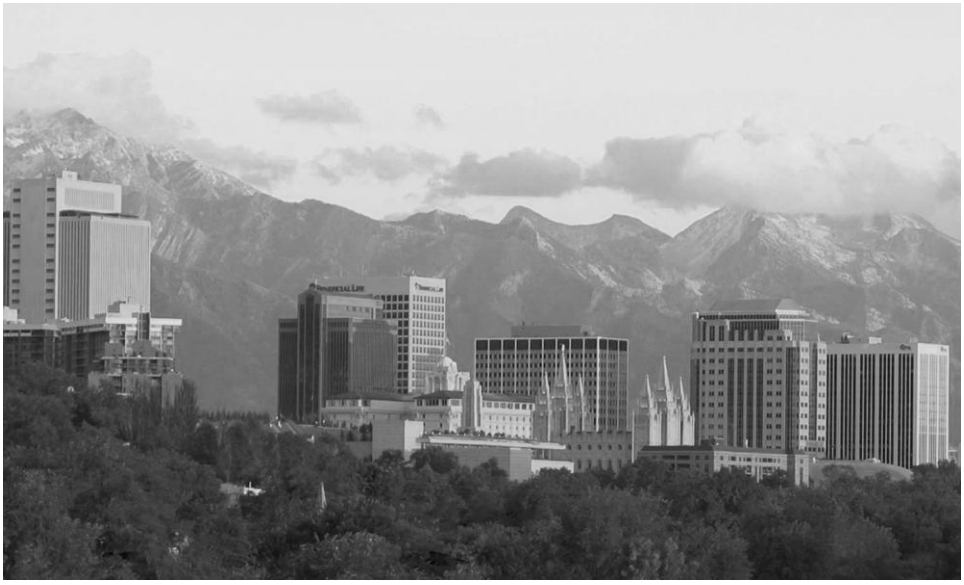
Salt Lake City Green



ENERGY AND TRANSPORTATION SUSTAINABILITY PLAN

August 2011

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LETTER OF INTRODUCTION

We are not leaving our future to chance. Having completed a comprehensive analysis of current activities and identified a wide range of potential strategies, we will carry out this plan for creating an even cleaner, more livable, and responsible community. The strategies proposed in this plan are a reflection of the extensive expertise and commitment of community members and experts using the highest quality data available, local knowledge, and best practices from around the country. Salt Lake City has already been recognized as a leader in sustainable development, a great place to do business, and an exceptional community in which to live and recreate. The approaches detailed in this plan will ensure we continue to lead and thrive in accordance with our values.

Our recently completed Community Carbon Footprint quantified all significant emissions resulting from residential, commercial, and industrial activities in our community. It gave us our first ever baseline and is invaluable for the insights it provides into where we can make the biggest difference. In 2009, we emitted 4.75 million metric tons of carbon dioxide equivalent – or 26 metric tons per person, which is just above the national average. Most of these emissions, 54 percent, resulted from electricity use. Consequently, there is great opportunity for drastically reducing emissions if we can improve energy efficiency, particularly in buildings where most electricity is consumed, and use cleaner sources of electricity.

Another result this inventory tells us is that Salt Lake City residents drive less than the average American in large part because we live in a relatively small urban area with increasing access to transit and other alternatives to the single occupant automobile. We are committed to further reducing vehicle miles traveled and reducing traffic by making biking, walking, transit, carpooling, and car sharing as convenient and enjoyable as possible.

Armed with this information, we are committing to reduce our greenhouse gas emissions to 17 percent below 2005 levels by 2020. This plan details how six key strategies and a host of supporting strategies for reducing emissions will get us there. They reduce our contribution to climate change; clean the air; provide greater energy security; support a green energy economy; reduce traffic; and protect our water supply, wildlife, and other natural resources. In essence, these strategies create a stronger and more livable community. Additionally, this plan provides suggestions for adapting to the impacts of climate change, which are already being observed in Utah.

Salt Lake City is proud to be a leader in the area of sustainable development. We believe that our thoughtful, collaborative, and quantified approach will ensure even greater success in the future. This effort is just the beginning. Annually, we will report on our carbon emissions and analyze our performance with respect to our goal, current initiatives, and new potential strategies. Additionally, new activities will be considered based on their impact to our carbon footprint. The city will also continue to depend upon the depth of knowledge and passion of our citizens to help drive us to our goals.

Thank you for all you do,

Mayor Ralph Becker

EXECUTIVE SUMMARY

Salt Lake City, as Utah's economic, cultural, and political hub, has and continues to experience strong population growth. Investments in housing, education, and commercial infrastructure are fueling economic expansion, population growth, and tourism. Along with the benefits of such growth come challenges: air pollution, traffic, energy consumption, water supply, stormwater management, and pressures on open space and agriculture among others. Meeting these challenges responsibly is at the heart of the city's desire to maintain a high quality of life for its citizens. Effective planning and management of energy sources and consumption are keys to growing responsibly.

Beyond simply meeting challenges, Salt Lake City is committed to continued leadership in sustainable development. This Energy and Transportation Sustainability Plan (ETSP) has been developed based on the firm belief that thoughtful planning and solutions can benefit the financial, physical, and social health of our citizens. It is also embedded in the notion that we must assess the impacts of our actions.

Based on the first Community Carbon Footprint, this ETSP pursues meaningful improvements while minimizing unnecessary risk or harm. It also serves as a way to prioritize actions based on the costs and impacts. The ETSP is guided by data obtained for the Community Carbon Footprint, which detailed emissions resulting from of all activities within the city's boundaries from 2005 to 2009, to create informed and reasonable strategies for similarly reducing the carbon footprint of the entire community. The Community Carbon Footprint will serve as a benchmark by which to annually assess progress in reaching reduction goals.

Salt Lake City is not alone in this effort. Other Utah communities (Park City, Town of Alta), universities (University of Utah, Westminster College, Salt Lake Community College), and businesses (Kennecott Utah Copper, Kennecott Land, the Utah Transit Authority) are also identifying carbon emission reductions as a goal and integrating it into their decision making and planning.

Salt Lake City requested the participation of a diverse group of well-informed stakeholders to form the Energy and Carbon Advisory Committee (ECAC,) whose role was to validate the process for developing the greenhouse gas inventory, establish a community greenhouse gas reduction goal, and to create strategies for meeting the city's carbon reduction goals.

Using the city's ten key sustainability areas as a starting point, the ECAC and consultants brainstormed potential strategies. Surveys and conference calls were used to consolidate and further define the most effective and feasible measures. Once key strategies were identified, data from similar programs in other communities were used to create cost, savings, and impact estimates. Where analogous programs could not be found, estimates were based on conservative assumptions. Details regarding assumptions and data used to quantify strategies can be found in Appendices B and C.

The ECAC established a community goal to reduce emissions 17 percent below 2005 levels by 2020, which is aligned with some proposed federal targets and slightly more aggressive than the regional goal for the Western Climate Initiative and Park City of 15 percent below 2005 levels by 2020. Utah has established the goal of reducing emissions to 2005 levels by 2020. As signatories to the American College and University Presidents' Climate Commitment, the University of Utah, Westminster College, Utah State University, and Weber State University have committed to achieving climate neutrality as soon as possible.

Although this ETSP is the city's first formal step at assessing strategies with respect to their impact on reducing carbon emissions, it is not the first effort toward sustainable development and carbon reduction programs, improving the environment, and building a strong economy.

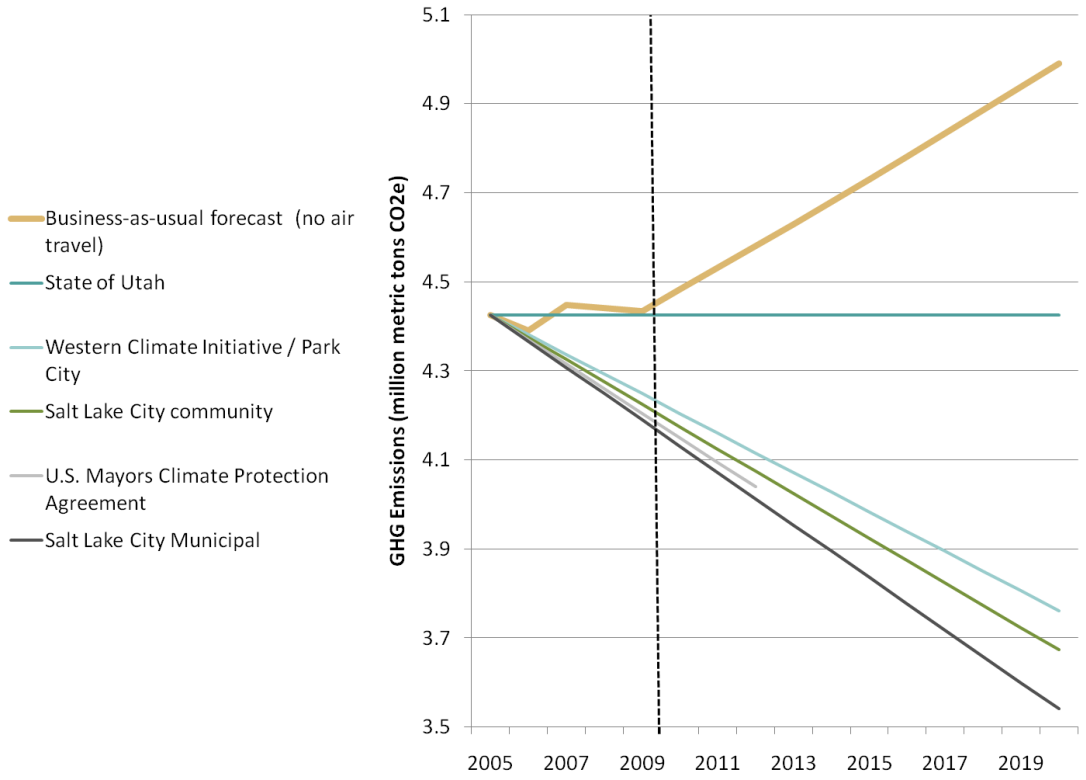

Figure 1. Business-As-Usual Forecast and Target Scenarios

Salt Lake City joined the U.S. Conference of Mayors Climate Protection Agreement, committing to strive to meet or exceed the goals of the Kyoto Protocol targets, urge state and federal government to enact policies and programs to meet or exceed Kyoto Protocol targets, and urge congress to pass bipartisan greenhouse gas legislation. Additionally, the Salt Lake City Corporation set a goal of reducing its own emissions by 2 percent per year, reaching an overall reduction of 80 percent below 2005 levels by 2050. Toward these goals, the city is compiling an operational greenhouse gas inventory and is

taking aggressive actions to minimize the carbon intensity of its own operations, including fleet vehicle emissions, street and traffic lights, building efficiency, energy monitoring, and the use of renewable energy.

The Division of Sustainability and the Environment has also implemented a host of programs, incentives, and educational campaigns along with partners throughout the city that are assessed in this plan alongside newly proposed strategies. Current initiatives in the Division, as well as other existing practices around the community (such as energy efficiency programs, efficiency and planning zoning codes, and strategies in place by other institutions), are expected to reduce emissions over 4 percent below a business-as-usual scenario by 2020.

