the year 2020 targets. The interim GHG reduction targets should be reviewed and evaluated to track progress toward the 2020 goal. If the interim emission reduction goals are not met, the staff can consider recommending the implementation of *Phase 2: GHG Reduction Programs for Implementation 2012 to 2020*. Staff and or the Sustainability Coordinator should ensure that the City Council and City Manager receive Climate Action Plan progress reports that provide the status on Hillsborough achieving the emission reduction targets. These progress reports could be posted on the Sustainable Hillsborough Web site to educate the community on Hillsborough's progress.

It is also recommended that the approved Climate Action Plan program and policies are included Hillsborough's General Plan Element updates. The approved Climate Action Plan policies should be made consistent in the associated Elements of the General Plan.

Staff and or consultant can identify and assess regional climate change vulnerabilities that are specific to Hillsborough and work with neighboring cities and regional agencies to establish more uniform approaches to climate change adaptation strategies. Recent reports from the International Panel on Climate Change (IPCC) state that climate change is occurring now and that the current goal is to first slow and then reverse emissions to avert more serious impacts in the future. It is recommended that the Town prepare itself for the potential of increasing challenges that climate change can bring that include shrinking water supplies, rising temperatures, increased wildfires, rising bay levels and increased public health issues for the elderly and young. It is recommended that the Town participate in regional efforts for climate

<sup>51</sup> [www.energy.ca.gov/recovery](http://www.energy.ca.gov/recovery)

change adaptation. Additionally, the Town could include climate change adaptation measures and policies in the General Plan updates.

Involvement and support from the Hillsborough City Council, staff and the entire community will be essential for the meeting GHG emission reduction targets. Hillsborough's Climate Action Plan should be viewed as a living document and programs should be revised as new technologies emerge and as new regional, state and federal policies evolve.

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## VI. Adaptation to Climate Change

As discussed in the introduction, the impacts of climate change include sea level rise, increased wildfires, and drought due to reduced snow pack in the Sierra Nevada Mountains, an increase in unpredictable weather, negative impacts on wildlife and a deterioration of public health. Between 1900 and 2000, the San Francisco Bay rose seven inches. The California Climate Action Team found that the San Francisco Bay could rise an additional five inches to three feet by the end of this century.

It is recommended that Hillsborough prepare itself internally for climate change resiliency. Climate change adaptation has become a priority at the state level through Executive Order S-13-08, signed by the Governor in November 2008. The mandate initiates the development of a California Climate Adaptation Strategy (CAS) to be completed in 2009. The CAS will identify climate change vulnerabilities resulting from sea level rise, increased temperatures, shifting precipitation and extreme weather events, and will recommend methods and policies to adapt to these changes. The Order also directs state agencies to analyze existing and planned infrastructure projects that could be at risk to sea level rise.

Local governments are on the front line, both in dealing with the impacts of climate change and in reducing emissions. The Ahwanee Principles for Climate Principles ([www.lgc.org](http://www.lgc.org)) build on previous principles authored by the Local Government Commission and provide specific guidelines for local governments to follow in addressing this urgent and often overwhelming challenge.

Source: Local Government Commission

Climate change adaptation strategies will be necessary as the climate changes and sea levels rise. Adaptation measures are important in order to allow the Hillsborough community to proactively prepare for potential effects of climate change to come. It has become clear that regardless of the efforts to reduce greenhouse gas emissions, not all the effects of climate change can be prevented or reversed. The challenge will be to reduce the effects to the lowest level possible and enable Hillsborough to remain healthy and prosperous.

To address these impacts, it is recommended that Hillsborough staff evaluate the potential climate change impacts of items being considered by the City Council. It is recommended that staff identify and reassess regional climate change vulnerabilities and work with neighboring cities and regional agencies to establish more uniform approaches to addressing climate change. Consistency with state goals regarding emission reductions could potentially open sources of funding that the Town could use to expand or maintain climate programs.

