Climate Action Plan 2009

20% Reduction by 2020

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Executive Summary

Background

In 2007, the City of Mission hosted a Sustainable Governance Workshop in Grand Lake, Colorado. Mission citizens, elected officials, and staff attended the event, along with other representatives of neighboring municipalities, Johnson County, the State of Kansas, and the federal government. The workshop gave participants an opportunity to explore the implications of climate change and learn about principles of sustainability and models of sustainable governance. As a result of this workshop, Mayor Laura McConwell appointed a Sustainability Task Force (STF) composed of citizens, business owners, and City Council representatives.

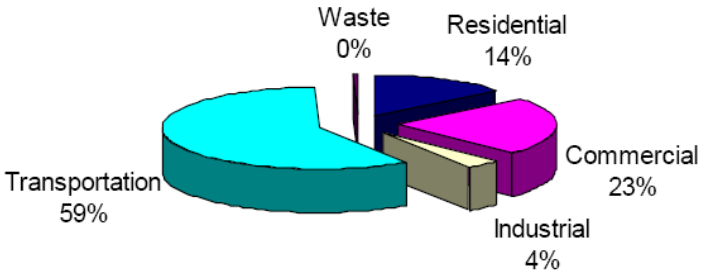
In addition to the creation of the STF, the City of Mission became a signatory to the U.S. Conference of Mayors' Climate Protection Agreement (MCPA) on November 2, 2007. This event also marked the largest single-day signing of the MCPA, with sixteen mayors participating. The agreement calls for a 7% reduction in greenhouse gas emissions from 1990 levels by the year 2012.

The mission of the STF was "to provide a prioritized action plan to serve as model of sustainability for our local government, citizens and surrounding communities that encompasses People, Planet and Prosperity."

As a step to fulfill this mission, the STF set a tentative goal of achieving a 20% reduction in carbon emissions by 2020 and directed City staff to complete a greenhouse gas inventory to measure Mission's carbon footprint. This inventory, completed in September 2008, established 2005 as a baseline year for emissions calculations. It found that in 2005 the community was responsible for 421,844 tons of carbon-dioxide equivalent (CO2e) emissions.

The report also showed that by the end of 2007, the City has achieved a net CO2e reduction of 9,026 tons. This represents 7.6% of the cut needed by 2020. A significant contributing factor to this reduction includes the closing of the Mission Mall.

City of Mission: Community-wide Emissions 2005[1]



While transportation is a major factor in Mission's emissions, it is an inescapable reality that the City's ability to regulate transportation is limited at best. The City covers a relatively small area (approximately 2.5 square miles) but hosts a portion of I-35 and several high-volume arterial

[1] Mission 2008 GHG Inventory, p3-2.

roadways which serve the greater Kansas City region. The regional nature of these roadways makes it virtually impossible for Mission to regulate them on its own, but simultaneously contributes to the City's emissions numbers. While the high volume of commuter traffic is a problem for Mission, its limited size makes investing in transit options such as rapid bus lines unattractive unless implemented on a regional scale with other cities. In short, there is relatively little the City can do to proactively counter its transportation emissions without the support of its neighbors and the region at large.

Aside from these transportation issues, the 2008 survey found that electricity usage also contributed approximately 33% to Mission's annual community-wide emissions.[2] Thus, in formulating an action plan for the City, more attention was given to infrastructure issues since the City can regulate these more easily.

Devising an Action Plan

After examining the 2008 inventory, the STF directed City staff to examine specific emissions-reducing strategies. To accomplish this, staff utilized an early version of the International Council for Local Environmental Initiatives (ICLEI) Climate and Air Pollution Planning Assistant (CAPPA) software. The early version utilized emissions information from the City's 2008 survey and information on the City's implementation preferences (speed, payback time, amount of staff involvement, etc.) to rank various strategies that would help Mission reach its goal.

The City found that the CAPPA software consistently suggested a number of strategies as appropriate for Mission regardless of the implementation variables used. The majority of the strategies elevated by CAPPA were infrastructure-based, which fit with the City's inability to conduct comprehensive transportation reductions. These strategies were presented to Mission's Sustainability Task Force, which voted on individual strategies to examine in depth. Each strategy which received a vote from the STF is included in this action plan.

Reduction Goals

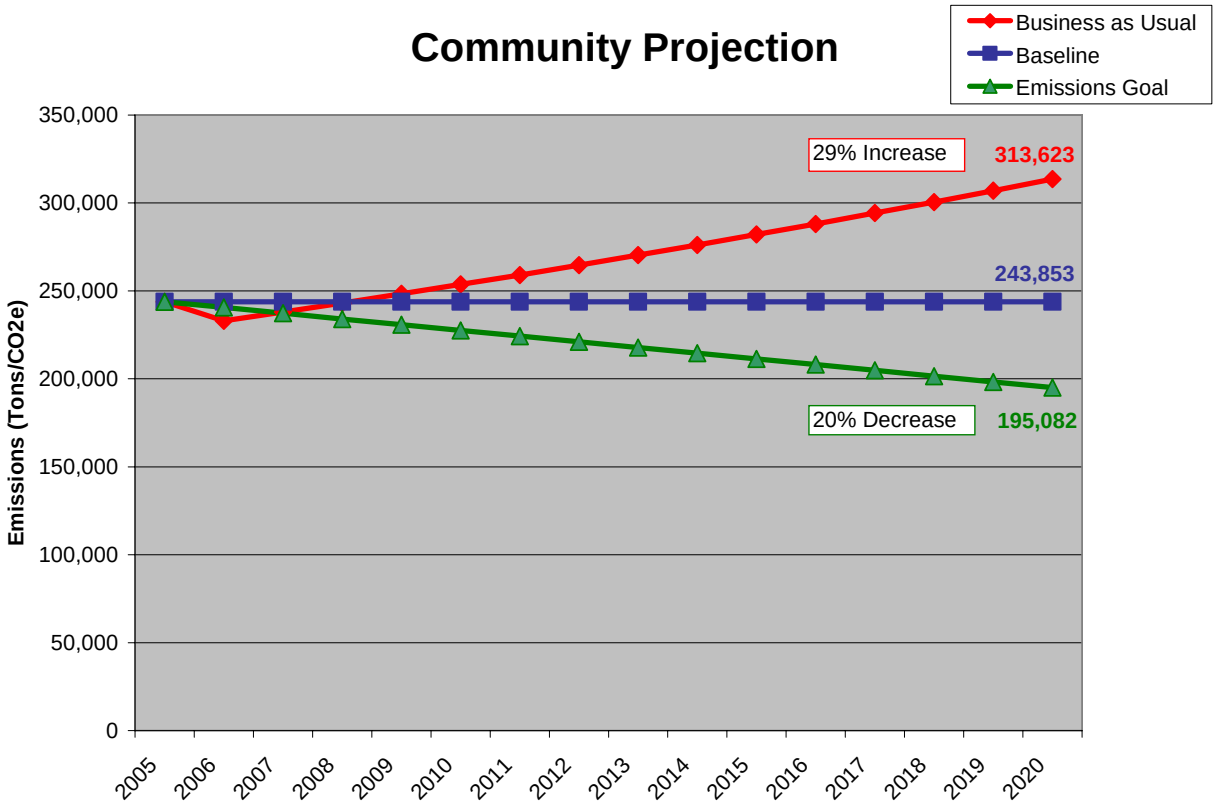
Community Level

The City's goal stands as a 20% reduction in emissions on both the community and governmental levels by the year 2020. However, because nearly 2/3 of emissions in Mission are beyond the City's control (since they are highway transportation related), these emissions were factored out of the reduction plan. This leaves the City with an emissions baseline of 243,853 metric tons of CO2e.

In order to compute the necessary reduction appropriately, the City must account for new growth and the addition of more sources of carbon emissions. Chart 1.1 illustrates current projections of community-based emissions as they relate to our baseline and goal. Assuming no steps are implemented and emissions increase 2% annually, Mission can expect to increase CO2e output 29% over 2005 levels during the next 11 years.

[2] Mission 2008 GHG Survey, Appendix B.

Chart 1.1 – Projected Community Emissions



Because Mission will likely continue to grow as we implement carbon reduction strategies, we must take that growth into account when projecting the total tonnage of emissions to reduce. To do this, we subtract the target 2020 emissions (green line) from our business-as-usual trend (red line). This leaves us with 118,541 tons of CO2e emissions to reduce by the year 2020.

Table 1.1 – Community Projection Breakdown

	Metric Tons CO2e
Baseline Emissions	243,853
20% Baseline Reduction	48,771
Target 2020 Emissions	195,083
Business as Usual	313,623
Target 2020 Emissions	195,083
Total Emissions to Reduce	**118,540**
Tons Reduced from 2005-2007	9,026
% of Goal Achieved	8%

It is important to note that although we have counted the slight reduction between 2005-2007 emissions towards our overall goals, we fully expect that future emissions will spike sharply. The current reduction occurred largely because of the Mission Mall's closing and the resulting decrease in economic traffic in the city. Once the Mission Mall site (now the Gateway project) is fully redeveloped, we can anticipate that increased emissions will meet or exceed this reduction.