The existing activities and strategies presented in this plan achieve a 14 percent reduction toward the city's goal of a 17 percent reduction below 2005 levels by 2020. Many of the strategies are detailed in terms of emissions reductions, costs, and savings by 2020. Not only are they feasible, but also multifaceted, often achieving additional goals for the community. Each strategy will require an investment but many achieve a net cost savings in the short term, leading to long-term savings for the community.

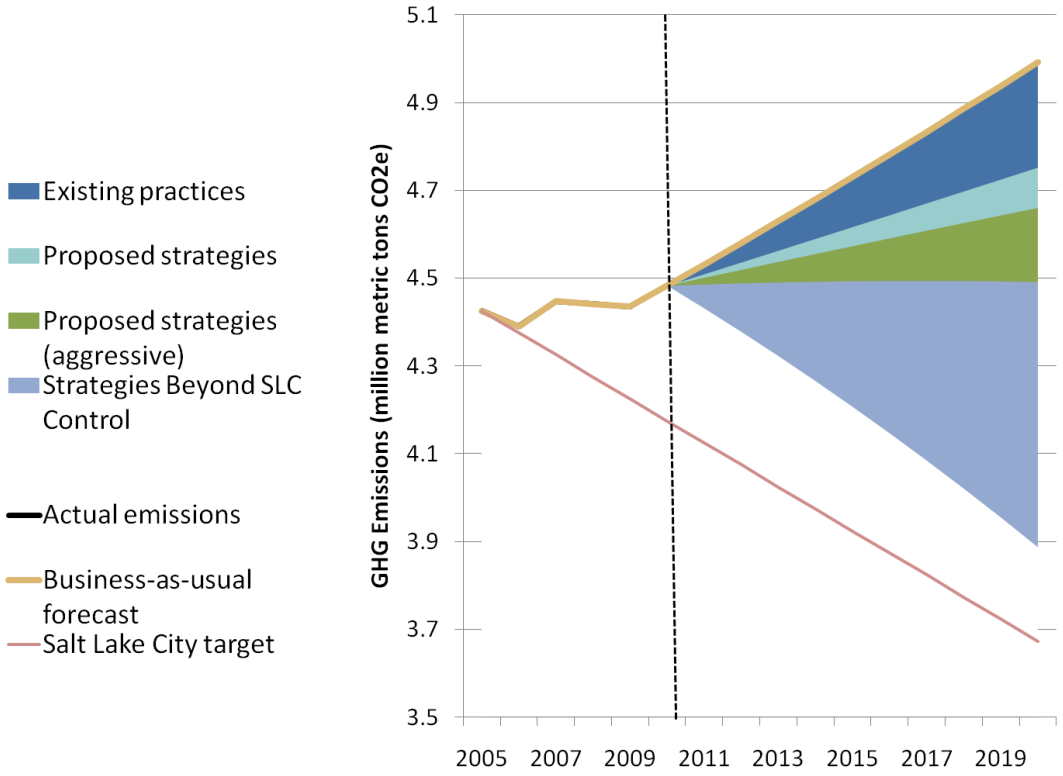

Figure 2. Illustration of Energy and Transportation Sustainability Plan

Reaching the carbon emissions goal will mean keeping 1.3 million metric tons carbon dioxide equivalent ($MTCO_2e$) out of the atmosphere in 2020. It will save residents and businesses more than $60 million dollars by 2020, while creating greater energy security.

Potential co-benefits of these strategies include improved air quality, more transportation options, less traffic congestion, greater access to cleaner energy, and lower energy consumption to balance increasing energy costs.

1 ENERGY, SUSTAINABILITY, AND SALT LAKE CITY

1.1 COMMUNITY GREENHOUSE GAS INVENTORY

The recently completed Community Carbon Footprint revealed that Salt Lake City was responsible emitting 4.75 million $MTCO_2e$ in 2009. Electricity consumption, the single largest emission source, accounted for 54 percent of the total and natural gas combustion, the second largest source, accounted for 20 percent. Together these emissions, which are primarily from the building sector, account for nearly three quarters (74 percent) of all emissions. The transportation sector made up 24 percent of 2009 emissions, with waste disposal and other sources accounting for less than 1 percent each. On-road vehicle emissions, resulting largely from the combustion of gasoline, accounted for 15 percent of the total, while off-road emissions and airline transportation accounted for 1.9 percent and 7 percent, respectively.

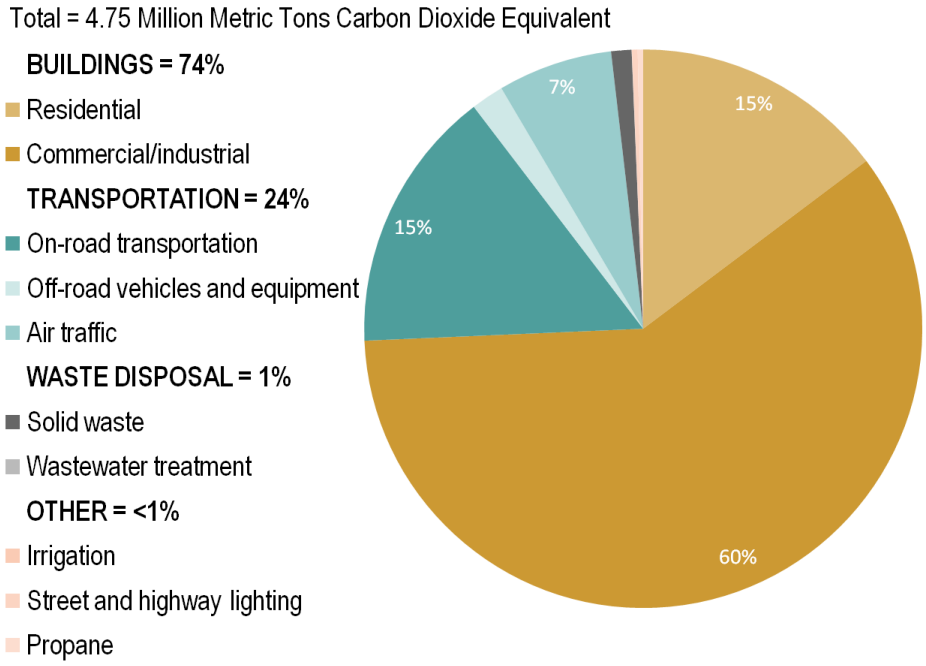

Figure 3. 2009 Community Greenhouse Gas Emissions by Sector

Over 5 years, from 2005 to 2009, per capita emissions of residents declined by over 3 percent, from 27.1 to 26.3 $MTCO_2e$. These numbers are relatively consistent with per capita estimates for the State of Utah (27 $MTCO_2e$) and national estimates (25 $MTCO_2e$). Based on new strategies the city, county, nation, and utility providers are putting in place, it is expected that this downward trend will continue for Salt Lake City.

1.2 IMPACTS OF CLIMATE CHANGE

Climate change refers to the wide range of impacts resulting from the increase in accumulated concentrations of greenhouse gases as a result of human activity, primarily the combustion of fossil fuels and deforestation. Globally, these impacts include changes in temperature, precipitation, sea level, ice melt, frequency and severity of storms, and changes to species and habitats. Human health and economies, depending on ecosystems and the services they provide, are ultimately affected.

In 2007, Utah Governor Huntsman's Blue Ribbon Advisory Council on Climate Change (BRAC) summarized the scientific consensus regarding climate change and the likely impacts on Utah. Based on BRAC's report, Utah is anticipated to warm more than the average region worldwide. This will result in a longer growing season and more heat waves. Middle of the road assumptions predict this will be an 8 degree Fahrenheit increase by the end of the century, which is roughly the current difference in annual mean temperature between Salt Lake City and Park City. More frequent and heavy precipitation events punctuating periods of longer dry spells are anticipated to accompany the warming.

Reduced snowfall in the surrounding mountains will drastically change the city's water supply, storage, and tourism economy. Snowpack and stream flows supply roughly half of municipal water requirements. Repercussions of changes to patterns of precipitation resulting from warming for Salt Lake City include lack of water or reduced storage, increased floods, more forest fires, and less winter tourism. Winter tourism is estimated to bring in nearly a billion dollars to the state annually and support 18,000 jobs. Other impacts may include lower stream flows, resulting in more concentrated pollutants; altered habitat for fisheries; reduced hydropower capacity; and less water for irrigation, recreation, and agriculture.

1.3 POTENTIAL CO-BENEFITS OF ADDRESSING ENERGY CONSUMPTION AND CLIMATE CHANGE

Reducing carbon emissions has benefits beyond mitigating global climate change that may be more immediate and tangible to many in the community. Perhaps most notably, reducing greenhouse gas emissions will improve air quality. To the contrary, not addressing the problem will exacerbate current air quality issues. Ground-level ozone, known as smog, increases with warmer temperatures and decreased rainfall leads to higher levels of particulate matter (PM). Both ozone and PM are linked to respiratory disorders. In 2009, the American Lung Association ranked Salt Lake City the 6th most polluted city in terms of short-term particulate pollution.

Additional benefits to lowering the city's reliance on carbon-intensive energy and transportation include greater energy security, strengthening the local economy, less volatile energy costs, reduced vulnerability to federal and state energy regulations, and water security. Protecting the climate also minimizes a range of potential impacts, such

as forest fires, extreme weather events, insect outbreaks, climate-sensitive diseases, and agricultural impacts to which response or adaptation could be very costly.

1.4 ADAPTATION

The primary purpose of this ETSP is to identify strategies for reducing energy consumption and mitigating climate change, thereby guiding the city toward its carbon reduction goal. The impacts of climate change, however, are already being realized. While minimizing the effects of climate change is essential, it is crucial to simultaneously adapt to observed changes and those that are predicted with high certainty. This plan, therefore, includes an overview of anticipated and observed impacts and goals for adapting to anticipated climate changes.

2 FORECAST AND TARGETS

2.1 FORECAST OF GREENHOUSE GAS EMISSIONS

Based on the results of the Community Carbon Footprint (2005-2009) a business-as-usual scenario forecasts emissions of 5.3 million $MTCO_2e$ in 2020. This scenario is based on a number of assumptions:

- One to 1.4 percent growth per year in emissions, depending on source, based on projected population growth for Salt Lake City
- All existing circumstances from today (e.g., energy intensity in buildings and current vehicle use patterns) continue until 2020
- Impacts of technology improvements, existing or planned practices in the community to reduce energy consumption, and changing growth patterns not accounted for

2.2 TARGET FOR REDUCING GREENHOUSE GAS EMISSIONS

Salt Lake City is pursuing a target to reduce emissions 17 percent below 2005 levels by 2020, excluding emissions from air travel. This is equivalent to reducing emissions by 26 percent over projected emissions in 2020. This target was selected by the ECAC based on analysis of the Community Carbon Footprint, consideration of similar regional and national targets, and the potential reductions that can be achieved by existing practices and the strategies proposed in this plan. The Salt Lake City Corporation's aggressive goal to reduce emissions 2 percent per year, reaching an overall reduction of 80 percent below 2005 levels by 2050, is included in the community goal.