## Glossary of Terms<sup>52</sup>

**Adaptation** — Adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.<sup>53</sup>

**Anthropogenic** — Made by people or resulting from human activities. Usually used in the context of emissions that is produced as a result of human activities.<sup>54</sup>

**Base Year** — An emissions analysis year for which comprehensive and reliable data can be obtained. It is better to select a more recent base year for which a lot of information can be obtained easily than to spend weeks trying to track down data that may not exist or be incomplete.

**California Air Resources Board (ARB)** — The ARB is the state agency tasked with implementing AB 32, The California Global Warming Solutions Act of 2006, and achieving the mandated emission reduction goals.

**California Climate Action Registry (CCAR)** — A private nonprofit organization originally formed by the State of California. The California Registry serves as a voluntary greenhouse gas (GHG) registry to protect and promote early actions to reduce emissions by organizations. The California Registry provides leadership on climate change by developing and promoting credible, accurate and consistent GHG reporting standards and tools for organizations to measure, monitor, third-party verify and reduce their emissions consistently across industry sectors and geographical borders.

**Carbon Dioxide** — Carbon dioxide, abbreviated CO<sub>2</sub>, is essential to living systems and released by animal respiration, decay of organic matter and fossil fuel burning. It is removed from the atmosphere by photosynthesis in green plants. The amount of CO<sub>2</sub> in the atmosphere has increased by at least 25% since the burning of coal and oil began on a large scale. Atmospheric carbon dioxide varies by a small amount with the seasons, and the ocean contains many times the amount of the gas that exists in the atmosphere.

**Carbon Dioxide Concentration** — The atmospheric carbon dioxide concentration, at 353 parts per million on a volume basis (ppmv) in 1990, is now about 25% greater than the pre-industrial (1750-1800) value of about 280 ppmv, and higher than at any time in at least the last 160,000 years. Carbon dioxide is currently rising at about 1.8 ppmv (0.5%) per year due to human-caused emissions and currently accounts for approximately 84% of U.S. greenhouse gas emissions.

**Climate Change** — Climate change refers to any significant change in measures of climate (such as temperature, precipitation or wind) lasting for an extended period (decades or longer). Climate change may result from:

- ✧ Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun;

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<sup>52</sup> Unless otherwise noted, definitions of glossary terms were obtained from ICLEI's "Cities for Climate Protection Milestone Guide"

<sup>53</sup> IPCC "Third Assessment Report Working Group III: Mitigation"

<sup>54</sup> NASA's Earth Observatory library

- ✧ Natural processes within the climate system (e.g., changes in ocean circulation);
- ✧ Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, desertification, etc.)<sup>55</sup>

**Criteria Air Pollutants (CAPs)** — The term criteria air pollutants refers to pollutants that are regulated under the U.S. Clean Air Act. As with carbon dioxide, the major sources of these pollutants are fossil fuels. Most measures that reduce carbon dioxide emissions also reduce criteria air pollutants. Criteria air pollutants include nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs), carbon monoxide (CO), sulfur oxides (SO<sub>x</sub>) and particulate matter smaller than ten microns in diameter (PM-10). ICLEI's CACP software provides estimated emissions of CAPs as well as GHGs for emissions analyses and reduction benefits of measures.

**Emissions Factor** — A unique value for scaling emissions to activity data in terms of a standard rate of emissions per unit of activity (e.g., grams of carbon dioxide emitted per barrel of fossil fuel consumed).<sup>56</sup>

**Equivalent Carbon Dioxide (CO<sub>2</sub>e)** — Equivalent carbon dioxide, abbreviated as CO<sub>2</sub>e and also known as global warming potential (GWP), is a unit that allows emissions of greenhouse gases of different strengths to be added together and framed in terms of comparative units. For carbon dioxide itself, emissions in tons of CO<sub>2</sub> and tons of CO<sub>2</sub>e are identical, whereas for methane, an example of a stronger greenhouse gas, 1 ton of methane emissions has the same GWP as 21 tons of CO<sub>2</sub>. Thus 1 ton of methane emissions can be expressed as 21 tons of CO<sub>2</sub>e.