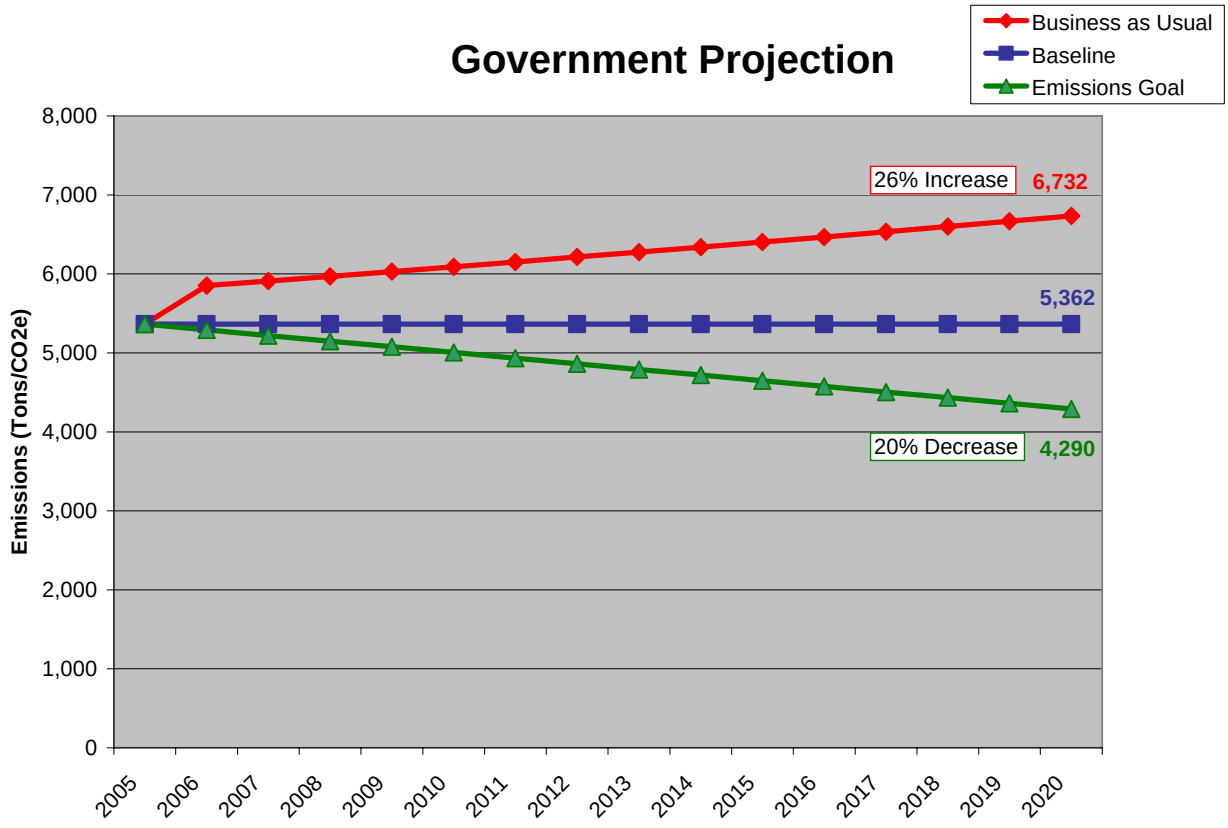
Government Level

In the 2008 inventory, government-level emissions are already factored into community-wide emissions to eliminate double counting. However, ICLEI software allows governments to isolate their own emissions because they are often easier to control and manipulate on an organizational level.

The City government's emissions are divided into several different sectors: those caused by buildings (electricity and natural gas consumption), the municipal vehicle fleet, employee commutes, powering street lights, solid waste disposal, and an "other" category. In 2005, the baseline emissions caused by these sectors totaled 5,362 tons of CO2e. Note that these emissions only cover municipal operations, thus there is no need to adjust for community-level factors like highway transportation.

Using the same process as the Community-level, we can project emissions growth in relation to our target reduction on a governmental scale. Chart 1.2 illustrates projections about the City government's emissions contributions given data pulled from the 2008 inventory. Assuming no steps are implemented and the government's emissions rise at 1% annually, the City can expect to have a CO2e output 26% greater than the baseline year by 2020.

Chart 1.2 – Projected Government Emissions



Again, by subtracting the emissions goal (green line) from our business-as-usual projection (red line), we arrive at a total number of tons to reduce by the year 2020 which accounts for growth in the City. This equates to roughly 2,443 tons total on the governmental level.

Table 1.2 – Government Goal

	Metric Tons CO2e
Baseline Emissions	5,362
20% Baseline Reduction	1,072
Target 2020 Emissions	4,290
Business as Usual	6,732
Target 2020 Emissions	4,290
Total Emissions to Reduce	**2,443**
Tons Reduced from 2005-2007	-547*
% of Goal Achieved	-22%

*Note that a negative number here means that in 2007, emissions were 547 tons higher than they were in 2005—in other words, this number represents a 10.2% increase in C02e emissions over 2005.

Notably, this graph shows that government emissions rose sharply from 2005-2007, which resulted in additional CO2e output of 547 tons. This effectively put the City behind its goal by 22%. Chief contributors to this increase include added energy needs for buildings (perhaps affiliated with temporary light and heat associated with the construction of the new Public Works building), increases in the miles City employees had to travel while commuting, and additional streetlight fixtures.

More specific extrapolations of the projections found in these charts and graphs can be found in Appendix A.

Goal Evaluation

Because the City's baseline is so recent, and because certain steps the City may take to reduce emissions are not easily quantifiable, this goal will be revisited in the future. As new technologies enter the market and understanding of global climate change improves, this goal may change to accommodate advances or setbacks in the world and in the Kansas City region.

Mission fully intends on following ICLEI's 5-step process for achieving climate protection milestones. We have completed Milestones 1, 2, and 3 by conducting an emissions analysis, setting a target, and creating this action plan. As we move forward with Milestones 4 and 5, implementing the plan and quantifying results, we will continue to revise and update our inventory and action plan to ensure we are making progress toward our goals.

Recommendations for Greenhouse Gas Reductions

After evaluating several reduction scenarios using the CAPPA software, the STF voted on those most appropriate and feasible for Mission to undertake. The following strategies are those the task force recommends the City pursue as it seeks to lower its emissions.

While the projected impact of the strategies does not entirely close the gap between Mission's projected emissions output and stated reduction goals, it should be noted that these strategies are not the only ones available to the City. They do not include those which are more difficult to quantify, nor do they include those the City was already pursuing as of December 31, 2008. Rather, the strategies listed below are recommendations for future action—they are by no means exclusive of other options. More information about the assumptions used to compute the figures below can be found in Appendix B.

Table 2.1 – Community Level Strategies

**Note: The strategies listed below are not listed in order of preference or by how many votes each received from the STF. Rather, we have organized them based on the potential to achieve reductions, from greatest to least.

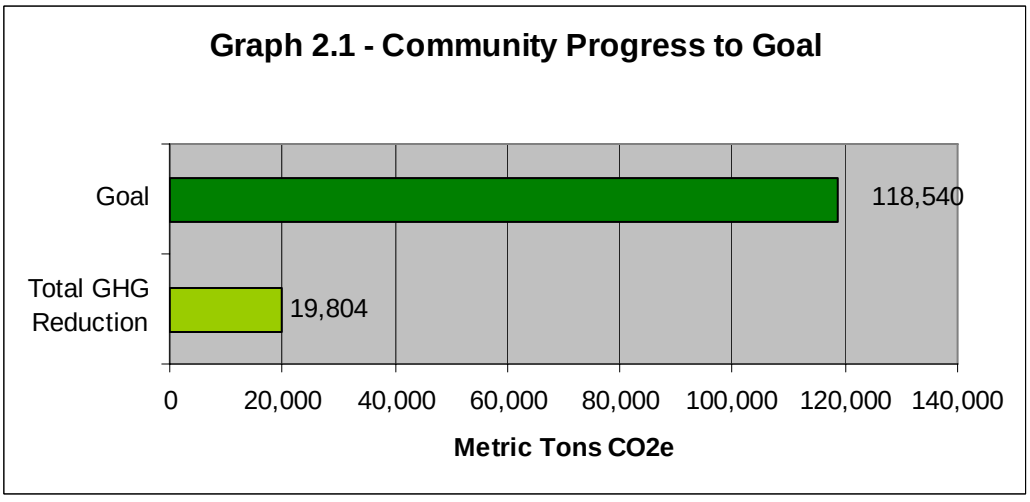
Recommendation	Projected GHG Emissions Reduced (metric tons)
Renewable Energy Credits Residents and community organizations purchase renewable energy credits to offset 5% of community-wide electricity consumption.	5,282
Incorporate Green Building Standards into Building Code Update residential and commercial building codes to incorporate higher, more sustainable building standards in terms of material, durability of construction, etc.	2,354
Yard Waste Composting Divert 300lbs of yard waste per person, per year from the landfill to a composting facility.	640
Energy Efficiency Education Targeted at Business Offer awards or loans to businesses to make energy efficient retrofits and changes to infrastructure.	585
Green Business Programs Certify 50 businesses that implement "green" business practices, such as energy savings upgrades, pollution/waste reduction, and recycling.	585
Low-Maintenance Landscaping Promote the use of lawn landscaping using native plants and shrubs which require less water and maintenance.	509
Education on Low-carbon Transportation Options Provide incentives and education aimed at encouraging citizens to use their cars less and utilize public or alternate modes of transportation more.	408
Efficient Lighting Retrofits Upgrade incandescent and older fluorescent lighting to more efficient fluorescent lighting for at least 50,000 sq. ft. of building space.	172

Water Conservation Ordinance Establish a water conservation ordinance with the goal of reducing individual household water use by 5%.	112
Water Saving Shower Heads Establish a program or incentives for homeowners to upgrade to more efficient shower heads to save water and energy.	99
Increase Chiller Efficiency Upgrade air conditioner chillers for at least 30,000 sq. ft. of building space.	26
Limit Idling of Heavy Duty Vehicles Consider a city ordinance, education campaign, or other measures to increase awareness of the environmental impact of unnecessary idling and reduce its occurrence in Mission.	9
HVAC Maintenance Tune-ups Retrofit HVAC systems to more efficient models to save energy and reduce waste.	7
Total	**10,778**

While the strategies here do not add up to the total amount of reductions necessary to meet the City's goal, they are only a few of many solutions the City may choose to implement over the next few years. Table 2.2 and Graph 2.1, below, show the City's progress to its 2020 goals assuming each of the above strategies is fully implemented.

Table 2.2 - Community Progress to Goal

	Metric Tons C02e
Reduction from 2005-2007	9,026
Implementing 13 Strategies	10,778
Total GHG Reduction	**19,804**
Goal	118,540
% Progress to Goal	**17%**



In addition to the strategies listed above, the task force recommended implementing two other strategies that are unavailable to the City at this time, but could become available in the future. These are detailed in Table 2.3 below.