The ECAC elected to exclude air travel emissions from the target because these emissions are largely outside of the influence of the community to reduce in a meaningful way without negatively impacting tourism and the economy. Emissions from Salt Lake City International Airport, including the buildings and ground operations, are still included.

For comparison, in 2007 Utah joined the Western Climate Initiative, a comprehensive initiative for reducing regional greenhouse gas emissions to 15 percent below 2005 levels by 2020. The initiative also intends to encourage investment in and development of clean energy technologies, create green jobs, and protect public health. Toward these goals, the state inventoried its greenhouse gas emissions, established the Blue Ribbon Advisory Council on Climate Change (which, in October of 2007, released a report containing 72 policy recommendations for reducing emissions), and set a voluntary carbon reduction goal of reaching 2005 emissions by 2020.

Park City recently set the goal of reducing emissions 15 percent below 2005 levels by 2020. Similar to Salt Lake City's efforts, Park City completed a greenhouse gas emissions

inventory and an action plan comprised of strategies in various sectors that will allow the city to reach that goal.

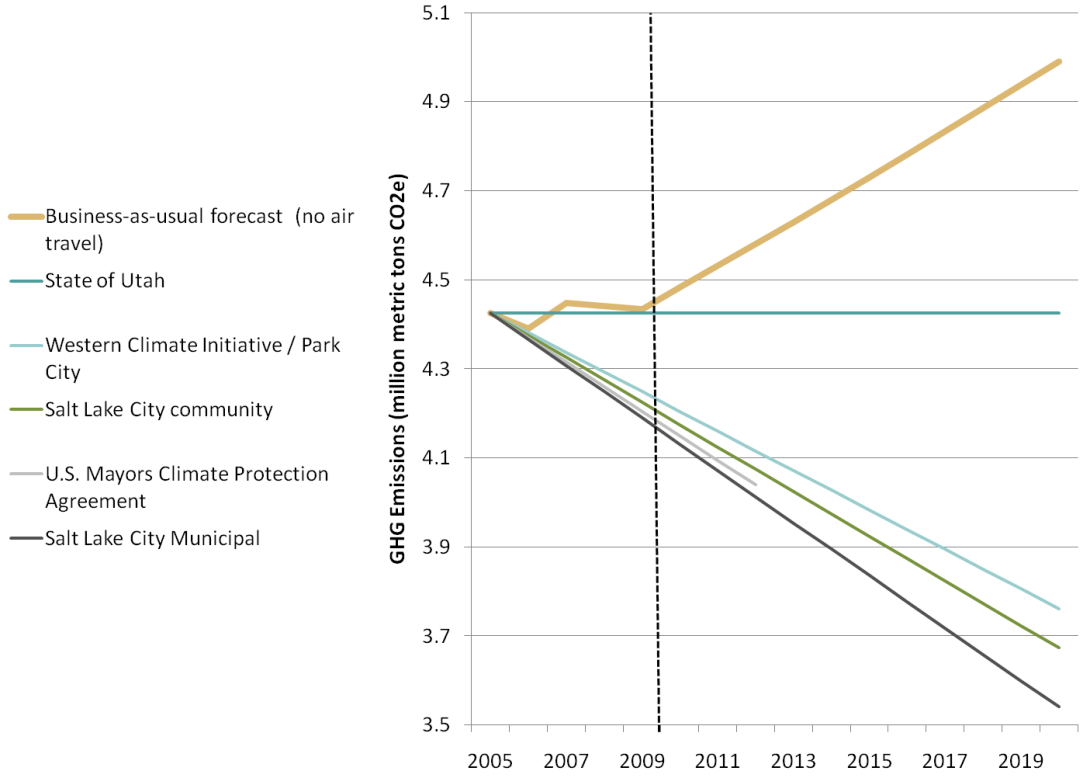

Figure 4. Business-As-Usual Forecast and Target Scenarios

As signatories to the American College and University Presidents' Climate Commitment, the University of Utah, Westminster College, Utah State University, and Weber State University have committed to completing a greenhouse gas inventory; setting a target date and interim milestones for achieving climate neutrality; and taking immediate steps to reduce greenhouse gas emissions, integrate sustainability into the curriculum, and make action plans, inventories, and progress reports publicly available.

These simultaneous efforts by municipalities, institutions, businesses, and other organizations will make it easier for every organization to reach its goals and collectively minimize the impacts of climate change, air and water pollution, traffic congestion, and other negative impacts that accompany a business-as-usual energy path. It should also spur increased development of cleaner energy in the region.

3 ENERGY AND TRANSPORTATION SUSTAINABILITY PLAN FRAMEWORK

Figure 5. Sustainability Topics

3.1 RELATIONSHIP TO BROADER SUSTAINABILITY

The ETSP is one component of Salt Lake City's broader Sustainable Salt Lake vision that addresses the 10 topic areas depicted in Figure 5. The ETSP specifically deals with the topics of Energy and Transportation and Mobility through their shared impact of greenhouse gas emissions. While the ETSP focuses on these two topic areas, it has complimentary benefits with many of the other topics, including Climate Change and Air Quality.

3.2 PROCESS

Salt Lake City Corporation requested the participation of a diverse group of well-informed stakeholders to form the ECAC to validate the process for developing the greenhouse gas inventory as well as to establish reduction targets and create strategies for meeting those targets. Members represented the interests of a broad group of organizations, but were also asked to provide input as members of the community.

Existing activities in the Energy and Transportation and Mobility topic areas were identified. The ECAC then brainstormed opportunities for each topic and developed a list of strategies to address gaps between current programs and best practices in other communities. Through three meetings and a series of conference calls, the ECAC provided feedback to further refine strategies and identify how to best implement them. Similar programs in other communities were identified and data regarding costs, savings, impacts, benefits, scale, and approach were gleaned from the results. Using conservative assumptions based on these other programs, cost, savings, and impact were estimated for implementing these strategies in Salt Lake City.

3.3 STRATEGY IDENTIFICATION

This ETSP presents strategies for energy conservation and renewable energy and transportation and mobility. Although strategies are discussed separately, their interdependency should not be overlooked. Transportation demand and opportunities for greater efficiency, for instance, are highly dependent on building density and diversity. Planning, zoning, and technology drive the transit, parking, biking, walking, and even alternative fueling options.

Beyond the direct use of energy, the information and opportunities available for citizens to realize and reduce the environmental impacts of their lifestyle while improving their health and security will most often create synergies between approaches. Growing and producing food locally reduces the transportation demand of imported products, saves money, empowers and nourishes citizens, creates food security, and supports the local economy. A well-managed urban forestry program helps ensure clean air and water, reduces the economic and ecological impact of stormwater run-off, increases property values and neighborhood aesthetics, creates habitat, provides local food sources, and improves safety through lowering automobile speeds. It was essential in this plan to create distinct approaches to address Energy and Transportation topics for their most direct impacts, but it does not lessen the amplified effect they can have if implemented in concert with other sustainability efforts.

3.4 FRAMEWORK

The organization of this ETSP has been alluded to in previous sections and is fully described here and illustrated in Figure 2. The ECAC began with an energy and greenhouse gas emissions inventory for the years 2005 through 2009, represented in the figure below as actual emissions. A business-as-usual forecast was then developed, based on the approach described in Section Forecast of Greenhouse Gas Emissions2.1, to serve as a benchmark for the energy and sustainability strategies proposed in the ETSP. The ECAC then took stock of existing practices in the community to estimate the long-term benefits of existing energy efficiency, conservation, renewable energy, and transportation programs. This ETSP then elaborates on additional proposed strategies, aggressive proposed strategies, and strategies beyond Salt Lake City's direct control to advance the Salt Lake City community toward the proposed target of a 17 percent reduction under 2005 emissions by 2020.

ENERGY AND CARBON ADVISORY COMMITTEE INVITED ORGANIZATIONS

- CH2M Hill
- Utah Department of Environmental Quality (DEQ)
- Utah DEQ Division of Air Quality
- Economic Development Corporation Utah
- Envision Utah
- Governor's Energy Office
- Holland & Hart
- Interfaith Power and Light
- Interfaith Roundtable
- Questar Gas
- Rocky Mountain Power
- Salt Lake Chamber of Commerce
- Salt Lake City International Airport
- Salt Lake Community College
- Salt Lake Convention & Visitors Bureau
- Salt Lake County
- Salt Lake County Mayor's Office
- Salt Lake School District
- Salt Lake City Transportation Division
- Salt Lake City Utilities Department
- State Energy Office
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- US Green Building Council
- Utah Transit Authority
- Utah Clean Cities
- Utah Clean Energy
- Varian Medical Systems
- Wasatch Front Regional Council
- Westminster College

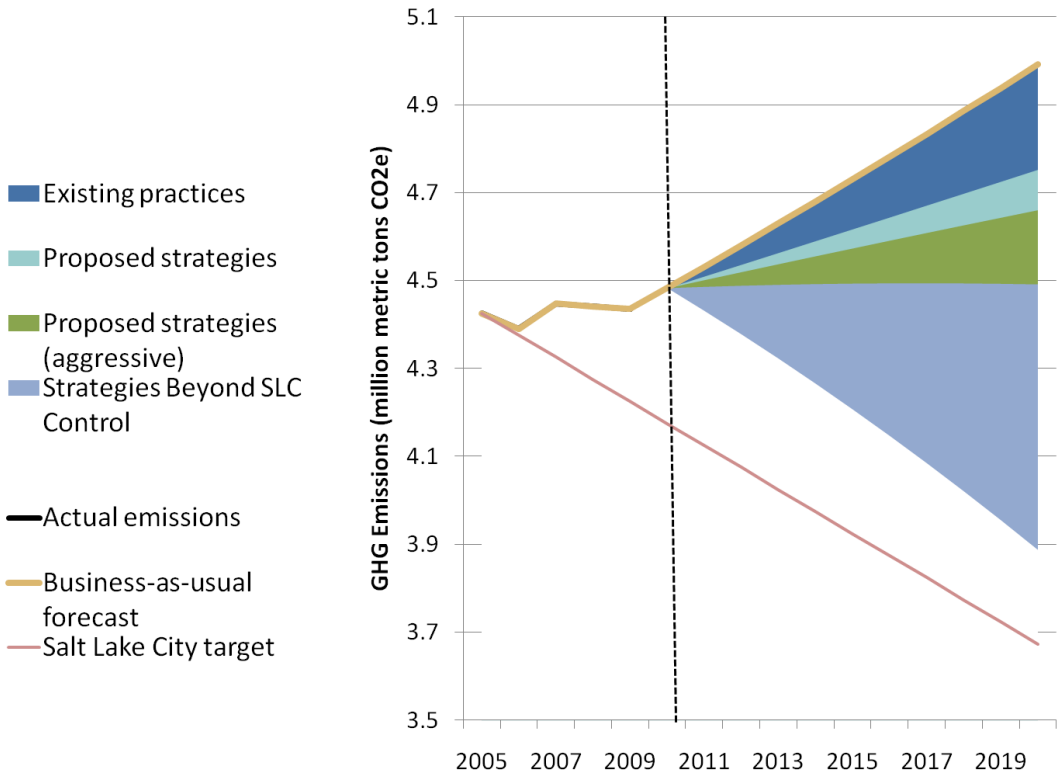

Figure 6. Illustration of Energy and Transportation Sustainability Plan

3.5 EXISTING PRACTICES

The community of Salt Lake City, including individuals, businesses, institutions, non-profits, utilities, and governmental agencies, has already undertaken efforts that will reduce energy consumption and greenhouse gas emissions between now and 2020. Table 1 summarizes estimated benefits from some of these practices. The list of practices is not exclusive and insufficient data were available to estimate benefits for some known programs such as Idle Free Utah, Clear the Air Challenge, asphalt "warm mix", home repair program, expedited green building plan reviews, and Questar demand side management programs. The existing practices for which reductions could be estimated are projected to reduce emissions by 4.7 percent below the business-as-usual in 2020. A 26 percent total reduction is required in order to achieve the goal of reducing emissions to 17 percent below 2005 levels.