**Global Warming** — Global warming describes the recent trend of increasing average global surface and tropospheric (referring to the lowest part of the atmosphere where “weather” phenomena occur) temperatures that scientists believe is caused by increased emissions of human-induced greenhouse gases. The greenhouse gases (CO<sub>2</sub>, methane, nitrous oxides and CFCs) are emitted into the atmosphere and increase the atmosphere’s “entrapment” of heat.

**Global Warming Potential (GWP)** — Global warming potential is a concept developed by the Intergovernmental Panel on Climate Change that provides a comparative measure of the impacts of different greenhouse gases on global warming, with the effect of carbon dioxide being equal to 1.

**Greenhouse Gases and the Greenhouse Effect** — The Earth’s climate is determined by a delicate balance between the solar energy that arrives from space and the heat energy that the Earth creates from the sun’s rays. The energy that arrives from space should always equal the energy that the Earth emits back to space. When something disturbs this balance, our climate adjusts by cooling or warming the Earth to return things to normal. A portion of outgoing heat energy is absorbed in the atmosphere by greenhouse gases such as water vapor, carbon dioxide, methane, and nitrous oxide. If these trace gases were not present, the average temperature on the Earth’s surface would be -32 degrees Fahrenheit, and life as we know it would not have evolved here. But the natural greenhouse effect keeps the average global surface temperature at a comfortable 59 degrees Fahrenheit.

Today, the atmospheric concentration of the most important greenhouse gas, carbon dioxide, is higher than it has been in the past 650,000 years. Scientists participating in the British Antarctic Survey have succeeded in charting the atmospheric concentration of carbon dioxide over the last 800,000 years. Their research has shown that temperature unflinching rises and falls in

<sup>55</sup> EPA, [www.epa.gov/climatechange/glossary.html](http://www.epa.gov/climatechange/glossary.html)

<sup>56</sup> EPA, [www.epa.gov/climatechange/glossary.html](http://www.epa.gov/climatechange/glossary.html)

response to carbon dioxide levels. This increase is the result of an increased reliance on fossil fuels and deforestation, which has caused an imbalance between the absorption and release of carbon dioxide by vegetation. Other greenhouse gases, also found in the atmosphere in increasing amounts, are methane, nitrous oxide and the chlorofluorocarbons (CFCs).

**IPCC—Intergovernmental Panel on Climate Change** —The Intergovernmental Panel on Climate Change (IPCC) was jointly established in 1988 by the World Meteorological Organization and the United Nations Environment Programme to:

- ✧ Assess available scientific information on climate change;
- ✧ Assess the environmental and socioeconomic impacts of climate change;
- ✧ Formulate response strategies.

It has emerged as the predominant international forum for the development of scientific knowledge and policy advice on matters related to climate change. Its periodic Assessment Reports are relied upon by governments to guide policy making on this issue. The IPCC's Third Assessment Report in 2001 projects that the Earth's average surface temperature will increase between 2.5° and 10.4°F (1.4°-5.8°C) between 1990 and 2100 if no major efforts are undertaken to reduce the emissions of greenhouse gases (the "business-as-usual" scenario). Furthermore, the Third Assessment Report also found that "there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities."

**Kyoto Protocol** —The Kyoto protocol was adopted by consensus at the third session of the Conference of the Parties (COP-3) in December 1997 in Kyoto, Japan. When ratified by a certain percentage of participating countries, it contains legally binding emissions targets for developed countries in the post-2000 period. By arresting and reversing the upward trend in greenhouse gas emissions that started in these countries 150 years ago, the Protocol promises to move the international community one step closer to achieving the Convention's ultimate objective of preventing "dangerous anthropogenic [human-induced] interference with the climate system."

According to the Protocol, developed countries commit themselves to reducing their collective emissions of six key greenhouse gases by at least 5%. This group target will be achieved through cuts of 8% by Switzerland, most Central and East European states, and the European Union (the EU will meet its target by distributing different rates among its 61 member states); 7% by the US; and 6% by Canada, Hungary, Japan, and Poland. Russia, New Zealand, and Ukraine are to stabilize their emissions, while Norway may increase emissions by up to 1%, Australia by up to 8%, and Iceland 10%. The six gases are to be combined in a "basket", with reductions in individual gases translated into "CO<sub>2</sub> equivalents" that are then added up to produce a single figure. In 2005 the Kyoto Protocol went into effect after 141 industrialized countries signed on to the agreement.