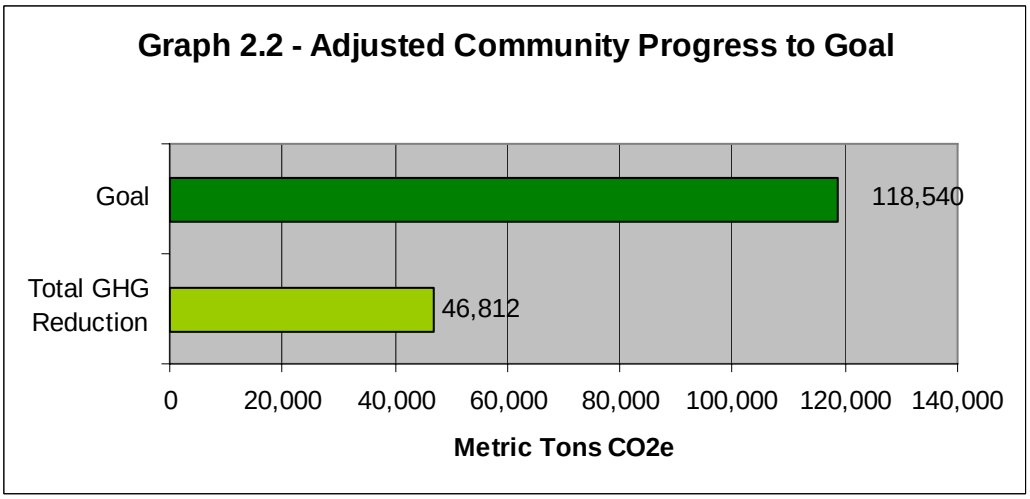
Table 2.3 – Secondary Recommendations

Recommendation	Projected GHG Emissions Reduced (metric tons)
Purchase Green Electricity Buying electricity generated from clean sources such as wind and solar (but excluding nuclear energy) off the grid rather than that produced in coal plants would dramatically reduce the City's output of GHG emissions and dirty electricity consumption. **This strategy is currently unavailable as all the green energy being produced in the Kansas City area is being purchased by Sprint. If more energy becomes available, the City should seriously consider purchasing it and offering incentives for residents to do so as well.	21,128
Transit-Oriented Development Create higher-density residential options along major transit lines, such as bus routes and light-rail systems, and provide residents in these areas with incentives to utilize public transportation rather than automobiles (such as bus passes). **This is currently not feasible because of the absence of light rail lines and Bus Rapid Transit (BRT) in the Kansas City Metro Area. However, Mission is positioned well to achieve progress on this issue due to the approval of a Form-Based Code for portions of the downtown district and other mixed-use initiatives.	2,940
Total of Secondary Recommendations:	**27,008**
Cumulative Total Reduction:	**37,786**

If, at some future point, these secondary recommendations become available, they will dramatically increase the City's capability to meet its GHG reduction goals. In the meantime the City will continue to advocate for and participate in regional efforts to implement viable mass-transit and clean energy options for the Kansas City region. Table 2.4 and Graph 2.2, below, illustrate just how effective these secondary strategies would be:

Table 2.4 - Adj. Community Progress to Goal

	Metric Tons C02e
Reduction from 2005-2007	9,026
Implementing 13 Strategies	10,778
Secondary Recommendations	27,008
Total GHG Reduction	**46,812**
Goal	118,540
% Progress to Goal	**39%**



Due to the City's limited staff and budget, it would be unreasonable to expect that all of these programs will be implemented simultaneously. Rather, City staff will seek to implement these recommendations over time with direction from the City Council. This plan will also be revisited in future years to revise reduction projections, include updated strategies, and accommodate any changes in the City's carbon footprint.

The STF also recommended government-level strategies for the City to implement. These strategies, targeted specifically at municipal administration, require change in the City's business practices. While it is possible that City staff might make more headway on these recommendations, it is important to remember that government emissions in Mission account for only 1.2% of total GHG emissions in the city (or 2.1% if community-wide emissions are adjusted for transportation). Consequently, even if the city government were to eliminate all its emissions, the impact on the community's total carbon footprint would be negligible.

It is also important to note that the strategies listed below do not include some measures the City has already taken which are difficult to quantify. The City's internal recycling program, for instance, came into existence in 2008 and has diverted paper from the landfill, but the actual amount diverted has been difficult to estimate. More information about this and other programs can be found on page 14.

Table 2.5 illustrates recommended strategies for the government level and their anticipated effect on Mission's carbon footprint. More specific information about the assumptions used regarding these strategies can be found in Appendix B.

Table 2.5 – Government Level Strategies

Recommendation	Projected GHG Emissions Reduced (metric tons)
Lights Out at Night Policy Institute a policy of turning off all unnecessary lighting at the end of the work day.	244

Install Lighting Occupancy Sensors Replace switches with occupancy sensors that automatically turn lights off if no one is present.	244
Efficient Street Lights Replace 1000 traditional street lights with LED street lights.	221
Efficient Lighting Retrofits Upgrade incandescent and older fluorescent lighting to more efficient fluorescent lighting.	209
Energy Efficiency Retrofits Make general efficiency improvements to City-owned buildings.	198
Utilize Solar Energy Install solar panels to offset the City's electricity consumption.	138
Reflective Roofing Consider installing reflective roofing on City-owned buildings to cut down on energy needs.	120
Increase Chiller Efficiency Upgrade air conditioner chillers for at least 121,000 sq. ft. of building space.	104
Green Roofing Consider installing green roofing on City-owned buildings to cut down on energy needs.	100
Total	**1,578**

While implementing all these strategies is expected to reduce the City government's carbon footprint by over 1500 tons, this represents just over 40% of the reduction necessary. This table also assumes that each strategy can be implemented to its fullest extent without being mutually exclusive of the other strategies—which is not the case. Assumptions used for computing Reflective Roofing and Green Roofing reductions both presume that all available roofing space on City buildings will be utilized, which slightly inflates these projections. Naturally the available space could be dedicated entirely to one of the strategies or divided between the two, but in either case the City's overall reductions will be fewer.

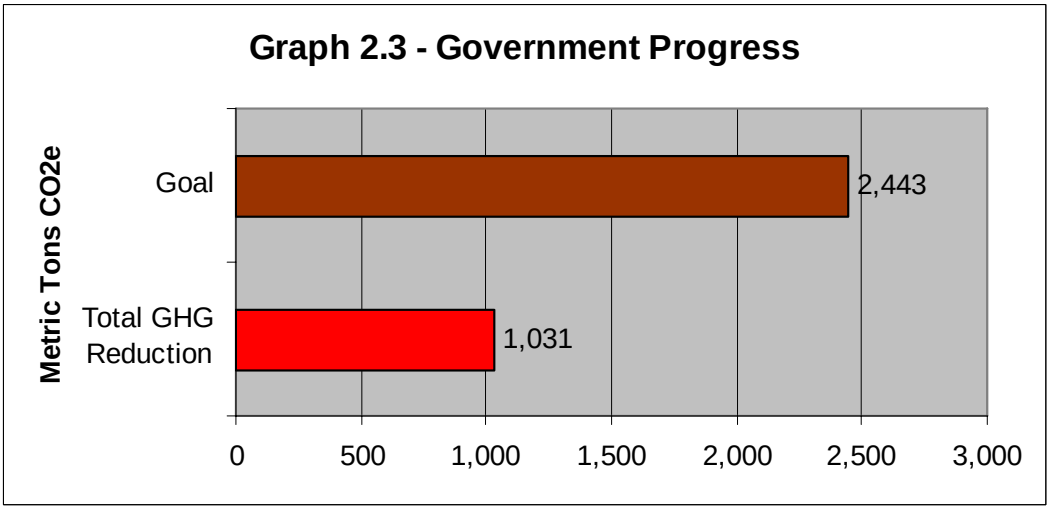
The same concepts holds true for the efficient lighting and retrofit steps listed above; part of retrofitting a building includes updating lighting fixtures. Consequently, this table should be read more as a comparison of the effectiveness of various strategies rather than as a list of strategies to accomplish. While the community-level strategies are broad, the government-level strategies are limited because of the size of Mission's government and its capacity to effect change.

Table 2.6 illustrates this further:

Table 2.6 – Government Progress to Goal

	Metric Tons C02e
Reduction from 2005-2007	-547
Implementing 9 Strategies	1,578
Total GHG Reduction	**1,031**
Goal	2,443
% Progress to Goal	**42%**

Because the City government's emissions have risen 547 tons over the baseline year, the effectiveness of the strategies listed above is somewhat diluted. For a graphical representation of the City government's progress, see graph 2.3 below.



Addressing the Shortfall

It is important to remember that this Action Plan should not be considered as a restrictive document by either the governing body or the citizens of Mission. The City should not limit itself to the recommendations found in this plan and should consider and pursue all possible means for reducing carbon emissions.

Although both estimates for the community and government-levels fall short of the necessary reductions to achieve our goal, we believe this shortcoming is partly the result of several important factors. Firstly, these assumptions were created using cost and usage averages generated by ICLEI in order to compute GHG emissions. Although ICLEI's numbers and assumptions are fairly reliable, the computations hinge on Mission's capacity to carry them out to the full extent presumed in the software model. In all likelihood this will not happen exactly as the software predicts, and certain strategies might have more or less success (meaning a greater or lesser carbon reduction) depending on how much the community invests in a particular solution.

Secondly, while this action plan is intended to help the City start on the path of carbon reductions, one should not presume that it is forever unchanging or set in stone. The strategies listed in this action plan are excellent first steps for taking action on climate change; however, as technologies evolve and awareness improves we expect that newer, better strategies will emerge that will help the City further meet its goals. In short, this version of our action plan is very much a "first step." As we continue to revisit our carbon emissions inventories in future years, we will revise and expand our action plan accordingly. Our hope is that as we continue this

process we will begin to see which strategies work most effectively and invest more heavily in what works.

Thirdly, we have already undertaken an assortment of measures which have an impact on our carbon footprint that is difficult to quantify. More information on these measures can be found on page 14 of this report. As we continue to implement smaller measures or take other steps where quantification of emissions reductions is difficult, we will use our climate inventories and other indicators to help benchmark the effectiveness of these programs. Regardless of whether we are able to quantify the effectiveness of these programs up front, we should know whether or not they are working based on whether the City's emissions decrease or continue to rise.

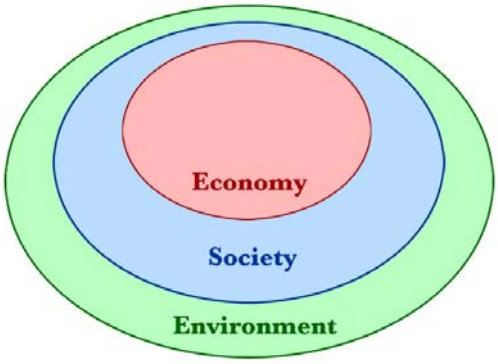
Finally, the education of citizens and community businesses plays a critical role in ensuring support for climate initiatives and achieving real results. A robust educational program will build awareness and allow citizens to participate in existing initiatives, while simultaneously helping to decrease carbon emissions. Consequently, public relations and educational awareness campaigns will play a critical role in the implementation of many initiatives. With greater participation among the citizens, even more carbon reductions could be realized than are projected in the tables and graphs above. Thus this report presumes that every reasonable effort will be made to maximize awareness and participation on community-wide climate issues. Whenever possible, educational initiatives should direct citizens and businesses to already existing programs, such as upgrades for heating, cooling, and other utilities. This ensures that the City's initiatives do not work at cross-purposes with other ongoing initiatives in the region.