A number of entities in the Salt Lake City community are purchasing renewable energy credits (RECs) and/or carbon offsets, including the city's purchase of offsets for air travel through the Pax Natura program, resident and business participation in the Rocky Mountain Power Blue Sky Program, and REC purchases by a number of other major institutions.

Since there is still ambiguity on how to fairly account for these instruments and to assure that no double counting occurs, the benefits of these purchases are not included toward Salt Lake City's emission reduction target. Furthermore, this ETSP is intended to focus on activities that occur in Salt Lake City and bring associated co-benefits to the community, and RECs may do neither.

However, the importance of these purchases as evidence of the community's values and financial commitment to promoting renewable energy and reducing greenhouse gas emissions is noteworthy. In total, these purchases could account for an emission reduction of about 48,000 $MTCO_2e$ or 1 percent of projected emissions in 2020.

Table 1. Existing Practices to Mitigate Energy Consumption and Greenhouse Gas Emissions

Existing Practices	2020 Estimated Greenhouse Gas Reduction (MTCO2e)	Source
Energy Efficiency Policy Development and Planning and the Salt Lake City Corporation Reduction Goal	15,000	Energy Efficiency and Conservation Block Grant (EECBG) Activity Worksheet
Energy Efficiency Outreach and Education	1,000	EECBG Activity Worksheet
e2-Revolving Loan Fund	6,000	Salt Lake City Corporation (originally EECBG)
Traffic Signal Management	300	EECBG Activity Worksheet
Bicycle Transit Center	100	EECBG Activity Worksheet
Energy Efficiency and Conservation Zoning and Planning Codes	16,000	EECBG Activity Worksheet
Bike Lanes	20	EECBG Activity Worksheet
Traffic Signal and Street Lighting Program	1,000	EECBG Activity Worksheet
Renewable Energy Installation at Salt lake City Fire Station #8	10	EECBG Activity Worksheet
Solar Salt Lake Project	11,000	Roughly 1megawatt (MW) currently installed and more than 250 kilowatts (kW) in Salt Lake City. With 2.6MW Salt Lake Palace project, assume Salt Lake City will eventually have 10MW of photovoltaics by 2020.
Rocky Mountain Power Efficiency Programs	111,000	Estimate based on 80% annual retention of savings from previous years
Goals Set by Other Institutions	74,000	University of Utah and Westminster College climate neutral targets
Residential Solid Waste Diversion Programs	2,000	Projected diversion from existing residential diversion programs
Total of Existing Mitigation Practices*	**237,000**	
Percentage of Projected (business-as-usual) Emissions in 2020	**4.7%**	

*Values may not sum due to rounding.

4 ENERGY AND TRANSPORTATION SUSTAINABILITY PLAN

This ETSP presents strategies for energy conservation and renewable energy and transportation and mobility.

Some of the high priority strategies proposed are presented with implementation paths – the first key steps to getting the strategies started; many are evaluated for emission reduction potential, costs, and benefits; and still others are presented as supporting strategies. Salt Lake City is currently beginning the process of facilitating implementation sub-committees for six high priority strategies:

- Energy
    - Commercial Building Re-commissioning
    - Targeted Energy Information for Consumers
    - Voluntary Adoption of Above-Code Energy Practices in New Construction
- Transportation
    - Development of Compact, Transit-Supportive, Mixed-Use Urban Form
    - Management of Parking Supply Downtown to Encourage Alternatives to Driving
    - Commuter Reduction Programs

Table 2 summarizes potential progress toward the reduction target with contributions of existing practices, proposed strategies with average and aggressive implementations, and the impact of strategies that are beyond Salt Lake City's control. Existing practices and the strategies proposed achieve a 4.2 percent reduction under 2005 emissions. The aggressive implementation case and strategies beyond the direct control of Salt Lake City (federal standards for vehicle fuel efficiency and electricity supply) bring the reduction to 14.2 percent toward the 17 percent target. There is still a gap of about 3 percent or 216,000 MTCO2e.

Table 2. Plan Potential to Address Target

Summary of Existing Practices and Proposed Strategies	2020 Greenhouse Gas Reduction (MTCO2e)	Percentage of Emissions under 2005	Percentage of Business-as-Usual Emissions in 2020
Existing Practices	237,000	3.1%	4.7%
Proposed Strategies (average implementation)	92,000	1.2%	1.8%
Sub total	**329,000**	**4.2%**	**6.6%**
Proposed Strategies (additional for aggressive implementation)	169,000	2.2%	3.4%
Strategies Beyond Salt Lake City Control	604,000	7.8%	12.1%
Grand total	**1,102,000**	**14.2%**	**22.1%**
Target (17% below 2005)	1,318,000	17.0%	26.4%

The size of the gap between the reduction potential and the target is dependent on the growth forecast. Under the projections used for the ETSP in the business-as-usual scenario, Salt Lake City achieves about 84 percent of the reduction required to meet the target. Table 3 presents the gap between reduction potential and target based on various growth projections.

Table 3. Plan Sensitivity to Growth Assumptions

Emissions Growth Scenario	2020 Reduction from All Strategies (MTCO2e)	2020 Target Reduction (MTCO2e)	Percentage of Target Achieved
0.5% per year, all emission sources	1,076,000	1,012,000	106%
1.02% per year, 1.4% for on-road transportation (business-as-usual scenario)	**1,102,000**	**1,318,000**	**84%**
1.5% per year, all emission sources	1,125,000	1,551,000	73%
2.0% per year, all emission sources	1,153,000	1,841,000	63%

4.1 ENERGY CONSERVATION AND RENEWABLE ENERGY

Energy efficiency and conservation are often the most cost effective approaches for reducing emissions and costs associated with energy consumption. Residents save money and are more comfortable in their homes or work and businesses reduce operating costs, maximizing profitability. Efficiency and conservation span both the technology and the behavioral aspects of how a community consumes energy, and the following strategies seek to address both aspects.

Utah is fortunate to be rich in renewable energy sources (solar, wind, geothermal) that create viable options for a wide range of applications and scales. As the cost of traditional energy sources increase and the technology and markets reduce the cost of renewables, these opportunities are becoming increasingly relevant for the Salt Lake City community.

Energy conservation and renewable energy projects can be applied to existing buildings and infrastructure as well as to the operation of new high efficiency buildings. Because the building sector is responsible for nearly three quarters of all emissions in the City and buildings operate for many decades, it is imperative that both existing and new buildings be targeted. Integrating these concepts into the planning phase of a project is a far more cost effective way to achieve energy savings that will persist for decades to come.

Energy conservation and renewable energy strategies are detailed in the following section and were quantified as accurately as possible with respect to cost, savings, and greenhouse gas reductions through 2020 in Table 4. Details regarding assumptions can be found in Appendix B. The table presents a range of costs and benefits from an average level of implementation through an aggressive level of implementation. All values are estimates based on the performance of similar programs in other communities, or research and localized assumptions.

Table 4. Energy Conservation and Renewable Energy Strategies

Strategies[1] Average – Aggressive Performance	2020 Estimated Greenhouse Gas Reduction (MTCO2e)	Cumulative Greenhouse Gas Reduction by 2020 (MTCO2e)	Cumulative Cost Savings by 2020 (Million $)	Cumulative Cost to Implement by 2020 (Million $)	Cost Effectiveness by 2020 ($/MTCO2e)[1]
Energy Efficiency Assessments	3,000 - 18,000	23,000 - 125,000	$2.7 - $15.0	$14.4 - $75.0	$510 - $480
Re-commissioning of Small Commercial Buildings	11,000 - 56,000	90,000 - 448,000	$8.3 - $41.4	$7.3 - $36.5	$(10) - $(10)
Re-commissioning of Large Commercial Buildings	25,000 - 49,000	173,000 - 345,000	$19.9 - $39.8	$12.1 - $24.3	$(40) - $(40)
Direct Implementation Support for Low-income Residents	3,000 - 7,000	18,000 - 44,000	$2.2 - $5.4	$6.8 - $16.9	$260 - $260
Support for Large Institutions	1,000 - 1,000	8,000 - 8,000	$0.7 - $0.7	$0.7 - $0.7	$10 - $10
After Hours Lighting Control Program	4,000 - 12,000	41,000 - 128,000	$4.8 - $14.8	$6.4 - $3.2	$40 - $(90)
Code Modification	9,000 - 9,000	52,000 - 52,000	$6.4 - $6.4	$4.6 - $4.6	$(40) - $(40)
Voluntary Above-code Adoption	5,000 - 11,000	33,000 - 65,000	$3.9 - $7.8	$13.4 - $24.5	$290 - $260
Targeted Energy Information for Consumers	5,000 - 24,000	57,000 - 250,000	$7.0 - $30.8	$2.8 - $6.5	$(70) - $(100)
Municipal Opportunities in Renewable Energy	3,000 - 14,000	32,000 - 158,000	$2.1 - $10.4	$4.6 - $23.0	$80 - $80
Biofuels on Unused City Lands	1,000 - 1,000	14,000 - 14,000	$3.2 - $3.2	$2.6 - $2.6	$(40) - $(40)

[1]Cost Effectiveness = [(Cumulative Cost - Cumulative Savings)/Cumulative GHG Reduction]; negative equals savings

4.1.1 Residential, Commercial, and Institutional Buildings

Priority Evaluated Strategies

Re-commissioning of Small Commercial Buildings

Rocky Mountain Power currently offers a re-commissioning, or building tune-up, program for larger buildings (larger than 20,000 square feet). Offering a similar program for smaller commercial buildings can greatly expand the audience for this energy saving process.

Some considerations for this program identified by the ECAC include the following:

- Upgrades for low-hanging opportunities should be included in the process.
- Water conservation opportunities can also be addressed.
- ENERGY STAR's Portfolio Manager may be a useful tool for collecting and sharing information.
- The process should be accessible to non-profits.