**Methane** — Methane, abbreviated CH<sub>4</sub>, accounted for about 8.6% of U.S. emissions in 2005. Methane is produced by anaerobic decomposition of solid waste in landfills and sewage treatment facilities, wetlands and rice paddies, as a by-product of fossil fuel energy production and transport and also from outgassing in livestock. It is also the principle constituent of natural gas and can leak from natural gas production and distribution systems and is emitted in the process of coal production. The methane concentration in the atmosphere has been rising steadily for several centuries, keeping pace with the increase in the world population and expansion of the world economy.

**Nitrous Oxide** — Nitrous oxide or N<sub>2</sub>O (not to be confused with nitrogen oxides or NO<sub>x</sub>) is a potent greenhouse gas accounting for about 5.1% of U.S. CO<sub>2</sub>e emissions in 2005. Main



sources for this GHG are nitrogen fertilization of agricultural soils, agricultural runoff and motor vehicles equipped with catalytic converters.

**Ozone** — An ozone molecule consists of three atoms of oxygen. Ozone is much more reactive than oxygen and is toxic to human beings and living matter. At ground level it forms smog and causes damage to forests and humans. (In the stratosphere, it functions mainly as a filter for ultraviolet radiation and to a lesser extent as a greenhouse gas.) Ground level ozone formation is closely connected to climate change since the primary sources of emissions that cause it (e.g., motor vehicle use) are also global-warming pollutants. Additionally, the formation of ground level ozone requires not only pollutants but also heat and sunlight. As regions get hotter due to global warming, local ozone smog problems tend to be exacerbated.

**United Nations Framework Convention on Climate Change (UNFCCC)** — This convention served as the foundation of global efforts to combat global warming. Opened for signature at the Rio Earth Summit in 1992, its ultimate objective was the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-induced] interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.”

**U.S. Conference of Mayors Climate Protection Agreement** — This initiative was launched in 2005 by Seattle Mayor Greg Nickels. He invited mayors to commit to reduce emissions in their cities to 7 percent below 1990 levels by 2012.

**Western Climate Initiative (WCI)** — launched in February 2007, the WCI is a collaboration of seven U.S. governors and four Canadian Premiers created to identify, evaluate and implement collective and cooperative ways to reduce greenhouse gases in the region, focusing on a market-based cap-and-trade system.

## Appendix A: U.S. Mayors Climate Protection Agreement



### **The U.S. Mayors Climate Protection Agreement**

**(As endorsed by the 73<sup>rd</sup> Annual U.S. Conference of Mayors meeting, Chicago, 2005)**

- A. We urge the federal government and state governments to enact policies and programs to meet or beat the target of reducing global warming pollution levels to 7 percent below 1990 levels by 2012, including efforts to: reduce the United States' dependence on fossil fuels and accelerate the development of clean, economical energy resources and fuel-efficient technologies such as conservation, methane recovery for energy generation, waste to energy, wind and solar energy, fuel cells, efficient motor vehicles, and biofuels;
- B. We urge the U.S. Congress to pass bipartisan greenhouse gas reduction legislation that 1) includes clear timetables and emissions limits and 2) a flexible, market-based system of tradable allowances among emitting industries; and
- C. We will strive to meet or exceed Kyoto Protocol targets for reducing global warming pollution by taking actions in our own operations and communities such as:
  - 1. Inventory global warming emissions in City operations and in the community, set reduction targets and create an action plan.
  - 2. Adopt and enforce land-use policies that reduce sprawl, preserve open space, and create compact, walkable urban communities;
  - 3. Promote transportation options such as bicycle trails, commute trip reduction programs, incentives for car pooling and public transit;
  - 4. Increase the use of clean, alternative energy by, for example, investing in "green tags", advocating for the development of renewable energy resources, recovering landfill methane for energy production, and supporting the use of waste to energy technology;
  - 5. Make energy efficiency a priority through building code improvements, retrofitting city facilities with energy efficient lighting and urging employees to conserve energy and save money;
  - 6. Purchase only Energy Star equipment and appliances for City use;
  - 7. Practice and promote sustainable building practices using the U.S. Green Building Council's LEED program or a similar system;
  - 8. Increase the average fuel efficiency of municipal fleet vehicles; reduce the number of vehicles; launch an employee education program including anti-idling messages; convert diesel vehicles to bio-diesel;
  - 9. Evaluate opportunities to increase pump efficiency in water and wastewater systems; recover wastewater treatment methane for energy production;
  - 10. Increase recycling rates in City operations and in the community;
  - 11. Maintain healthy urban forests; promote tree planting to increase shading and to absorb CO<sub>2</sub>; and
  - 12. Help educate the public, schools, other jurisdictions, professional associations, business and industry about reducing global warming pollution.