The P3 Philosophy – People, Planet, Prosperity

The United Nations defines sustainability as "[meeting] the needs of the present without compromising the ability of future generations to meet their own needs."[3] The idea that people, their economy, and the environment in which they live are inextricably intertwined is at the core of sustainable development. Rather than look at community goals and initiatives through just one dimension (i.e. as just an economic or environmental issue), sustainability encourages consideration of the whole in decisionmaking processes.

Sustainable development is often portrayed as a series of concentric circles, such as the ones shown below:

Image 3.1 – A Model of Sustainability



This image illustrates the idea that environmental systems, economies, and individuals are inherently connected. Changes in any circle will create ripple effects in the others, just as changes in our environment, economy, and population today affect each other. Thus it is important to consider how our actions will impact our neighbors and the spaces in which we live, work, and do business. A worldview built upon the idea of sustainability seeks a balance between these circles that allows the needs of each to be met while conserving resources for the future.

As part of the STF's mission statement, "People, Planet, Prosperity" echoes this holistic approach to sustainability planning and initiatives. The idea of the P3 approach is to consider the linkages between citizens, their environment, and the economy when deciding what options are best for the long-term growth, happiness, and stability of the City. The City recognizes that sustainability is not a one-initiative program, but rather a mindset and a targeted approach to achieving a better standard of living for generations now and in the future. By considering each dimension and its connections, we can more accurately meet our own needs and safeguard our resources so that future generations may use them as well.

Many of the P3 initiatives the City has taken to date are difficult to quantify; hence they were not included in previous sections of this report. As these initiatives expand, grow, or are replaced, the City will continue to look for ways to document and track the impact of these projects. The

[3] United Nations General Assembly (1987) *Report of the World Commission on Environment and Development: Our Common Future*. Transmitted to the General Assembly as an Annex to document A/42/427 - Development and International Co-operation: Environment. Retrieved on: 2009-04-15. <http://www.un-documents.net/wced-ocf.htm>

following table lists the initiatives the City has taken to date and in which P the initiative is primarily rooted. Appendix C provides more information on these programs.

Table 3.1 – P3 Programs

Start Date	Initiative	P3
<2000	Bulky Item Pickup	People
2000	Mission Bank Home Improvement Loans	People
2002	Tree Board Initiatives	Planet
2003	Mission Business Development Committee Grant Program	Prosperity
2005	Business Relocation Policy	Prosperity
2005	Franchise Fee & Property Tax Rebate Program	People
2005	Rain Barrel Workshops	Planet
2006	Buffalo Grass Plantings	Planet
2006	City Greenhouse	Planet
2006	Mission Possible	People
2006	Tax Increment Financing Districts for Mixed-Use Redevelopment	Prosperity
2006	Volunteer Home Painting	People
2007	Free Limb Pickup	People
2007	Home Renovation Workshop	People
2007	Housing Choices	People
2007	Neighborhood Organization Startups	People
2007	Paint Give-Away Program	People
2007	Bicycle Parking	Planet
2007	Energy Audit of City Buildings	Planet
2007	Kansas City Area Mayors Sustainability & Climate Protection Conference	Planet
2007	Mission Green - City Newsletter	Planet
2007	Recycled Content Paper	Planet
2007	Shadowcliff Lodge, Grand Lake, Colorado	Planet
2007	Sustainability Task Force	Planet
2007	Sustainability Content on City Website	People
2007	Travel Policy - Carbon Offsets	Planet
2007	West Gateway Form-Based Code	Planet
2008	Biodegradable Cleaning Products	Planet
2008	Biodegradable Table Service	Planet
2008	Clean Commute Program	Planet
2008	Community Shredding Event	Planet
2008	EarthWalk 2008	Planet
2008	High School Robotic Challenge	Planet
2008	Pay-as-You-Throw Solid Waste Contract	Planet
2008	Recycling in City Buildings	Planet
2008	Tree Tagging Program	Planet
2008	Vehicle Replacement Program	Planet
2009	Community Garden Program	Prosperity
2009	Tree Trimming Program	People

While none of these programs are accounted for in our specific climate strategies, each one has

some role in raising awareness in citizens, increasing economic prosperity in the long term, and reducing Mission's environmental impact. While the extent of this role may be difficult to measure, we will continue to grow and implement projects like these which fit with the P3 philosophy. As time passes and the scope of these projects continues to grow and change, we anticipate that the effectiveness of these programs will become noticeable in the overall drop of our GHG emissions.

Given the extent and variety of projects we have already implemented, we believe the City of Mission has made significant progress considering its size, population, and geographical location in the metro area. Our work, however, is far from being finished. We must continue to catalog our programs and efforts, and continue conducting GHG inventories and revisiting this action plan if we hope to achieve our goal by 2020.

It is also the City's goal to balance future sustainability programs and investments against each P, to help ensure that our approach to climate change stays equitable to citizens but also achieves positive results. Additionally, we will strive to keep our efforts locally focused and geared toward the creation of local markets where green initiatives will find success. This in turn will help us to build community, increase economic opportunity, and achieve progress on GHG reductions. The cost savings we recover as a result of these programs should be recycled into additional funding for further sustainable initiatives.

Appendix A:

Emissions Projections for the City of Mission, 2005-2020

COMMUNITY	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Original Transportation	249,998	245,949	242,680													
Adjusted Transportation	69,999	68,866	67,950													
Commercial	99,127	92,650	96,692													
Residential	59,081	57,174	58,583													
Industrial	15,646	14,362	14,822	"Business As Usual" Projected Total Emissions												
Total Emissions	243,853	233,052	238,047	243,150	248,362	253,686	259,124	264,679	270,352	276,148	282,067	288,114	294,289	300,598	307,041	313,623
Annual Increase		-4.43%	2.14% **Assume 2% annual rise from 2008 to 2020													
Baseline	243,853	243,853	243,853	243,853	243,853	243,853	243,853	243,853	243,853	243,853	243,853	243,853	243,853	243,853	243,853	243,853
Emissions Goal	243,853	240,602	237,350	234,099	230,847	227,596	224,345	221,093	217,842	214,591	211,339	208,088	204,836	201,585	198,334	195,082

GOVERNMENT	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
				"Business As Usual" Projected Total Emissions												
Total Emissions	5,362	5,850	5,909	5,969	6,029	6,090	6,151	6,213	6,276	6,339	6,403	6,468	6,533	6,599	6,665	6,732
Annual Increase		9.10%	1.01% **Assume 1% annual rise from 2008 to 2020													
Baseline	5,362	5,362	5,362	5,362	5,362	5,362	5,362	5,362	5,362	5,362	5,362	5,362	5,362	5,362	5,362	5,362
Emissions Goal	5,362	5,291	5,219	5,148	5,076	5,005	4,933	4,862	4,790	4,719	4,647	4,576	4,504	4,433	4,361	4,290

Community Reduction Accounting for Growth

Business as Usual	313,623
Target 2020 Emissions	195,082
Total Emissions to Reduce	**118,541**

Government Reduction Accounting for Growth

Business as Usual	6,732
Target 2020 Emissions	4,290
Total Emissions to Reduce	**2,443**

Appendix B

Detailed Strategy Assumptions

Key:

Cell information supplied by the City
Cell information is an ICLEI assumption/estimate
Cell information is a CAPPA computation

**All tables were generated using the beta version of ICLEI's CAPPA software.

Community Level

1. Renewable Energy Credits

5	Percent of Electricity Purchased Green
$ 0.0220	Incremental Price of Green Electricity ($ per kWh)
10,000	Community Population
12,600	Annual Energy Use per Person (kWh)
$138,600	Annual Cost

CO2e (metric tons)
5,282

Comments:
A renewable energy credit is a form of paying for the generation of "clean" energy even if that energy is not consumed within the locality. In other words, Mission residents who purchase green energy credits effectively subsidize the creation of green electricity in another part of the country, should clean energy be unavailable in Kansas. We can count this as an emissions reduction because even though the city will still be supplied with coal energy, the net offset of creating clean energy through the purchase of renewable energy credits results in decreased carbon emissions entering the atmosphere.

Two figures are important in the above chart. ICLEI assumes that the "incremental price" of green electricity is just over $0.02, meaning that on average customers should pay about 2 cents more per kilowatt hour of green electricity they purchase. Secondly, the "Annual Cost" figure is not necessarily something the City would be billed for, unless the City purchased renewable energy credits. Rather, "Annual Cost" stands for the amount of money citizens of Mission would have to spend collectively in order to purchase 5% of the community's electricity as green electricity.

This strategy is limited by the availability of Renewable Energy Credits on the market. It is conceivable that the availability of these credits could fluctuate in the future, depending on a variety of factors. If local credits become available, those credits should be purchased locally before purchasing credits outside the region.

2. Incorporation of Green Building Standards into Code

479,792	Square Foot of New Construction & Renovation
$ 0.0988	Price of Electricity ($ per kWh)
$ 1.06	Price of Natural Gas ($ per therm)
17.3	Typical New Construction Annual Energy Use per Square Foot (kWh)
0.33	Typical New Construction Annual Energy Use per Square Foot (therms)
30	Percent Electricity Savings
30	Percent Natural Gas Savings
$4.00	Increased Building Cost ($ per square foot)
2,490,120	Total Annual Electricity Savings (kWh)
47,499	Total Annual Natural Gas Savings (therms)
$296,373	Annual Cost Savings
6.5	Simple Payback (years)
CO2e (metric tons)	
2,354	

Comments:
Because the City tracks only the costs of new construction/renovation through its building permit process, we divided the annual total valuations on building permit by an estimate of average construction costs per square foot. In 2008, Building Permit Valuations = $71,968,824.85. This was divided by the average sq. ft. cost of new construction/renovation of $150 (according to Katz, et al "The Costs and Financial Benefits of Green Buildings" 2003). Katz originally gives estimates of $150-$250 for construction to account for different variables (such as building type, size, etc.) We chose to use the lower end of his estimate since California's costs are typically higher than those in Kansas.

Buildings account for 40% of total energy use and about 35% of GHG emissions in the United States. Design and construction of new buildings, or major renovation of existing ones, provides an opportunity to implement energy saving measures that reduce GHG emissions. Green building design views buildings as a complete system in order to maximize health, comfort, and productivity of occupants while minimizing resource use for construction and operation. An example of the kind of savings possible by carefully considering the whole building system before construction is that windows, insulation, and lighting systems can be chosen to minimize the cooling load, allowing for a smaller cooling unit to be used for savings in both capital and operations costs.