Re-commissioning Schedule for Larger Commercial Buildings

Re-commissioning for larger commercial buildings (greater than 50,000 square feet) on a regular schedule (e.g., every 10 years).

Key Parties

- Rocky Mountain Power
- Questar
- Utah State Energy Program (USEP)
- Chamber of Commerce
- Salt Lake City Corporation
- Contractors

Related Efforts

- Existing Rocky Mountain Power program for larger buildings
- Questar benchmarking program
- Financing mechanism, city may be able to assist

Recommended Actions

- Continue dialogue between Rocky Mountain Power, Questar, and city through Demand Side Management Advisory Group. Create coherent outreach and advertising with support structure to guide prospective participants through process (city).
- Investigate opportunities to pilot through Utah Building Energy Efficiency Strategies

Targeted Energy Information for Consumers

Providing consumers more information on how much energy they use can lead to behavior changes that result in less consumption. One approach, from OPOWER, combines analysis of utility data, geographic information systems, and property record information to give customers customized reports – often included with utility billing – that anonymously compare their consumption to that of the average similar neighbor and their most efficient neighbors. This information, combined with targeted tips for reducing energy consumption, has led to measurable reductions in energy consumption.

Some considerations for this strategy identified by the ECAC include the following:

- Addressing landlord/renter issues with where bills are paid
- Privacy issues
- Delivery method and associated cost (e.g., with billing)
- Program identity and recognition

Key Parties

- Rocky Mountain Power
- Questar
- USEP
- Interfaith Power & Light
- Jazz Green
- e2 Citizen program

Related Efforts

- Both Rocky Mountain Power and Questar are currently considering such a platform.
- Rocky Mountain Power program targets higher consumption customers.
- Questar program is addressing privacy issues. Phase 1 will include actual and weather normalized consumption history and comparison to nearby participants.

Recommended Actions

- Consider opportunities for building on and perhaps integrating efforts currently underway at Rocky Mountain Power and Questar

Evaluated Strategies

Direct Implementation Support for Low-income Residents

When paired with existing resources from the utilities, providing cost-effective weatherization measures for low-income residents can provide a dual benefit of reaching this audience and reducing its spending on energy. Activities in the weatherization strategy include insulation (building, duct, water heater), storm windows, furnace tune-up or replacement, vent dampers, smart thermostats, low-flow shower heads, water heater replacement, and lighting retrofits.

There is currently a statewide weatherization program administered by the Utah Division of Housing and Community Development. This proposed strategy, however, would be exclusively focused on meeting the needs of Salt Lake City residents. Additional benefits of this program include equity for low-income residents, lowering energy costs for those who need it most, and as an effective tool for outreach and education.

Support for Large Institutions

Institutions such as school districts and universities offer an opportunity to address

efficiency in large quantities of building space under fairly centralized management. Often, these institutions are already very active in energy efficiency but may benefit from building better connections with utility rebate programs and grant opportunities. Facilitating these connections and supporting institutions in their energy efficiency efforts can be a cost effective way to achieve greater energy efficiency. Some institutions in Salt Lake City feel this relationship is already well developed while others still see potential benefits.

Analysis for this strategy includes support for 36 schools in the Salt Lake City School District. Reducing energy costs for schools frees operating budgets to be used more directly toward education. Additionally, it creates opportunities for education and outreach to youth. The impact can also be greatly increased if expanded to other institutions beyond the Salt Lake City School District, such as private schools, religious organizations, and hospitals.

After Hours Lighting Control Program

This strategy would require businesses to turn off internal and external lights for a period at night after business hours. This can be accomplished by installing timers or other automated control or done manually by building owners/occupants. Security, access, circulation, and lights needed for safety would be exempted. This strategy is based on a code modification and there are a number of similar concepts emerging in new green building codes. The enforcement mechanism would likely be on a complaint basis.

Supporting Strategies

The following strategies support the goal of greater efficiency in the building sector, but their direct impact could not be assessed. Either data were unavailable or they do not directly lead to emissions reductions of their own. Nonetheless, these are important approaches for maximizing the effectiveness of the strategies above.

Enforcement of Existing Building Energy Codes

Improving the enforcement of existing energy codes is an opportunity to get the best possible performance out of standards that have already been adopted. Issues related to duct sizing, sealing, and window types can often result in energy savings if addressed through code compliance. Utah is participating in the Department of Energy's Compliance Pilot Study to develop a roadmap for states to achieve 90 percent compliance with International Energy Conservation Code (IECC) 2009.

Commercial Buildings Benchmarking

A program that incentivizes or requires commercial buildings to use a benchmarking tool, such as ENERGY STAR's Portfolio Manager,
can increase awareness of energy consumption and relative performance. It has been demonstrated that information regarding energy use can be very a very effective tool in energy conservation.

Assessment Follow-up and Implementation Support

This can be a pivotal, and often missing, aspect of a successful energy efficiency

program. Connecting the enthusiasm of a participant and the knowledge gained through the assessment process with support in pursuing bids, identifying contractors, coordinating work, and applying for incentives can increase implementation rates over an assessment-only approach. Furthermore, an implementation support program that bypasses the assessment process and focuses directly on supporting business in implementing more common opportunities (e.g., lighting retrofits) may be an effective complement to expanding assessment resources. Both residential and commercial sectors can be included. This strategy supports implementation of recommendations from assessments in other programs but does not result in a direct impact on its own.

Voluntary Consumption Labeling at Sale

An effort to increase the energy consumption information available to residential and commercial customers at the time-of-sale can help inform buyers and drive sellers to increase the efficiency of their properties. This applies to energy and water efficiency opportunities.

Financial Incentives

Implementation of the above strategies should be closely coordinated with the utilities, which already have significant incentives, to assure that their programs are prepared for the increased demand.

Furthermore, additional financial assistance, such as the city's forthcoming e2 Revolving Loan Fund, can further increase participation in efficiency activities.

4.1.2 Green Building

Momentum in green building is growing throughout the state and particularly in Salt Lake City. Above-code commitments have been made by the state for new or renovated buildings and by the Salt Lake City Corporation for city buildings or public sector buildings receiving funding from the city. Demand for more energy efficient and environmentally sensitive design is on the rise in the private sector as well, primarily driven by the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) rating system and ENERGY STAR Homes.

The Utah Chapter of the USGBC organizes educational programs and events aimed at increasing knowledge and demand in the local building sector. It also provides access to additional resources and opportunities through its website. Annually, the city is host to the Salt Lake Sustainable Building Conference, a forum to encourage a dialogue about regional green building topics and provide educational opportunities for a wide range of building professionals.

Priority Evaluated Strategies

Voluntary Above-code Adoption Additional voluntary adoption of above-code or third-party green building certifications, such as LEED and Home Performance with ENERGY STAR, can be encouraged through additional incentives. One path for incentives is to reduce permitting fees and provide additional outreach regarding expedited permit reviews for green building.	Key Parties • Utah Chapter of the USGBC • USEP • Local home builders associations • Progressive residential and commercial builders Related Efforts • Existing outreach and education by USGBC Recommended Actions • Promote and differentiate green builders. • Generate case studies of green buildings and owners. • Provide workshops for the building community, including designers, builders, trades, and inspectors.

Evaluated Strategies

Code Modification

Though jurisdictions in Utah can modify their local building codes with approval from the Uniform Building Code Commission and the legislature, this may not be a feasible approach for Salt Lake City to take unilaterally. However, Salt Lake City can continue to actively work with other organizations to support the adoption of more stringent codes at the state level. Adjustments to building codes that can lead to greater efficiency and lower operating costs include the following:

- Adopting the 2009 IECC for residential buildings. The 2009 IECC was just made effective for commercial buildings on July 1, 2010
- Adopting green building codes, such as National Green Building Standard and International Green Construction Code
- Adopting amendments to existing code that require elements of green building (e.g., green or cool roofs, increased insulation, improved sealing, higher efficiency equipment)

4.1.3 Renewable Energy in the Community

Since the consumption of electricity results in about 54 percent of the greenhouse gas emissions for the Salt Lake City community, reducing the carbon intensity of this consumed electricity is an enormous opportunity for the city to reduce emissions. Introducing additional renewable energy generation both at the utility and local scales is one approach to reducing these emissions.

Evaluated Strategies

Reduced Carbon Intensity in Electricity Supply

This strategy considers that there are a range of approaches for the Salt Lake City community to have more influence on its electrical supply, including current discussions with Rocky Mountain Power on ways to direct funding to community projects, additional incentives for renewable energy, third-party financing and power purchase agreements, and others.

As a community served by an investor-owned utility (IOU), Rocky Mountain Power, Salt Lake City does not have significant direct influence over the energy resources that contribute to its electricity supply. However, in March 2008, Utah enacted *The Energy Resource and Carbon Emission Reduction Initiative* (S.B. 2020) that requires IOUs and other utilities to use eligible renewables to account for 20 percent of their 2025 adjusted retail electricity sales to the extent that renewables are cost effective.

Because of this and other internal initiatives, Rocky Mountain Power has increased the use of less carbon-intensive natural gas and wind resources in its generation mix. Greenhouse gas emissions intensity per unit of electricity delivered dropped by 5.7 percent between 2005 and 2009. Rocky Mountain Power's Integrated Resource Plan indicates the potential for ongoing decreases in carbon intensity with a 15 percent reduction by 2018 as part of the preferred portfolio scenario.

This strategy assumes that a trend of lower carbon intensity in the electricity supply will continue[1].

[1] The emission factor applied in the GHG Inventory and this ETSP is a California Climate Action Registry (CCAR) verified efficiency metric for PacifiCorp, which operates as Rocky Mountain Power in Utah. This metric includes wind energy generated by Rocky Mountain Power for which RECs are subsequently sold. In accordance with guidance from CCAR and The Climate Registry (TCR), consumers of these RECs are not to claim a reduction in their own emissions resulting from the REC purchase. Therefore, emission reductions should not be double counted.

Municipal Opportunities

Salt Lake City Corporation has already adopted renewable energy in some aspects of its operations. A cogeneration system at the wastewater treatment plant generates electricity and thermal energy from methane captured from the process for use in plant processes. The city also purchases RECs for the City and County building with savings from energy efficiency measures. In addition, there may be opportunities for the city to develop renewable energy, including the following:

- Solar Salt Lake Project
- Solar or wind applications on existing or new city buildings
- Energy recovery through small-scale hydroelectric turbines in the city's water supply and wastewater systems (Mountain Dell Dam)
- Conversion of the current investment in RECs into on-site renewable energy projects
- A city renewable portfolio standard

Biofuels on Unused City Lands

This strategy proposes growing biofuels from safflower oil on 3,000 acres of unused city lands using dry land farming techniques (no irrigation) and implementing best management practices from the Freeways to Fuel research being conducted at Utah State University.

Supporting Strategies

Third Party Financing

Under House Bill 145, passed in the 2010 legislative session, Utah not-for-profits, local governments, and other non-taxable entities can employ third-party financing and pass-through tax incentives for renewable energy projects and the third-party financier will not be regulated by the Utah Public Service Commission. This allows for outside investment in renewable energy in Utah and could drive significant development. A collaborative effort can be undertaken to identify candidate entities and sites city-wide, to develop a replicable process to reduce barriers (county's experience as a template), and to actively market these opportunities to third-party financiers.