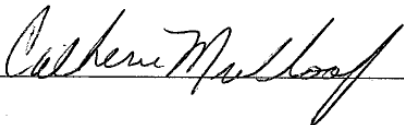


**The U.S. Conference of Mayors Climate Protection Agreement – Signature Page**

You have my support for the Mayors Climate Protection Agreement.

Date: April 17, 2008

Mayor: Catherine Mullooly

Signature: 

Address: 1600 Floribunda Avenue

City: Hillsborough State: CA Zip: 94010

Mayor's e-mail: \_\_\_\_\_

Staff Contact Name: Kathy Leroux

Staff Contact Title: Assistant City Manager

Staff Phone: 650-375-7407

Staff e-mail: kleroux@hillsborough.net

Please add my comments in support of the Mayors Climate Protection Agreement. We will add these to the Website *(optional)*:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Please return completed form at your earliest convenience to:

**The U.S. Conference of Mayors  
Climate Protection Center**

**By Mail:**  
1620 I Street, NW  
Washington, DC 20006

**By Fax:** (202) 293-2352

For additional information, contact  
Kevin McCarty  
[kmccarty@usmayors.org](mailto:kmccarty@usmayors.org)

(202) 861-6728

## Appendix B: Resolution – U.S. Mayors Climate Protection Agreement

### RESOLUTION NO. 08-28

#### RESOLUTION OF THE CITY COUNCIL OF THE TOWN OF HILLSBOROUGH AUTHORIZING THE MAYOR TO SIGN THE U.S. MAYORS CLIMATE PROTECTION AGREEMENT

- WHEREAS**, the International Panel on Climate Change (IPCC) and the U.S. Global Change Research Program (USGCRP) has scientific consensus that greenhouse gases released into the atmosphere have a profound negative effect on the Earth's climate; and
- WHEREAS**, energy consumption, specifically the burning of fossil fuels, accounts for more than 80% of U.S. greenhouse gas emissions and local government can influence a community's emissions by strategic decisions involving energy management, building and construction, transportation and waste management; and
- WHEREAS**, local government can take action to reduce greenhouse gas emissions and increase energy efficiency and that these actions provide local benefits by decreasing air pollution, creating jobs, reducing energy expenditures, and saving money for local government, businesses and residents; and
- WHEREAS**, the Town of Hillsborough has joined the Cities for Climate Protection (sponsored by ICLEI/Local Governments for Sustainability) and has several key activities already underway to reduce greenhouse gas emissions such as the formation of the Sustainable Hillsborough Task Force, a greenhouse gas inventory in progress, sustainable programs education and municipal energy saving projects; and
- WHEREAS**, the U.S. Mayor's Climate Protection Agreement has been signed by over 825 U.S. jurisdictions to support the reduction of greenhouse gas emissions and that these jurisdictions pledge to undertake the following actions in their municipal and community government to reduce greenhouse gas emissions: inventory global warming emissions in City operations and in the community; set reduction targets and create an action plan; make energy efficiency a priority through building code improvement; preserve open space; promote increased use of clean, alternative energy; advocate for the development of renewable energy resources; retrofit civic facilities with energy efficient lighting and urge employees to conserve energy; practice and promote sustainable building practices using the U.S. Green Building Council's LEED program or equivalent; increase the fuel efficiency of municipal fleet vehicles; launch an employee education program including anti-idling messages; convert diesel vehicles to bio-diesel; evaluate opportunities to increase pump efficiency in water pumping; maintain healthy urban forests; promote tree