3. Yard Waste Composting

300	Waste Diverted from Landfill (lbs/person*yr)
10,000	City Population
0.00028	Methane Emission/lb Yard Waste (metric tons CO2e)

CO2e (metric tons)
640

Comments:
Here we use assumptions provided by ICLEI but tailored to the size of Mission's population. In 2009 the City began implementing this strategy with its new solid waste contract.

When organic matter like wood, paper, food, and yard wastes is placed in landfills, it decomposes anaerobically, producing methane. Methane is a GHG 21 times more powerful than carbon dioxide. Composting yard waste rather than sending it to landfills prevents these emissions.

4. Energy Efficiency Education Targeted at Businesses

50	Businesses Participating
$ 0.0988	Price of Electricity ($ per kWh)
$ 1.06	Price of Natural Gas ($ per therm)
11,500	Annual Energy Savings per Business (kWh)
367	Annual Energy Savings per Business (therms)
$1,000	Cost of Program ($ per business)
575,000	Total Annual Electricity Savings (kWh)
18,350	Total Annual Natural Gas Savings (therms)
$76,261	Annual Cost Savings
0.7	Simple Payback (years)

CO2e (metric tons)
585

Comments:
We assume a 10% participation rate among all the business located in Mission; at the end of 2008 there were just over 500 licensed businesses operating in the City.

Businesses, particularly small businesses, represent a significant portion of energy use in a community. Businesses can enact many simple measures to save energy. Outreach and education programs that offer information about and encourage conservation measures can tap into this potential. Energy efficiency education that reaches a large number of businesses can bring a significant reduction in electricity use. Communities with fossil fuel power plants within their airshed could contribute to the reduction of criteria air pollutants created from electricity generation through such a program.

5. Green Business Programs

50	Businesses Participating
$ 0.0988	Price of Electricity ($ per kWh)
$ 1.06	Price of Natural Gas ($ per therm)
11,500	Annual Energy Savings per Business (kWh)
367	Annual Energy Savings per Business (therms)
$100	Cost of Program ($ per business)
575,000	Total Annual Electricity Savings (kWh)
18,350	Total Annual Natural Gas Savings (therms)
$76,261	Annual Cost Savings
0.1	Simple Payback (years)

CO2e (metric tons)
585

Comments:
We assume a 10% participation rate among all the business located in Mission; at the end of 2008 there were just over 500 licensed businesses operating in the City.

Green business programs are voluntary programs to encourage businesses to go beyond operations regulations and to conduct business in an environmental friendly manner. Green business programs typically look at pollution reductions, energy savings, and recycling and waste reduction. Businesses receive a checklist of measures, and implement a certain number of them to be certified. The incentive for businesses to participate is good publicity resulting from their efforts and the ability to advertise as a certified green business.

Green business programs usually provide technical assistance to participating businesses. This is helpful to smaller businesses that cannot afford to hire environmental consultants. Programs can focus on a type of businesses of particular concern or large potential for impact in that community. Programs have focused on hotel and restaurant, automotive, office, landscaping, and other kinds of businesses.

6. Low-Maintenance Landscaping

512	Residences Using Low Maintenance Landscaping
19	Annual VOC Produced by one Mower (lbs)
4	Annual Gasoline Use per Lawn (gal)
0.5	Yard Size per Home (acres)
652,000	Annual Gallons of Water Used per Acre
0.0035	Energy Use per Gallon of Water (kWh)
166,912,000	Total Annual Water Savings (gallons)
584,192	Total Annual Electricity Savings (kWh)
2,048	Total Annual Gasoline Savings (gal)

CO2e (metric tons)
509

Comments:
The 2000 US Census lists 5119 housing units as occupied in the City of Mission. Assuming a 10% participation rate, we hope to reach 512 homes.

The well-groomed green lawns that have become the assumed default landscape throughout the U.S. are aesthetically pleasing, but they come with a number of environmental costs. Landscaping using local native plants can greatly reduce or eliminate the need for irrigation, pesticides, and gasoline powered maintenance equipment. Local governments can promote landscaping with native plants by making allowances in zoning codes and weed laws, for example making exceptions to restrictions that landscaping cannot be more than a certain number of inches high.

An average acre of lawn in the U.S. uses 652,000 gallons of water each year. Urban water supplies require energy to transport, treat, distribute, and to treat wastewater. Small gasoline engines on lawnmowers and other yard equipment like leaf blowers are much more polluting than automobiles. One mower can produce as much pollution in a year as 43 cars.

When low-maintenance landscaping is implemented as a part of a broader water conservation program, a significant reduction in water use can be achieved. Water pumping, purification, and wastewater treatment can represent a large portion of municipal energy use. Communities with fossil fuel power plants within their airshed could contribute to the reduction of criteria air pollutants created from electricity generation through such a program.

Other Benefits
Once established, landscaping with native plants is less expensive to maintain than lawns. Natural landscaping provides habitat for wildlife. The high levels of pesticides and fertilizers used on lawns are also avoided.

7. Education on Low-Carbon Transportation Options

512	Number of Households Targeted
$3.00	Price of Gasoline ($ per gallon)
8,081	Average Vehicle Miles per Person
8	Percent Reduction in Vehicle Miles
29	Cost per Household
853,974	Annual Vehicle Mile Reduction
43,349	Annual Gasoline Savings (gallons)
$130,047	Annual Cost Savings
0.1	Simple Payback (years)

CO2e (metric tons)
408

Comments:
The 2000 US Census lists 5119 housing units as occupied in the City of Mission. Assuming a 10% participation rate, we hope to reach 512 homes.
Educational and marketing efforts can have a significant effect in getting people to choose other transportation modes besides driving, in many cases comparable to the effect of much more expensive system upgrades. Successful marketing efforts involve a two-way flow of information, finding out what people want in transit and what information will help them use it.

Individualized marketing has been particularly successful, surveying people to find out their interest in automobile alternatives, then sending targeted information they request about what is available in their particular location.

Promotion of a variety of transportation options (transit, ridesharing, walking, bicycling) is more effective than just providing information on a single mode. A multi-modal access guide can help people find a car-free way from starting point to destination.

Fewer vehicles on the road means less congestion and a reduced need for parking. Increased walking and bicycling makes people healthier.

8. Efficient Lighting Retrofits

100,000	Square Foot of Facilities Retrofitted with Efficient Lighting
$ 0.0988	Price of Electricity ($ per kWh)
6.85	Annual Lighting Energy Use per Square Foot (kWh)
30	Percent Savings with Retrofit
$0.06	Cost of retrofit ($ per square foot)
1,027,500	Total Annual Electricity Savings (kWh)
$101,517	Annual Cost Savings
0.3	Simple Payback (years)

CO2e (metric tons)
172

Comments:
To compute the square footage of facilities for more efficient lighting, ICLEI assumes renovating 50% of usable commercial space for an average city with a population of 100,000 persons (this number is approximately 1,000,000 square feet). Since Mission's population is 10,000 (or 10% of 100,000) we assume a square footage of 100,000 (that is, 10% of 1,000,000).

Lighting is typically the largest electricity user in commercial buildings. Most commercial buildings use fluorescent lighting, which is relatively efficient, but many buildings still have older fixtures with magnetic ballasts and T-12 size fluorescent tubes. New electronic ballasts with T-8 size tubes use 30% less energy and can provide better light quality without flicker.

Lighting plays an important role in keeping public employees and citizens comfortable and healthy. The light output of bulbs is measured in lumens. To get the most efficient bulb you should determine what lumen output is needed for a particular application and choose the lowest wattage bulb that provides that output. When retrofitting lighting, consider lighting occupancy sensors to turn lights off when no one is in the building, and automatic dimmers to adjust lighting to the level needed and take advantage of daylighting. Also pay attention to fixture design. Fixtures that direct light downward where it is needed reduce the number of bulbs needed, saving energy. In addition, light color rendering and wall colors are important factors for satisfaction of people who work under the light.

9. Water Conservation Ordinance

5	Percent Household Savings Under Ordinance
$ 0.0025	Price of Water ($ per gallon)
350	Water Used per Household per Day
10,000	City Population
0.0054	Energy Use per Gallon of Water (kWh)
24,757,752	Total Annual Water Savings (gallons)
133,692	Total Annual Electricity Savings (kWh)
$61,894	Annual Cost Savings

CO2e (metric tons)
112

Comments:
While the specifics of any such program would have to be worked out in the future, given Mission's population and 5% goal, the City could expect to see a modest decrease in GHG emissions.

Water pumping, purification, and wastewater treatment can represent a large portion of municipal energy use. Communities with fossil fuel power plants within their airshed could contribute to the reduction of criteria air pollutants created from electricity generation through a comprehensive water conservation program.

10. Water-Saving Shower Heads

500	Showerheads Replaced
$ 0.0025	Price of Water ($ per gallon)
$ 0.0988	Price of Electricity ($ per kWh)
$ 1.55	Price of Natural Gas ($ per therm)
2,690	Annual Water Savings per Shower Head
70	Percent Hot Water
0.0054	Energy Use per Gallon of Water (kWh)
0.19	Energy Use to Heat Gallon of Hot Water (kWh)
0.0098	Energy Use to Heat Gallon of Hot Water (therms)
42	Percent of Homes with Electric Water Heaters
$29	Cost per Shower Head
1,345,000	Total Annual Water Savings (gallons)
941,500	Total Annual Hot Water Savings (gallons)
82,395	Total Annual Electricity Savings (kWh)
5,351	Total Annual Natural Gas Savings (therms)
$19,080	Annual Cost Savings
0.8	Simple Payback (years)

CO2e (metric tons)
99

Comments:
The goal of 500 shower heads replaced represents almost 10% of Mission households.

Water heating is the second largest energy user in homes, after space heating and cooling. Using hot water efficiently reduces energy use and emissions. Switching to more efficient shower heads will have a negligible effect on local air quality as a stand-alone action. When shower heads are purchased as a part of a broader water and energy conservation program, a significant reduction in water use can be achieved.

11. Increase Chiller Efficiency

30,000	Square Ft of Facilities with Upgraded Chillers
$ 0.0988	Price of Electricity ($ per kWh)
3.3	Annual Energy use for Cooling (kWh per ft^2)
31	Percent Savings with Efficient Chiller
$0.36	Incremental Cost of Efficient Chillers ($/ft^2)
30,690	Total Annual Energy Savings (kWh)
$3,032	Annual Cost Savings
3.6	Simple Payback (years)

CO2e (metric tons)
26

Comments:
To compute the square footage of facilities for chiller upgrades, ICLEI assumes renovating 10% of usable commercial space for an average city with a population of 100,000 persons (this number is 300,000 square feet). Since Mission's population is 10,000 (or 10% of 100,000) we assume a square footage of 30,000 (that is, 10% of 300,000).