Expand Incentives

The community and city can expand on existing incentives for renewable energy by expediting permit applications and reducing permit fees for renewable energy installations. A grant or loan program, such as the revolving loan program soon to be made available for energy efficiency, can be considered to supplement where existing incentives are not sufficient.

4.2 TRANSPORTATION AND MOBILITY

Reducing transportation related carbon emissions can involve a wide range of strategies, including shortening the number and length of trips, reducing the carbon intensity of travel, and incentivizing the most efficient modes of travel. Many strategies can be implemented immediately, while others such as increasing development density are longer-term solutions.

People primarily move between buildings: home, work, shopping, entertainment, and the homes of others. Therefore transportation must be addressed in concert with the built environment. Increasingly, developments are integrating more transportation options into design through proximity and access to transit, bike lanes, fueling stations, car sharing, and shuttles. Pricing and availability for parking are also being more thoughtfully addressed.

The automobile is the most common form of personal transportation today, but cities throughout the country are experiencing a renaissance of biking, walking, and transit. These modes are less expensive and carbon intensive, as well as healthier since exercise is integrated into daily transportation. These modes also encourage more social interaction with strangers and a more intimate relationship with the communities in which people live and work. Such connections, along with simply having more eyes on the streets, can lead to safer communities.

On-road vehicle transportation accounts for 15 percent of Salt Lake City's greenhouse gas emissions (2009) resulting from 1.35 billion vehicle miles. At 7,400 vehicle miles travelled (VMT) per capita, Salt Lake City is lower per capita than Utah (10,143) or the larger Salt Lake Metropolitan area (9,339).

The Wasatch Front Regional Council's Regional Travel Model predicts a 1.4 percent annual increase in greenhouse gas emissions through 2030 resulting from on-road vehicle emissions, which includes light rail, commuter rail, and local bus lines.

Salt Lake City has already undertaken a number of efforts to promote demand management strategies and increase the use of alternative modes to single occupancy vehicles in an effort to reduce greenhouse gas emissions and improve air quality in the community. The following table includes a summary of these activities and their projected benefits in 2020. The table presents a range of benefits from an average level of implementation through an aggressive level of implementation. All values are estimates based on the performance of similar programs in other communities, or research and localized assumptions.

Table 5. Transportation and Mobility Strategies

Strategies[1] Average – Aggressive Performance	2020 Estimated Greenhouse Gas Reduction (MTCO2e)	Cumulative Greenhouse Gas Reduction by 2020 (MTCO2e)	Cumulative Cost Savings by 2020 (Million $)	Cumulative Cost to Implement by 2020 (Million $)	Cost Effectiveness by 2020 ($/MTCO2e)[1]
Land Use and Location: Density, Diversity, Design	10,000 - 21,000				
Neighborhood/Site Enhancements: Increase Bike Infrastructure	1,000 - 3,000				
Parking Programs: Park & Ride, Cashout, Unbundled Parking	4,000 - 10,000				
Transportation Improvements/ Increased Mobility Options: Last-Mile Solutions and Commuter Reduction Programs	7,000 - 15,000				

[1]Cost Effectiveness = [(Cumulative Cost - Cumulative Savings)/Cumulative GHG Reduction]; negative equals savings

4.2.1 Land Use and Location

Land use and transportation have a close and dynamic relationship. To achieve many of the transportation goals Salt Lake City wishes to accomplish, appropriate development should occur. The beginnings of this land use/transportation focus within the city are occurring with recent transit-oriented development projects, dense residential projects in the urban core, and redevelopment in the Sugar House area. A comprehensive vision for the city would further strengthen the connection between land use and transportation. To this end, the following strategies are proposed.

Priority Evaluated Strategies

Pursue a Compact, TOD-supportive, Mixed-use Urban Form Pursue an urban form that is compact, supports transit-oriented development (TOD), and incorporates mixed-used developments through the following: • Increased density city-wide • Increased transit accessibility • Increased density through reuse of brownfields and infill • Increased diversity of urban and suburban developments • Balance of jobs and housing • Increased destination accessibility • Reduced block size in new and redevelopment This would impact all land use projects citywide. Although implementation can be immediate in some areas, the results may not be seen until substantial areas of the city have been reached.	Key Parties • City • Redevelopment Agency of Salt Lake City (RDA) • Utah Transit Authority • Housing and Urban Development Sustainability Communities working group • University of Utah • Air Quality Committee Related Efforts • City Plan • University plans Recommended Actions • Coordinate with housing related efforts around the University

4.2.2 Neighborhood and Site Enhancements

The city is currently engaged in a number of programs to improve the pedestrian environment and to provide facilities for bicyclists. Guidance for these programs is contained in the 2004 Salt Lake City Bicycle and Pedestrian Master Plan. This master plan provides goals and implementation strategies. Some of those goals and strategies involved infrastructure, such as trails, bike racks, and other resources (e.g., mapping).

As an educational component to this grouping, Salt Lake City and the Utah Department of Transportation (UDOT) have begun a school curriculum program for their TravelWise initiative. TravelWise seeks to reduce emissions through transportation demand management (TDM) strategies, such as telecommuting, transit, and carpooling. The curriculum program introduces these travel behaviors to children so they may positively influence their travel choices in the future.

Evaluated Strategies

Increase Overall Bike Infrastructure

This strategy includes increasing and improving the overall bike infrastructure within the city through the following methods:

- Bicycle Boulevards
    - Bicycle boulevards are corridors where the emphasis is on bicycle mobility. Bicycle mobility is created by reducing delay for bicycles through reversing stop signs away from the corridor and through applying necessary bike detectors at signals. Bike boulevards are well-marked as bicycle routes, have low vehicular volume, and low travel speeds. Often, they are parallel to high-volume roads or near commercial corridors. Safe and convenient biking routes encourages biking as a viable mode alternative.
- Land Dedication for Bike Trails
    - Land dedication for bike trails sets aside land from development for guaranteed future bike trails. This can occur through purchase or by ordinance requiring larger projects to provide for, contribute to, or dedicate land for the provision of off-site bicycle trails linking the project to designated bicycle commuting routes.
- Bike Signal Detection
    - Bike signal detection will help reduce delay for cyclists through detection of bicycles at intersections. Detector loops can be placed within the pavement on City streets and paired with a pavement mark to show cyclists where to stand to be detected.
- End-of-Trip Facilities
    - End-of-trip facilities encourage the use of bicycling as a viable form of travel to destinations, especially to work. Often there are no specified places to store or park bicycles. Bicyclists are often also unable to shower and change after riding to work and therefore may be disinclined to commute using bicycles. End-of-trip facilities provide the added convenience and security needed to encourage bicycle commuting. One method to address these disincentives is to require new developments to provide bicycle lockers and showers on site. This can be accomplished by increasing requirements to the city's zoning code. The Bicycle Transit Center at the Intermodal Hub is a good example of an end-of-trip facility.
- Bicycle Accommodations on Transit Vehicles
    - Currently, Utah Transit Authority (UTA) allows two bikes per bus and two bikes per light rail TRAX vehicle. If these spaces are full, bicyclists must wait

for the next transit vehicle, which can take anywhere from 15 minutes to 1 hour. To encourage bicycling and transit use throughout the city, transit vehicles should be retrofitted to increase bicycle capacity. Salt Lake City can encourage UTA to implement such retrofits.

The Bicycle and Pedestrian Master Plan addresses many strategies and implementation activities that should continue in the city. The strategies listed below can help the city further build on the master plan's existing momentum.

Supporting Strategies

Urban Non-motorized Zones

Urban non-motorized zones are areas of the city that are, effectively, pedestrian- and bicycle-only corridors. Non-motorized zones can be permanent or time-limited. Suggested corridors for non-motorized zones are Main Street in Downtown and Rio Grande Street. Other corridors should be considered and pursued. Time-limited non-motorized zones are often known as "car-free days" and are generally tied to a festival-like event. These elements encourage non-motorized travel and thus a reduction in VMT. Non-motorized zones are more effective when applied with multiple design elements.

4.2.3 Parking Programs

The city is actively participating in programs to reduce parking and to prioritize existing parking for carpools and energy conservative vehicles. An example of one such program is free metered parking for electric vehicles displaying clean energy license plates.

The Salt Lake City Zoning Ordinance has a number of exemptions that reduce parking requirements in certain zones that have pedestrian and bicycle facilities, as well other appropriate transportation demand management strategies, such as employer-sponsored public transportation subsidies and off-site parking. Some zones within the city can supplement off-street parking requirements with available on-street parking. However, parking throughout the city is determined by the minimum off-street parking requirements.

Strategic Management of Parking Supply Downtown Pursue a parking strategy city-wide that reduces parking lots and encourages other forms of transportation. In many jurisdictions, reducing parking requirements are thought to have a beneficial effect on the transportation system. For example, a worker at an office building where there is limited parking might be inclined to take transit or carpool if he/she knows that there is a limited amount of available parking.	Key Parties • City • RDA • Downtown business community • Chamber of Commerce Related Efforts • Parking study underway by city Recommended Actions • Reduce parking requirements by establishing parking maximums rather than minimums. Convert current surface parking to higher uses, especially along street fronts. • Locate all parking for new developments at the rear of buildings rather than the front. • Implement a market-based price structure for public parking that varies according to demand (high use periods would cost more).

Evaluated Strategies

Cashout Program

For many residents and workers in Salt Lake City, parking is provided free of charge. In other cities, charging for parking has been shown to reduce vehicular use by increasing the cost of driving, thereby shifting travelers to other modes, usually carpooling and transit. The issues that relate to parking pricing are charges for municipal/public parking and parking cashout. Under a parking cashout program, the employee exchanges his/her right to park for a cash payment. Typically this cash payment is related to the amount of parking charge the employer pays to the building owner for the parking spaces. The cash payment can also be substituted for a subsidized transit pass. It should be noted that this program typically is entirely voluntary and exists as a transaction between an employee and his/her employer. However, Salt Lake City can implement this type of program with its own employees and encourage development projects and businesses in the city to do the same.

Unbundled Parking

Unbundling separates parking from property costs, requiring those who wish to purchase parking spaces to do so at an additional cost from the property cost. This removes the

burden from those who do not wish to use a parking space. Parking would then be priced separately from home rents/purchase prices or office leases. An assumption is made that the parking costs are passed through to the vehicle owners/drivers using the parking spaces. While Salt Lake City cannot immediately control implementation of this strategy, it can pursue development strategies that would incentivize unbundled parking in new developments.

Remote Parking/Park and Ride

A way of preserving the urban core is to relocate parking to outlying areas, to areas around transit stops, and to areas near High Occupancy Vehicle lanes. In addition to promoting transit ridership, park-and-ride lots also facilitate car- and vanpooling. Remote parking can also be used in suburban areas to create clusters of density. The benefits of this strategy can be increased through bike-sharing programs at the destination.