planting to increase shading and absorb CO<sub>2</sub>; and help educate the public, schools, other jurisdictions and professional associations about reducing global warming pollution; and

**WHEREAS**, the Town of Hillsborough urges the federal government and state governments to enact bipartisan legislation to establish policies and programs to meet or beat the Kyoto Protocol target or U.S. equivalent of reducing global warming pollution levels, including efforts to reduce the United State's dependence on fossil fuels and accelerate the development of clean, economical energy resources and fuel-efficient technologies, such as conservation, wind and solar energy, efficient motor vehicles, and biofuels.

**NOW, THEREFORE, LET IT BE RESOLVED** that the City Council of the Town of Hillsborough hereby authorizes the Mayor of Hillsborough to sign the U. S. Climate Protection Agreement and strive to meet or exceed Kyoto Protocol targets or the U.S. equivalent greenhouse gas reduction goal of a 20% reduction of greenhouse gas emissions by 2020 (using a 2005 baseline) by taking actions in our own municipal operations and our community.

  
Attest: City Clerk

  
Mayor of the Town of Hillsborough

This resolution was adopted by the City Council of the Town of Hillsborough at its regular meeting held on the 14<sup>th</sup> of April 2008, by the following vote of the members thereof:

AYES:	Councilmembers	<u>Mullooly, Krolik, Regan</u>
NOES:	Councilmembers	<u>None</u>
ABSENT:	Councilmembers	<u>Kasten, Fannon</u>
ABSTAIN:	Councilmembers	<u>None</u>

## Appendix C: Draft Cost-Benefit Analysis Methodology

### Draft Cost-Benefit Analysis Methodology for Greenhouse Gas Emissions Reduction Strategies

Program	Year	Initial Cost (one-time)	Annual Cost <sup>57</sup> (on-going)	Capital Cost	Annual Savings					Other Benefits (non-monetized)	Net Annual Cost	GHG Reduction (tons CO <sub>2</sub> e)	Cost / Ton CO <sub>2</sub> e Reduction
					Energy	Water	Waste	Fuel	Other				

This cost-benefit methodology uses a comprehensive approach to establishing the cost per reduced CO<sub>2</sub>e ton and incorporates a strategy's initial costs, ongoing/annual costs and financial savings to achieve the net cost benefit of a particular emissions reduction strategy.

1. Define the emissions reduction strategy with sufficient program detail to enable calculation of the CO<sub>2</sub>e tons reduction estimates using CAPPA, the initial or start up costs (education, staff training, document development, website development), ongoing costs (staff time, materials), capital costs (if applicable), financial savings in terms of energy, water, waste, fuel and other factors.
2. Determine the initial or start up costs (policy development, education, staff training, and document development).
3. Determine the ongoing costs (staff time, materials, etc.)
4. Determine capital costs if applicable.
5. Determine the financial savings in terms of energy, water, waste, fuel and other factors.
6. Consider the value of other non-monetized co-benefits that result from GHG reduction strategies that cannot be quantified in cost-benefit analyses. Though these benefits are difficult or impossible to quantify in terms of costs savings, it is important to consider these benefits when considering GHG reduction strategy implementation.