Energy used to heat, cool, and ventilate contributes to the majority of energy used in buildings. Improving the efficiency of the equipment used for these tasks reduces emissions and saves on climatization costs. To maximize energy savings, upgrade to the most efficient chillers, boilers, and heating, ventilation, and air conditioning (HVAC) units.

Air conditioning is one of the largest energy users in commercial buildings. Replacing older chillers with appropriately-sized and the most efficient, new chillers can reduce energy use by 30%.

12. Limit Idling of Heavy Duty Vehicles

10	Number of Buses
$3.00	Cost of Diesel
1.0	Daily Hours Buses Idled
0.5	Diesel Use per Hour of Idling (gallons)
180	Days of Operation per Year
900	Annual Diesel Savings (gallons)
$2,700	Annual Cost Savings

CO2e (metric tons)
9

Comments:
The number of buses is largely arbitrary. Mission has only three schools within its city limits, none of which use particularly heavy busing schedules. Idling vehicles needlessly burn fossil fuels and reduce local air quality.

13. HVAC Maintenance Tuneups

30,000	Square Ft of Facilities Tuned Up
$ 0.0988	Price of Electricity ($ per kWh)
$ 1.06	Price of Natural Gas ($ per therm)
3.3	Annual Energy Use for Cooling (kWh per ft^2)
0.33	Annual Energy Use for Heating (therm per ft^2)
5	Percent Savings
4,950	Total Annual Electricity Savings (kWh)
495	Total Annual Natural Gas Savings (therms)
$1,014	Annual Cost Savings

CO2e (metric tons)
7

Comments:
To compute the square footage of facilities for HVAC upgrades, ICLEI assumes renovating 10% of usable commercial space for an average city with a population of 100,000 persons (this number is 300,000 square feet). Since Mission's population is 10,000 (or 10% of 100,000) we assume a square footage of 30,000 (that is, 10% of 300,000).

Energy used to heat, cool, and ventilate contributes to the majority of energy used in buildings. Improving the efficiency of the equipment used for these tasks reduces emissions and saves on climatization costs. To maximize energy savings, upgrade to the most efficient chillers, boilers, and heating, ventilation, and air conditioning (HVAC) units.

14. Transit Oriented Development

500	Residential Units in Transit Oriented Development
$3.00	Price of Gasoline ($ per gallon)
4,770	Annual Reduction in Vehicle Miles per Person in TOD
6,153,300	Annual Vehicle Mile Reduction
312,350	Annual Gasoline Savings (gallons)
$937,051	Annual Cost Savings

CO2e (metric tons)
2,940

Comments:
500 units represents nearly 10% of Mission's households. The City's dependence on other regional governments to implement effective transportation reform cannot be overemphasized, especially in this case.

High density neighborhoods with good rail or bus transit, mixed residential and commercial uses, and pedestrian-friendly design have much lower rates of car use than typical low-density suburban developments. Transit oriented design (TOD) attempts to create such neighborhoods in planning of new or existing transit systems. The high capital investment of rail systems gives developers confidence that transit will be therefore a long time, but TOD has also been developed around bus stations, park-and-ride facilities, and bus rapid transit (BRT) routes.

15. Purchase Green Electricity

20	Percent of Electricity Purchased Green
$ 0.0220	Incremental Price of Green Electricity ($ per kWh)
10,000	Community Population
12,600	Annual Energy Use per Person (kWh)
$554,400	Annual Cost

CO2e (metric tons)
21,128

Comments:
It is important to note here that this is a community-wide measure, meaning 20% of all electricity consumed within the City of Mission (not just by its government) should be purchased as green electricity. An education campaign or other incentives would help the City reach its goal of 20%.

Green energy purchases allow an institution or home to use energy from renewable energy sources such as solar, wind, and biomass generation, without having to generate that energy themselves. The utility owns the renewable generation sources or purchases electricity from those who do, and sells green electricity to customers who sign up for it.

Government Level

1. Lights Out at Night Policy

121,200	Square Feet with Lights Out at Night Policy
$ 0.0759	Price of Electricity ($ per kWh)
6.85	Annual Lighting Energy Use per Square Foot (kWh)
35	Percent Savings With Policy
$0.06	Cost of Implementation ($ per square foot)
290,577	Total Annual Electricity Savings (kWh)
$22,055	Annual Cost Savings
0.3	Simple Payback (years)

CO2e (metric tons)
244

Comments:
Lighting is typically the largest electricity user in commercial buildings. Much energy is wasted by lights left on when no one is using them. Looking at an urban skyline, one can see many office buildings lit up at night, after everyone has left work for the day. A policy of turning lights off throughout buildings at the end of the work day eliminates this waste of energy. A lights out at night policy can use a combination of education and technology like timers and motion sensors. Many of the lights in City Hall are already switched off at night; implementing this strategy would have more of an effect at other locations such as the Community Center.

2. Lighting Occupancy Sensors

121,200	Square Feet Installed with Occupancy Sensors
$ 0.0759	Price of Electricity ($ per kWh)
6.85	Annual Lighting Energy Use per Square Foot (kWh)
35	Percent Savings With Occupancy Sensors
$0.06	Cost of Sensors ($ per square foot)
290,577	Total Annual Electricity Savings (kWh)
$22,055	Annual Cost Savings
0.3	Simple Payback (years)

CO2e (metric tons)
244

Comments:
City Hall has already experimented with installing a light sensor in the Mayor's office. This strategy advocates installing lighting occupancy sensors to detect motion in the lighted space and turn lights off if no one is present.

3. Efficient Street Lights

1,000	Street Lights Replaced with LED Street Lights
$ 0.0759	Price of Electricity ($ per kWh)
264	Annual Energy Savings of one LED Street Light (kWh)
$602	Incremental Cost to Purchase an LED Street Light
264,000	Total Annual Energy Savings (kWh)
$20,038	Annual Cost Savings
30.0	Simple Payback (years)
CO2e (metric tons)	
221	

Comments:
As LED lighting continues to improve, more significant gains could be realized from utilizing this technology on a wide basis within the city. It may also cut down on light pollution.

4. Efficient Lighting Retrofits

121,200	Square Feet Retrofitted with Efficient Lighting
$ 0.0759	Price of Electricity ($ per kWh)
6.85	Annual Lighting Energy Use per Square Foot (kWh)
30	Percent Savings with Retrofit
$0.06	Cost of retrofit ($ per square foot)
249,066	Total Annual Electricity Savings (kWh)
$18,904	Annual Cost Savings
0.4	Simple Payback (years)
CO2e (metric tons)	
209	

Comments:
The light fixtures in City Hall and other buildings may already adhere to the efficiency standard. Additionally, given concerns about the space needs of City Hall, consideration of this strategy should be included in any discussion of remodeling or moving municipal operations to a new building.

5. Energy Efficiency Retrofits of Existing Facilities

121,200	Square Foot of Facilities Retrofitted
$ 0.0759	Price of Electricity ($ per kWh)
$ 1.06	Price of Natural Gas ($ per therm)
17.3	Typical New Construction Annual Energy Use per Square Foot (kWh)
0.33	Typical New Construction Annual Energy Use per Square Foot (therms)
10	Percent Electricity Savings
10	Percent Natural Gas Savings
$1.50	Retrofit Cost ($ per square foot)
209,676	Total Annual Electricity Savings (kWh)
4,000	Total Annual Natural Gas Savings (therms)
$20,154	Annual Cost Savings
9.0	Simple Payback (years)

CO2e (metric tons)
198

Comments:
Energy efficiency retrofitting can include anything from insulation to efficient toilets and shower heads. Assuming the City could achieve 10% savings in electricity and natural gas from these retrofits, it would probably see a modest reduction in its GHG emissions.

Buildings account for 40% of total energy use and about 35% of GHG emissions in the United States. Over the next few decades, most of this energy will be used by existing buildings. Many measures can be applied to existing buildings to improve their efficiency, including using efficient lightbulbs and fixtures, replacing appliances with more efficient ones, increasing insulation, replacing windows, and upgrading HVAC systems. Local governments can set an example by making efficiency improvements to their own buildings. The jurisdiction can require improvements to private buildings when renovations are made or buildings are sold. Governments can also encourage efficiency improvements by offering low or zero interest loans to building owners for improvements.

6. Utilize Solar Energy

100	kW of PV Installed
$ 0.0759	Price of Electricity ($ per kWh)
4.5	Sun Hours per Day
$9,000	Cost of PV installation ($ per kW)
164,250	Annual Energy Production (kWh)
$12,467	Annual Cost Savings
72	Simple Payback (years)

CO2e (metric tons)
138

Comments:
100 kW installation appears to be typical according to the ICLEI software. The amount of kW power to be installed is dependent on the number of suitable locations for installation and the size of the budget for equipment and installation fees.

Putting solar panels on city buildings is a good way to increase the visibility of solar energy in the community, while providing clean energy for building use. Local governments can borrow money at low interest rates through bond issues, making solar more economical than it is for individuals or businesses. Some cities have combined solar energy with efficiency measures, with the shorter payback period of the efficiency measures helping to pay for the solar.

Many residents or businesses would like to use solar power, but the large up-front cost is an obstacle. Local governments can help overcome this barrier by paying a portion of system costs, offering low-interest loans, or organizing group buying programs to negotiate lower prices. These programs are an effective way of combining public and private funds for renewable energy. State or federal incentives may also be available, and local governments can help individuals apply for these. Educational and technical assistance programs can also promote solar power. Local governments can offer information clearinghouses and connect consumers with solar installers.

7. Reflective Roofing

121,200	Square Feet of Reflective Roof Installed
$ 0.0759	Price of Electricity ($ per kWh)
$ 1.06	Price of Natural Gas ($ per therm)
1.18	Annual Electricity Savings per Roof Square Foot (kWh)
0.0006	Annual Natural Gas Use Increase per Square Foot (therms)
$0.25	Incremental Cost of ENERGY STAR Roofing ($ per square foot)
143,380	Total Annual Electricity Savings (kWh)
73	Total Annual Natural Gas Use Increase (therms)
$10,805	Annual Cost Savings
2.8	Simple Payback (years)

CO2e (metric tons)
120

Comments:
The assumption here is that all roofing owned by the City could be transformed into reflective roofing; again this is dependent on the suitability of the roof. Reflective roofing works by deflecting light and heat from a building so that it takes less money to cool the building in the summertime. ENERGY STAR-certified reflective roof products reflect at least 65% of sunlight striking the roof, lowering roof temperature by up to 100 °F. Reflective roofs save the most energy in hot, sunny climates. A reflective roof will only save energy on a building with air conditioning, although it will keep a non-air conditioned building cooler. Reflective roofs cost about the same as traditional roofing products, so installing one during construction, or when roof replacement is needed anyway, involves no cost premium.