Supporting Strategies

Satellite Parking and Employer Shuttles

The combination of satellite parking and employer shuttles can reduce VMT for large office buildings. The strategy promotes parking at off-site facilities with shuttles bringing employees to the work site. Additionally, employer shuttles can work between transit stations and the work site, which can further reduce VMT. Every effort should be made to use electric vehicles for shuttles.

4.2.4 Increased Mobility/Transportation Improvements

Programs like Clear the Air Challenge, EcoPasses for city and University employees, and UTA rideshare provide increased mobility options to area residents. These programs are effective at reducing VMT and greenhouse gas emissions. The proposed strategies below can further improve transit operations and increase commuting options.

Commuter Reduction Programs Provide financial and other incentives to encourage employees to use transit, carpool, vanpooling, and other modes of transportation.	Key Parties • City • Clear The Air Challenge Related Efforts • UTA Global Positioning System Fare Determination Recommended Actions • Implement a Commuter Reduction Program (CRP) to encourage workers to use alternative modes of travel, including ride-matching assistance, vanpool assistance, preferential carpool parking transit subsidies, parking cash-out or priced parking, shuttles, emergency rides home, and improved on-site amenities. • Facilitate a CRP by implementing a Commute Trip Reduction ordinance.

Evaluated Strategies

Local Circulators for "First Mile/Last Mile" Travel

Local circulators of several types can be used to link people from regional transit lines to local destinations around Salt Lake City. These options include pedi-cabs (cabs powered by bicyclists), streetcars, local minibus shuttles, or other options. Salt Lake City is already considering streetcars in Sugar House and downtown. Streetcars are recognized for their ability to provide short-distance mobility options as well as spur economic growth. Streetcars can be seen as a replacement for busses in heavily-used corridors because they have higher seating capacity and are electric, which improves local air quality.

In areas where there are significant origins and destinations, such as the Convention Center and surrounding hotels, shuttles can be a practical alternative. Local shuttle service can be provided through coordination with the UTA or a private contractor and can service transit hubs, commercial centers, and residential areas. Every effort should be made to use electric vehicles for shuttles.

Supporting Strategies

Telecommute/Alternative Work Schedules

A successful TDM strategy is to implement alternative work schedules and telecommuting to reduce the need for employees to travel to their work locations. Alternative schedules are becoming increasingly common as employees and employers are able to take advantage of technological advances like email, video conferencing, cell phones, and other related items to work even when they are outside of the traditional office.

Currently, the State of Utah has a 4-40 workweek during which employees work 40 hours over 4 days, with Fridays off.

Create Downtown Traffic Management Association with a Funded Coordinator

A Traffic Management Association (TMA) is a non-profit, member-controlled organization independent of the city that helps local business and employees find transportation alternatives. The TMA provides assistance to downtown businesses in educating employees on transportation programs, as well as offering ride-sharing assistance for carpools and vanpools. Additionally, the TMA can provide monitoring services for mandatory TDM programs, and collect funding for a TDM coordinator position that would run programs for the association.

Regional or local governments and other management authorities can help create and provide funding for a TMA. Generally, stakeholders include regional and local government agencies, transit providers, business organizations, businesses, employees, and customers. Many TMAs start as a result of a downtown business association, which unite local businesses through common goals. A good resource for establishing TMAs is the *TMA Handbook: A Guide to Successful Transportation Management Associations*, written by the National Center for Transit Research's National TDM and Telework Clearinghouse on behalf of the Association for Commuter Transportation's TMA Council. It can be found here:

http://www.nctr.usf.edu/clearinghouse/pdf/tma_handbook_final.pdf.

Fund City Transportation Demand Management Coordinator position

At this time, the city does not have a central person who coordinates TDM activities. A TDM coordinator who oversees these programs on a full-time basis can provide several benefits. First, this person can provide information about carpooling, transit, and other alternative modes to city employees, which would encourage their use of alternative modes of travel. Second, this person can oversee any of the existing and future transportation management agencies in the city. This oversight can include reviewing any annual reports prepared by the TMA and providing any technical assistance as needed. Third, this person can serve as a resource for individual developments that are not included in a TMA but are implementing TDM strategies.

Transit Enhancement – Transit Signal Priority

Transit-passenger travel time can be reduced through decreased headways and increased speed and reliability. Transit signal priority increases transit speeds by giving transit vehicles signal priority and decreasing their wait time at intersections. Salt Lake City can encourage and support UTA efforts to provide transit signal priority along transit routes.

User Information (Next Bus Notification)

Next bus notifications allow transit users to know when the next bus is coming, alerting them to delays in the system. This notification can take place through a phone application, a website, and through message boards at transit stops. These

enhancements make transit service more attractive and may result in a mode shift from auto to transit to reduce VMT. Salt Lake City can encourage and support UTA efforts to provide enhanced user information at transit stations in the city.

Promotional and Partnership Activities for Transit

Transit ridership can increase through the use of promotional and partnership activities. Salt Lake City has days of extremely bad air, know as red days. On red days, residents are encouraged to carpool, take transit, bicycle, or telecommute to avoid exacerbating the air quality. The city and UTA can facilitate alternate modes by providing free transit on red days, reducing greenhouse gas emissions and helping to improve air quality. In addition, providing free or discounted transit with the purchase of an event ticket can promote transit use to large events, such as sporting events and concerts. Partnerships between UTA and businesses to provide a transit validation instead of parking validation can also benefit system-wide ridership.

4.2.5 Road Pricing/Management

With the installation of the I-15 Express Lanes system, UDOT is now using road pricing as a management strategy. The Express Lanes system charges tolls based on congestion level. In addition, the city is currently conducting a signal re-timing analysis. Education campaigns, such as Idle Free Utah − an educational program created by the state to increase awareness of the effects of idling and to encourage people to turn off their cars − have also recently been created.

Road pricing and intelligent transportation systems that are currently being applied to I-15 can be used throughout the city and in various fashions to better manage Salt Lake's road system. The strategies below provide financial and operational opportunities to manage these resources and to reduce greenhouse gases.

Supporting Strategies

Intelligent Transportation Systems

Intelligent transportation systems provide real-time information regarding road conditions and directions. This information can be used to help motorists avoid congested areas, reduce idling, and avoid driving aimlessly by directing motorists to available parking.

Arterial Speed Management (Smoothing, Optimum Speed)

Constant acceleration and braking reduces vehicle efficiency. A strategy for managing this pattern is arterial speed management that can occur through real-time response, alerting motorists of the optimum speed to travel smoothly, miss multiple red lights in a row, and avoid bunching of vehicles.

4.2.6 Fleet Management

The city is actively engaged in upgrading its fleet's fuel efficiency, adding alternative fuel vehicles to the fleet, and looking for ways to reduce driving.

Supporting Strategies

Install Charging Stations

As electric vehicles gain in popularity, installing charging stations at major employment and activity centers should be assessed. Residents and businesses will be more likely to purchase and lease electric vehicles if charging them is convenient.

4.3 CLIMATE CHANGE AND AIR QUALITY

The strategies proposed above will go a long way toward mitigating climate change and improving air quality. Beyond direct actions, creating awareness in the community about these issues can be a strong signal in motivating change. The recently completed Community Carbon Footprint is a major step in expanding awareness. Programs directed specifically at air quality, such as the Department of Environmental Quality's Choose Clean Air, are also improving awareness and changing behaviors.

5 ADAPTATION

Through the Community Carbon Footprint and the ETSP process, Salt Lake City is actively taking steps to measure its environmental impact and take steps to reduce that impact. Though climate mitigation strategies are extremely important, the city also recognizes that climate change will have impact on the Salt Lake region and steps need to be taken to adapt to the changing environment.

This section is meant to provide a brief overview of the anticipated impacts climate change will have on the Salt Lake City region, the main adaptation focus areas as a result of the anticipated impacts, and some high level goals for each focus area.

Because Salt Lake City is a Local Governments for Sustainability, or ICLEI, partner, it can take advantage of the many tools that ICLEI provides for climate adaptation planning (http://www.iclei.org/index.php?id=10832). One specific tool that may be helpful is the Climate Resilient Communities program for which ICLEI is currently seeking inaugural participants. For the purposes of this ETSP, ICLEI's 2007 Adaptation Guidebook has been used as the main reference in identifying the (1) climate change impacts in Salt Lake City, (2) the sectors to be most likely impacted by climate change, and (3) high level adaptation strategies and action items.

5.1 PROJECTED CONSEQUENCES OF CLIMATE CHANGE

In 2000, a national assessment of the climate change impacts on the United States was released. Many of the findings of the assessment are more regionally focused; however, there are some common national concerns, including the following (ICLEI, 2007):

- Increased average annual air temperature
- Lower snowpack in some regions
- Increased risk of drought
- Sea level rise and increased storm surges
- Shifts in types and distributions of forest species
- Near-term forest growth but long term decrease in forests
- Impacts to natural ecosystems
- Exacerbation of non-climate stresses (e.g., habitat fragmentation and patterns of human development)

Within the Mountain West region where Salt Lake City is located, "higher winter temperatures are very likely to reduce snowpack and peak runoff and shift the peak to earlier in the spring, reducing summer runoff and complicating water management for flood control, fish runs, cities, and irrigation (ICLEI, 2007)." The magnitude of these impacts in Salt Lake City should be researched further and in more detail as part of a complete Climate Adaptation Plan.

5.2 HYDROLOGY AND WATER RESOURCES

It is anticipated that water resources in Salt Lake City will be impacted significantly by climate change. Some of these impacts, such as increased drought and reduced snowpack, have already begun. A brief list of anticipated impacts includes the following:

- Earlier spring snowmelt and peak runoff, increasing flooding risk
- Decreased snowpack, resulting in reduced summer stream flows and increased drought risk
- Increased competition for water
- Warmer water temperature in lakes and rivers
- Changes in water quality

5.2.1 Adaptation Strategies

WR-1: Expand and Diversity Water Supply

Salt Lake City relies heavily on surface water supplies from local mountain streams to meet the needs of the city as well as the east bench of Salt Lake County, South Salt Lake, and Murray. Surface water is supplemented with deep wells during the summer months when stream flows are lower and demand is at its peak. With the anticipation of reduced snowpack as a result of climate change, Salt Lake City should begin exploring options for diversifying its water supply portfolio. Potential considerations include:

- Developing new groundwater sources
- Constructing new surface water reservoirs and expanding existing reservoirs (for supply and flood management)
- Exploring aquifer storage and recovery to enhance existing groundwater supplies and provide alternative storage capacity
- Implementing water reuse (gray water) both through advanced municipal wastewater treatment and on-site treatment

WR-2: Modify Water Law

In the western United States, water laws are based on the principles of prior appropriation, often referred to as "first in time, first in right." This water law structure grants senior water rights holders their full appropriation before more junior holders receive any water. However, all allocated water must be put to beneficial uses, otherwise the right can be lost to more junior holders. This structure leads to difficulty in transferring water rights and also promotes water waste. In order to ensure the limited water supplies in Salt Lake City can be used as efficiently and effectively as possible, the following actions should be considered:

- Broaden the concept of beneficial use to allow for more efficient use.
- Address issues with the "use-it-or-lose-it" principle and its impacts on water waste.