<sup>57</sup> Can be adjusted for CPI

<b>Transportation benefits</b>	Reduced traffic congestion, improved air quality (reduced asthma cases, improved safety)
<b>Waste reduction benefits</b>	Natural resource conservation, extend life of landfill, reduced congestion and traffic to landfill
<b>Purchasing</b>	Savings in equipment costs
<b>Green building benefits</b>	Improved indoor air quality, improved worker productivity, improved health and comfort of residents

7. Determine net annual cost, calculate the GHG emissions reduction estimate from CAPPA and determine the cost per CO<sub>2</sub>e ton reduced by dividing the net annual cost by the CO<sub>2</sub>e tons reduced.
8. Based on the cost-benefit evaluation and evaluation of the co-benefits of the GHG reduction strategies, the GHG reduction strategies could be prioritized or ranked for implementation.



## Appendix D: Emissions Sources and Inventory Methodology

The community-wide inventory comprises emissions resulting from within the geographic boundaries of the community. These emissions come from residential, commercial, transportation and waste management sources (also referred to as sectors). The inventory methodology broadly categorizes these sources as either stationary or mobile sources. It also categorizes the sources according to “scope,” which generally reflects where the emissions are generated. Scopes help determine which emissions should be inventoried and organizes emissions according to degree of control and the potential for reduction. These scopes are defined below.

- ✧ Scope 1 emission sources within the context of community-scale emissions analyses include all direct emissions generated within the community boundaries (e.g., vehicle emissions). In the context of the government emissions, scope 1 refers to direct emissions from sources within a local government’s operations that it owns and/or controls. This includes, for example, stationary combustion to produce heat and power equipment; mobile combustion of fuels, and fugitive emissions from leaked refrigerants.
- ✧ Scope 2 emission sources within the context of both community and government emissions analyses include all emissions generated outside the community’s geographic boundaries but generated due to activity occurring inside the boundaries (e.g., emissions from power plants associated with electricity consumption within the City’s boundaries).
- ✧ Scope 3 emissions are all other emissions sources that have policy relevance to the local government that can be measured and reported. This includes all indirect emissions not covered in Scope 2 that occur as a result of activities within the operations of the local government. Sources over which the local government does not have any financial or operational control would be accounted for here. Scope 3 emission sources include (but are not limited to) tailpipe emissions from employee commutes, employee business travel, and emissions resulting from the decomposition of government-generated solid waste.

Creating the inventory required the collection of data from a variety of entities. Community and municipal electricity and natural gas data were provided by Pacific Gas and Electric Company (PG&E). The Metropolitan Transportation Commission and Bay Area Air Quality Management District (BAAQMD) were sources of transportation data from which fuel usage was derived. Solid waste data was provided by the California Integrated Waste Management Board and Republic Services, Inc. (Allied Waste). ICLEI facilitated the acquisition of much of the community-level data for Hillsborough and other jurisdictions in the region.

Efforts were made to include all possible emission sources in the inventories. However, emission sources that met the following criteria were generally excluded.

- ✧ Small and unimportant – “De minimis” sources that, when combined, totaled less than 5% of the total of the emissions from the community or government.
- ✧ Prohibitively difficult to track with accuracy – Including off-highway construction equipment, non-combustion industrial emission sources and fuel not delivered by PG&E (e.g., wood, charcoal, propane, kerosene).

- ✧ Largely located outside the jurisdiction's boundaries – Sources such as intercity transportation fuel usage for air and rail travel.

### **CACP Software and Emission Factors**

ICLEI's Clean Air and Climate Protection (CACP) software package was used to calculate emissions resulting from energy consumption and waste generation. The CACP software determines emissions using specific factors (or coefficients) according to the type of fuel used. Greenhouse gas emissions are aggregated and reported in terms of equivalent carbon dioxide units, or CO<sub>2</sub>e. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is 21 times more powerful than carbon dioxide on a per weight basis in its capacity to trap heat, so the CACP software converts one metric ton of methane emissions to 21 metric tons of carbon dioxide equivalents. All greenhouse gases measured have been converted to CO<sub>2</sub>e.

The emissions coefficients and quantification method employed by the CACP software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National Inventories) and the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form 1605). At the time of this writing, the CACP software has been used by more than 160 U.S. cities and towns to inventory their greenhouse gas emissions. However, it is worth noting that, although the software provides Hillsborough with a sophisticated and useful tool, calculating emissions from energy use with precision is difficult. The model depends upon 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.