8. Increase Chiller Efficiency

121,200	Square Ft of Facilities with Upgraded Chillers
$ 0.0988	Price of Electricity ($ per kWh)
3.3	Annual energy use for Cooling (kWh per ft^2)
31	Percent Savings with Efficient Chiller
$0.36	Incremental Cost of Efficient Chillers ($/ft^2)
123,988	Total Annual Energy Savings (kWh)
$12,250	Annual Cost Savings
3.6	Simple Payback (years)

CO2e (metric tons)
104

Comments:
The combined floor space of existing City-owned buildings is approximately 121,000 square feet.

9. Green Roofs

121,200	Square Feet of Green Roof Installed
$ 0.0759	Price of Electricity ($ per kWh)
0.63	Annual Direct Electricity Savings per Roof Square Foot (kWh)
0.35	Annual indirect electricity savings per Roof Square Foot (kWh)
$7	Incremental Cost of Green Roofing ($ per square foot)
75,991	Annual Electricity Savings to Building Owner (kWh)
119,005	Total Annual Electricity Savings (kWh)
$5,768	Annual Cost Savings to Building Owner
141.8	Simple Payback (years)

CO2e (metric tons)
100

Comments:
This strategy currently assumes replacement of each roof owned by the City; this assumption is not entirely realistic as the roofs on City Hall are sloped and may have to be redesigned in order to accommodate green roofing. Green roofing includes using vegetation and other growing plants to shield a building from the sun and help act as a carbon sink.

A green roof uses a soil medium and plants on top of an impermeable membrane roof. They reduce building energy use by insulating the roof, and by cooling it through shading and evapotranspiration, the process by which plants draw water from the soil and release it to the air. A green roof also cools the air around surrounding buildings, and green roofs and many buildings through a city reduces the urban heat island effect. This saves on air conditioning energy for all buildings in the city.

Green roofs save the most energy in hot, sunny climates. A green roof will only save energy on a building with air conditioning, although it will keep a non-air conditioned building cooler.

Another benefit of green roofs in reducing stormwater runoff. Green roofs can hold 70-90% of the water from summer storms and 25-40% of winter storm water. Additionally, they delay runoff and filter the water. Green roofs can avoid the need for expensive expansions of wastewater treatment plants to handle stormwater. Green roofs also contribute to a LEED certification. And green roofs improve the aesthetic quality of buildings. If open to the public or building employees they can provide recreational space, and they have even been used to grow food.

Appendix C

Programs to Date

People

Prior to 2000:

Bulky Item Pick Up

In addition to regular trash pickup, two large items weighing no more than 65 lbs. each may be placed at the curb. This service is provided to assist those in the community unable physically or financially to make this arrangement for themselves.

2000:

Mission Bank Home Improvement Loan

This program is designed to provide loans for the purpose of making exterior home repairs or improvements, that affect the livability of the home, such as plumbing, HVAC, exterior siding, window replacement, roofs, etc.

The City of Mission has partnered with The Mission Bank to buy down a portion of the loan interest rate for Mission residents. Loans may be secured up to a maximum of $15,000 and may be repaid over a period not to exceed five years.

2005:

Franchise Fee & Property Tax Rebate Program

The Franchise Fee & Property Tax Rebate Program is available to Mission residents that fall within 80% of the HUD-MSA income guidelines. The City refunds 100% of the city franchise fees paid on electric, basic telephone (landline only) and gas utilities. Cable franchise fees are excluded. The City also refunds 50% of the City mill rate charged to owner-occupied residential applicants.

2006:

Mission Possible

The award winning Mission Possible program is designed to assist eligible residents with the removal of physical barriers, dilapidated structures, and qualifying minor home repairs. This program is limited to residents who are eligible to receive Medicare or Social Security disability benefits.

Volunteer Home Painting

In 2007, the City was into its second year of the Mission Possible and Paint Give-Away Programs. It became apparent that there was a segment of the population that wanted to paint their homes, but physically were unable to accomplish the task.

As a subset of the Mission Possible Program, the City began the Mission Volunteers, which provided exterior painting services for qualified residents. A total of two houses were painted using volunteers in 2007. Four properties are already scheduled for 2008, with numerous groups from the area expressing interest in doing a volunteer project.

2007:

Free Limb Pickup (post storm events)

Following a moderate ice event in December 2007, the City offered to residents who qualify for the Mission Possible program free curb-side limb removal. The ice event was not severe enough to qualify for FEMA reimbursements, but we wanted to ensure that residents who were physically unable to remove the limbs were able to access services.

Home Renovation Workshop

This free one-day workshop was offered by the City to encourage re-investment in the existing housing stock in Mission. Co-sponsored by the Home Builders Association of Greater Kansas City, Deffenbaugh Disposal, and the City of Prairie Village, it featured 8 demonstrations and numerous vendors.

Housing Choices

The City of Mission has spent a considerable amount of time over the last several years planning for its future and creating a vibrant, mixed-use downtown district. Through the visioning process, participants identified a number of positive traits that are unique to Mission. Conversely, the vision plan identified a number of negative features, one of which is the overwhelming present of asphalt, surface parking lots that do nothing to help promote the aesthetically pleasing, pedestrian friendly environment that the City is striving to achieve.

The City has decided to set an example, and play an active role in both encouraging and providing tangible examples of parking lot reuse and infill development. For that reason the City has entered into preliminary development contracts for the redevelopment of a city-owned parking lot located just west of the Community Center as senior independent apartments and city-owned land south of the Gateway Project as condos. Both of these proposed projects would bring additional housing choices to Mission. According to the 2000 U.S. Census, nearly 1 out of every 5 Mission households were headed by residents of 65 years of age or older.

In addition, the City of Mission Housing Task Force, comprised of residents and industry professionals, has been established to preserve quality housing in Mission. The Task Force will provide input that will lead to the adoption of a Comprehensive Housing Policy after considering topics such as: affordable housing, infill housing, sustainable housing, senior housing, foreclosure prevention, fair housing, and ways to encourage the remodeling of Post World War II housing using concepts from the MARC Idea Book.

Neighborhood Organization Startups

Mission has a large number of single-family neighborhoods that are not included in homes associations with deed restrictions, etc. As an aging first ring suburb, we felt it was critical to provide residents with opportunities to build social capital through the establishment of neighborhood groups.

Our pilot project was launched in 2007 using a blend of strategies we found from communities across the country. Morrison Ridge Neighborhood Organization was established in partnership with neighborhood leaders, residents, elected officials, and city sponsorship in the fall of 2007. They held a large and well attended event celebrating their 100th year as a neighborhood. The group continues to meet and is working on

becoming a recognized 501-4c. In the summer of 2008, the Roeland Court neighborhood offered climate change, recycling and other environmental information at their neighborhood event.

Paint Give-Away Program

The Paint Give-Away Program provides free exterior paint and primer to income eligible Mission homeowners. This year the City of Mission has partnered with Mack True Value Hardware and Sherwin Williams to provide quality paint to our residents. There is a wide variety of color selections to choose from.

Sustainability Content on City Website

In 2007 the City began posting information on climate change, energy efficiency, and steps residents could take to reduce their carbon footprint on its website, www.missionks.org. The website also informs residents of ongoing sustainability programs and resources to help them achieve their personal reduction goals.

2009:

Tree Trimming Program

The Neighborhood Services department coordinates a tree trimming/removal program which provides assistance to citizens who can't afford to do it themselves.

Prosperity

2003:

Mission Business Development Committee Grant Program

The goal of the Mission Business Development Committee is to create, maintain, and enhance a business climate that maintains the quality of life in Mission, Kansas. The Mission Business Development Committee (MBDC) was established in August 2003 to assist in the revitalization and redevelopment of the Mission business district. Responsibilities of the committee include development and administration of investment and revitalization programs for this area. The initial funding for the committee was provided by the City from funds generated from Target sales taxes in the amount of $450,000.

The MBDC is proud of the continued support of the MBDC Grant program. The committee administers the distribution of matching funds up to $10,000 per business for external improvements to commercial businesses. All commercial property is eligible. Reimbursement will be provided at 50% of actual costs but not to exceed 50% of original approved estimate or bid. Since the Committee was formed in 2003, assistance has been provided to 83 local businesses. MBDC grants in the amount of $175,943 have leveraged over $430,000 of total re-investment in Mission businesses.

In 2009 the MBDC became the Mission Convention & Visitors Bureau, or MCVB.

2005:

Business Relocation Policy

As part of a major flood control project for Rock Creek along Johnson Drive in Mission, it became necessary for the City to purchase and demolish certain properties. In

order to minimize the impact on the businesses affected by this project, the City developed a business relocation policy. The City assisted approximately 10 local businesses through this process.

2006:

Tax Increment Finance Districts for Mixed Use Redevelopment

In order to stimulate and develop the general and economic welfare of the City of Mission, the City Council determined to establish a redevelopment district for the old Mission Shopping Mall site. The establishment of a Tax Increment Finance District at this location was used to encourage the re-use of the site for a mixed use development proposal known as the Gateway Project. The Gateway is proposed to include approximately 823,000 square feet of retail, office, and residential, hotel, and aquarium uses in the heart of northeast Johnson County. It is hoped the Gateway will serve as a catalyst for additional redevelopment within the Johnson Drive corridor.

2009:

Community Garden Program

Beginning in 2009, the City of Mission will sponsor a community gardening effort using local volunteers to help grow food for low-income and disabled residents within the city. The garden will also be used as an educational tool for area youth, and excess produce may be sold and reinvested in the garden or in a scholarship fund for youth volunteers.

Planet

2002:

Tree Board Initiatives

The City of Mission's Tree Board must be consulted before any existing landscaping is destroyed or trees are removed. The Tree Board also issues recommendations and approval for replacing new and old landscaping, including for developments like the Rock Creek Trail. Additionally, the Tree Board advocates for native plantings both at the City level and residential/business level, and has an annual offering of trees and native grasses to residents at discount prices.

2005:

Rain Barrel Workshop

Storm water runoff is a concern for Mission. In an effort to reduce runoff flowing into our City's storm water system and creeks and to increase environmental awareness the City began hosting Rain Barrel Workshops in 2005. The City has hosted two workshops per year, each at capacity for interested residents. Rain Barrels are a great way to promote water conservation in the community! Mission Bank Home Improvement Loan Program

This program is designed to provide loans for the purpose of making exterior home repairs or improvements that affect the livability of the home, such as plumbing, HVAC, exterior siding, window replacement, roofs, etc.

2006:

Buffalo Grass Plantings

In 2006 the City began to incorporate buffalo grass into all medians in the city. Buffalo grass is a native, permanent, low growing, warm season grayish-green grass which requires less water, fertilizer and mowing than other grasses. Buffalo grass turf goes dormant and turns brown with extended drought and cool fall weather. This program was expanded in 2008 to include part of the Public Works property on Lamar and the Rock Creek Trail.

City Greenhouse

The new Public Works facility includes a green house in which the City is able to grow plant materials for landscaping projects in the City at a fraction of the cost of purchasing materials from a commercial greenhouse.

2007:

Bicycle Parking

The City recently purchased a bike rack in response to an increased interest in bicycle commuting following the national bike to work day in 2007. Two to four employees at City Hall bike to work year round. The bike rack was installed by Public Works employees and is located just outside the south entrance to City Hall.

Energy Audit of City Buildings

In the summer of 2007 the City began the process of conducting an energy audit of all City buildings. The goal of the audit is to identify ways to reduce operating costs and increase efficiency -- concepts that are key components to operating successful businesses.

Kansas City Area Mayors Sustainability & Climate Protection Conference

On Friday November 2, 2007 local mayors from around the Kansas City region thought globally and acted locally to combat climate change by gathering at Rockhurst University to sign the Mayors Climate Protection Agreement. The City of Mission in concert with Rockhurst University and the City of Gladstone, Missouri hosted and event at which sixteen local mayors from both Kansas and Missouri took part in the signing. This set the national record for the most signings of the U.S. Mayors Climate Protection Agreement for a region in a single day. Combined with other local mayors who had already endorsed the agreement, this brings the total regional population represented by the agreement to 652,569, according to the 2000 US Census.

The signing came at the same time as the U.S. Conference of Mayors first ever Climate Protection Summit in Seattle, Washington.

Among other things, the agreement calls for participating cities to inventory their greenhouse gas emissions and take steps to reduce them to 7% below their 1990 levels by the year 2012. The City of Mission and Prairie Village have both established committees to begin exploring who this can be accomplished.

Mission Green - City Newsletter

In the summer of 2007 the City added a 2 page section to its quarterly newsletter devoted entirely to sustainability issues. The newsletter is distributed to all Mission

residents. The "Mission Green" section is a two page spread which highlights local events and offers season tips for incorporating sustainability into resident's daily lives.

Recycled Content Paper

In the winter of 2007 the City of Mission switched to purchasing 100% post consumer waste, acid free, and chlorine free copier paper. On average the City uses over 800 reams or 400,000 sheets of paper per year.

Shadowcliff Lodge, Grand Lake, Colorado

Beginning in June of 2007 the City of Mission began a program of yearly sustainability retreats to Shadowcliff Lodge in Grand Lake, Colorado. These workshops help local decision makers, residents, and business owners to explore the big pattern implications of climate change, the underlying principles of sustainability, suggest some models of more sustainable governance and encourage local leaders to incorporate sustainable thinking and action into every aspect of their strategic plans. Participants work to create better quality places in which to live, work and raise our families. Sustainability incorporates these values while recognizing our responsibility to address climate change in a meaningful manner as leaders and private citizens. The ability of the Earth to support human life in the way that we have come to enjoy - clean water to drink, clean air to breathe, and soil that grows human-friendly crops, depends upon each of us making major changes now. This will only happen if we as leaders begin to see and act in the world with a new perspective.

Sustainability Task Force

The City of Mission recently hosted a Sustainable Governance Workshop in Grand Lake, Colorado. This event, which was attended by multiple Mission elected officials, and Staff, as well as other representatives of neighboring municipalities, county, state and federal government, was an opportunity to explore implications of climate change, learn about principles of sustainability, and models of more sustainable governance. As a result of this workshop, Mayor McConwell appointed a special task force to develop a Comprehensive Sustainability Action Plan to incorporate sustainable thinking into all strategic plans for the City. The City of Mission also became a signatory to the U.S. Conference of Mayor's Climate Protection Agreement on November 2, 2007. This agreement calls for a 7% reduction in greenhouse gas emissions from 1990 levels by the year 2012.

Travel Policy – Carbon Offsets

The City Council passed an amendment to their travel policy in August of 2007 to include the consideration of the carbon footprint of such activities. The policy states that at the conclusion of a trip the Finance Director or his or her designee will make a calculation of the carbon emissions that each trip generated. The carbon emissions generate by the trip will them be offset in "real" dollars using the City's Carbon Offset Calculator. Carbon offset dollars will be deposited in the City's Carbon Offset Fund. Over $500 have been allocated to this fund to date. As an indirect result of this policy, staff has begun to compare the carbon impacts of various modes of travel as part of the decision making process for travel arrangements. It is anticipated that several

participants in the 2008 Shadowcliff retreat will even choose to travel by train.

West Gateway Form Based Code

In October of 2007 the City Council adopted a new zoning overlay called the West Gateway Form Based Code. This zoning tool covers approximately 130 acres within the western part of the City of Mission. The Form Based Code is the implementation of the vision plan which was developed for the area which called for increased density, expanding housing options, and encouraging local and regional transit. The Form Based Code includes text descriptions, graphics, and photographic examples to clarify acceptable development and built improvements. This type of code describes the physical "form" of a development and how it relates to its surroundings. Overall, a Form Based Code clearly describes what can be done with a property by qualitative means (pictures, other graphics), rather than indicating what is not allowed by quantitative requirements (archaic zoning setbacks, parking requirements, building heights, etc.).

2008:

Biodegradable Cleaning Products

In the spring of 2008 the Community Center switched to a hydrogen peroxide based cleaning products. By using this solution the community center has been able to discontinue using 9 other cleaners.

Biodegradable Table Service

In the spring of 2008 the Community Center began using only biodegradable cups, utensils, and stir sticks for special events and rentals at the facility. The Community Center typically hosts several such events per week.

Clean Commute Program

Clean Commute is a program offered by Bridging the Gap and funded by the Congestion and Mitigation Air Quality Improvement Program (CMAQ), which focuses on how transportation choices affect local air quality. Clean Commute allows employees of all levels to work together to educate and change the driving habits of their co-workers and community members—focusing specifically on biking and walking to work.

Because of the City of Mission's high number of employees who registered for the Commuter Challenge during Bike Work Week, we have been selected as one of eight local businesses in Wyandotte and Johnson Counties to participate in the next round of the program. Participation includes speakers for lunch and learns, on-site bike clinics, 2 new fully equipped TREK commuter bikes and bike parking racks as needed. Employees will be asked to log their trips on the Clean Commute bikes to track the number of car trips eliminated and emissions saved. The program is administered by several staff coordinators who volunteer their time.

Community Shredding Event

The community shredding event is an annual opportunity for Mission residents to bring sensitive documents to be properly shredded and recycled. Beginning in 2008, Mission residents brought approximately 2 tons of paper to be recycled. The event was held for one day in the Sylvester Powell, Jr. Community Center parking lot.

EarthWalk 2008

The City of Mission has formed a team to participate in EarthWalk 2008. The team is open to both employees and residents of the City. EarthWalk is part of Kansas City region's largest annual celebration of Earth Day with the purpose of providing environmental education with planet-friendly exhibitors, live entertainment and crafts and activities for children of all ages. By walking and/or raising money for the Kansas City EarthWalk, the City of Mission is directly support environmental education and awareness in Kansas City. The EarthWalk benefits Bridging the Gap, a local environmental not-for-profit organization. Bridging The Gap works to make the Kansas City region sustainable by connecting environment, economy and communities.

High School Robotic Challenge

The City has partnered with local high school science students at Shawnee Mission North, to see if there's a way to hook up our stationary bikes and other equipment at our Community Center to small generators or batteries to produce electrical power for the facility. This energy could be used to operate television sets, fans, etc. The amount of renewable energy produced would be measured so community center patrons can see what they are doing for the environment.

Pay-as-You-Throw Solid Waste Contract

By implementing Johnson County's first pay-as-you-throw solid waste contract, the City of Mission is leading the way in curbing excess waste which is shortening the life of the area's landfill. The contract features unlimited curbside recycling for all single-family homes in Mission free of charge. Recycling is picked up on the regularly scheduled trash pick-up day. Trash is limited to one 65-gallon cart each week; excess must be placed in pre-purchased Deffenbaugh trash bags in order to be picked up. Additionally, the City negotiated for all yard waste picked up from residences to go to a composting facility rather than the landfill, to keep useful biodegradable matter from filling up the landfill's space.

Recycling in City Buildings

The City offers paper, plastic, aluminum and tin recycling at centralized locations at all City buildings. Fourteen can/bottle and seven paper recycling containers have been placed throughout the Community Center for the use of the public. The Community Center is a major center of activity in Mission. Waste is collected weekly by the Public Works Department and weighed to track how much is diverted from the land fill. As an incentive to participate in recycling at work, City employees were offered the opportunity to convert their desk side trash cans into personalized recycling bins and to share communal trash cans instead.

Tree Tagging Program

Conducted in collaboration with Heartland Alliance, the Tree Tagging Program places tags on designated trees in the community which indicate a monetary amount the tree is saving the community over its lifespan. The program brings more visibility to how much carbon emissions reduced, how valuable trees are for reducing energy, and raises awareness about environmental issues.

Vehicle Replacement Program

In consultation with the EPA's Green Vehicle Guide, the City is currently considering adding a new vehicle to its fleet. This vehicle would help to reduce the barriers faced by employees choosing alternative ways of commuting to work like biking, walking and mass transit. Currently the City does not have any vehicles available to employees for work related travel. While City employees make every attempt to carpool, all trips for meetings and conferences are made in personal vehicles. The potential for Mission employees to use alternate modes of travel is very high as 45% of Mission employees live within the zip code that more or less defines the City limits. More than 70% of City employees live within a roughly a five mile radius of the City Hall.

In addition, the police department is currently exploring the feasibility of adding higher fuel efficiency standards in its next fleet vehicle bid and conversion to alternative fuel vehicles.