WR-3: Reduce Demand/Improve Efficiency

Due to the combination of population growth and reduced water supplies in Salt Lake City, strategies that reduce overall demand and promote efficiency are needed to ensure that water demands can be met into the future.

- Increase billing rates for water as a means to encourage reduced demand and address full cost pricing. Work with third party entity to set pricing.
- Change building codes to require low-flow plumbing fixtures and high efficiency irrigation systems.
- Provide financial incentives (e.g., tax breaks, rebates) for switching to more efficient manufacturing processes, irrigation practices, and appliances.
- Increase authority to implement water restrictions during drought.
- Reduce the city's demand target to focus on critical human needs (limited indoor water use only.
- Increase public awareness about the impacts of climate change on water supplies and what individuals can do to reduce their water use.

WR-4: Improve Hydrologic Data and Models

One of the major challenges in preparing for the impacts of climate change is understanding what the changes will be. In order to more accurately predict impacts to the region and develop more accurate adaptive management strategies, Salt Lake City should do the following:

- Work with the climate science community to conduct additional research and develop down-scaled climate models that better predict climate change impacts on the local level.
- Implement climate forecasting tools available for water resources planning and management.
- Monitor hydrology trends in the region.

5.3 BIODIVERSITY AND ECOSYSTEMS

Though there is a high level of uncertainty regarding the localized impacts of climate change on biodiversity and ecosystems, some of the general anticipated impacts are listed below:

- Shift in the distribution and range of species
- Loss of species not able to adapt to changes
- Increased competition from invasive species
- Loss of habitat
- Increased stress on cold water species in lakes and rivers
- Increased risk of insect outbreaks
- Increased risk of forest fire

5.3.1 Adaptation Strategies

BE-1: Improve Species Survival Rates and Carrying Capacities

The impacts of climate change will create an environment in which some species adapt and thrive while others decline. To counteract the impacts of anthropogenic (or human induced) climate change, Salt Lake City should provide an environment that assists native species in the adaptation process and encourages biodiversity. Some activities are listed below:

- Evaluate vulnerability, sensitivity, exposure, and adaptive capacity to determine what species to address in an adaptation plan.
- Promote and use natural features in urban areas to assist adaptation.
- Increase the extent and diversity of protected and natural areas (aquatic and terrestrial)
- Improve the management and restoration of existing protected and natural areas to counteract the impacts of climate change (e.g., riparian forest plantings to shade streams and reduce warming, prescribed fires to reduce fuel loads, etc.).
- Take actions to protect native species threatened by climate change.
- Reduce the spread of invasive species.
- Protect and restore in-stream flows.
- Manage forests to reduce susceptibility to fire, invasive insects, and drought.
- Reduce non-climate change anthropogenic impacts.

BE-2: Improve Data

The impacts of climate change on ecosystems are still largely unknown. In order to more accurately predict impacts to the region and develop more accurate adaptive management strategies, Salt Lake City should do the following:

- Monitor regional trends in ecosystem and biodiversity changes.
- Work with the climate science community to conduct additional research and develop down-scaled climate models to better predict climate change impacts at the local level.
- Develop modeling tools to better predict climate change impacts on regional ecosystems.

5.4 RECREATION/TOURISM

The recreation and tourism sector in Salt Lake City is at least partially focused on outdoor activities and is expected to be impacted by climate change in a variety of ways:

- Increased opportunities for warm season activities
- Reduced opportunities for cold season recreation due to decreased snowpack
- Increased reliance on snow-making at ski areas

5.4.1 Adaptation Strategies

RT-1: Diversify Tourism Offerings

Salt Lake City is a well-known ski destination and also provides access to surrounding national parks and recreational areas. The city already has a diverse portfolio of tourism offerings however, to address potential impacts of climate change the City should adjust tourism and recreation marketing campaigns to align with the changes in climate. This may include additional or improved options during the summer season.

5.5 ENERGY

The majority of Salt Lake City's electricity is supplied by Rocky Mountain Power, which generates 93 percent of its electricity from coal-powered plants. Fossil fuels, like coal, are the largest man-made source of greenhouse gas emissions and significantly contribute to anthropogenic climate change. However, in addition to the impacts Salt Lake City energy use has on climate change, climate change is also expected to impact energy demand by reducing heating demand during winter months and increasing demand during the cooling season.

5.5.1 Adaptation Strategies

E-1: Modify Building Infrastructure

To address the anticipated increased summer temperatures as a result of climate change, Salt Lake City should make the following modifications to new and existing buildings:

- Install green roofs to provide cooling and stormwater management.
- Increase urban green spaces to reduce the heat island effect and encourage ecosystem adaptation.
- Increase appropriate, low-water shade trees.

E-2: Reduce Energy Demand

In addition to adapting to the increased temperatures through building modifications, Salt Lake City should also take steps to reduce overall energy demand through the following activities:

- Establish stringent energy efficiency standards for new construction and existing buildings.
- Promote high efficiency appliances and products.
- Establish stringent air conditioning efficiency standards.
- Increase renewable energy sources.

5.6 STORMWATER MANAGEMENT

In Salt Lake City, climate change is expected to result in earlier spring snowmelt and peak runoff, increasing flooding risk and the need for stormwater management in the region. The anticipated impacts of climate change on stormwater management include the following:

- Need for new or upgraded flood and erosion control structures
- More frequent road washouts and flooding
- Increased demands on stormwater management systems with the potential for more sewer overflows

5.6.1 Adaptation Strategies

SW-1: Reduce Flooding and Erosion Impacts

The Salt Lake City Department of Public Works is responsible for flood control, stormwater, and stream water quality within city boundaries. The impacts of climate change will require the Department to modify the existing stormwater management system to address changes in precipitation patterns and stream runoff in the following ways:

- Increase capacity of stormwater collection systems
- Increase requirements for on-site stormwater management to reduce runoff
- Preserve ecological buffers (e.g., wetlands)
- Update data used in managing stormwater to reflect the impacts of climate change

SW-2: Reduce Property Damage

Floodplains in Salt Lake City were determined based on hydrology that does not consider the impacts of climate change, and zoning within the city was based on these defined floodplains. In order to protect property from increased stormwater and flooding, the following steps should be taken:

- Update floodplain maps to reflect changes to the hydrology as a result of climate change.
- Encourage relocation or abandonment of infrastructure located within the new floodplain.
- Update building code requirements to include flood-proofing for all infrastructure in the floodplain.
- Require insurance for development in flood hazard areas.

5.7 PUBLIC HEALTH

The anticipated impacts of climate change on public health include the following:

- More heat-related stress, particularly among the elderly, the poor, and other vulnerable populations
- Fewer extreme cold-related health risks
- Increase in vector-borne (transmitted by insects) illnesses (e.g., West Nile)

- Reduced summer air quality in urban areas due to increased production of ground-level ozone

5.7.1 Adaptation Strategies

PH-1: Reduce Impacts of Extreme Heat Events

An increase in summer temperatures is likely to result in an increase in extreme heat events, which Salt Lake City should address with the following actions:

- Improve early warning systems.
- Increase the number of cooling centers and provide transport services for at-risk communities (elderly, economically disadvantaged, etc.).

PH-2: Reduce Impacts of Reduced Air Quality

Increased temperatures along with an increase in population are expected to result in poorer urban air quality, which Salt Lake City should address with the following actions:

- Improve alert system for high air pollution days.
- Develop incentive programs to discourage driving on high air pollution days.
- Increase public education and awareness of the risk of air pollutants.

PH-3: Improve Disease Surveillance and Protection

Changes in weather patterns and temperatures as a result of climate change are expected to result in an increase in such vector-borne illnesses as West Nile. Salt Lake City should take the following actions to address this impact of climate change:

- Improve monitoring of diseases of concern for the region.
- Increase public education and awareness of diseases of concern.
- Increase emergency planning for disease outbreaks.

6 FRAMEWORK FOR CONTINUED PROGRESS

The ETSP is intended to provide a framework for developing strategies to reduce building and transportation energy consumption and associated greenhouse gas emissions, as well as to begin to prioritize and suggest next implementation steps for those strategies. Taking these next steps will require leadership and accountability across multiple fronts, including political, commercial, non-profit, and individual groups. The city's Division of Sustainability and the Environment, in concert with the ECAC, will be facilitating the creation of a number of sub-committees to pursue the priority strategies identified in this plan.

The success of these priority strategies and the ETSP will be measured in an annual report card summarizing the performance across all 10 sustainability topic areas illustrated in Figure 5. Future updates of the greenhouse gas inventory and this inventory will also be used to consider progress toward the goals established in this ETSP.

APPENDIX A: ENERGY STRATEGY ASSUMPTIONS

Re-commissioning of Small Commercial Buildings

Implementa -tion Cost	Electricity Savings	Natural Gas Savings	CO2e Savings	Savings Depreciation Rate
$4,692/bldg	$1,593/bldg	n/a (elec only)	19 tons/bldg	20%

1. Commercial buildings under 20,000 square feet included.
2. Penetration rate estimated to be 2% average, 10% above average.
3. Savings and cost data from Boulder, CO small building tune-up program results.
4. Future costs and savings do not consider impacts of population growth, inflation, etc.

Re-commissioning Schedule for Larger Commercial Buildings

Implementa -tion Cost	Electricity Savings	Natural Gas Savings	Savings Depreciation Rate
$0.25/sq ft	10%	n/a (elec only)	10%

1. Commercial buildings under 50,000 square feet included.
2. Average assumes 5% of square footage per year, above-average 10%.
3. Only includes electricity, no natural gas.
4. Potential savings based on ENERGY STAR estimates; cost ranges from $0.10 to $1.00 per square foot. in review of different programs.
5. Future costs and savings do not consider impacts of population growth, inflation, etc.

Targeted Energy Information for Consumers

1. Implementation of this approach has shown 1.5 to3.5 percent savings over electric and gas baselines; average case 1.5 percent electricity, above average case 3.5 percent gas.
2. Can also be applied to natural gas (assumed savings to be 1.0 percent).
3. Cost to implement is $0.03/kWh saved.

Voluntary Above-code Adoption

Cooling & Lighting Savings	Heating Savings	Implementation Costs	Savings Depreciation Rate
$0.01/sq ft	$0.06/sq ft	$1.79/sq ft	0%

1. ENERGY STAR projected savings for 2011 ENERGY STAR for NEW HOMES over 2009 IECC.
2. Incremental cost from ENERGY STAR, not amortized.

3. Market penetration rate for ENERGY STAR at 50 percent for average and 75 percent for above average, was 38 percent in 2009.
4. Future costs and savings do not consider impacts of population growth, inflation, etc.

Cooling & Lighting Savings	Heating Savings	Implementation Costs	Savings Depreciation Rate
11.9 kBtu/sq ft	17.0 kBtu/sq ft	$5/sq ft	0%

1. Projected savings at LEED-Silver equivalent.
2. Implementation cost based on federal General Services Administration (GSA) implementations of LEED.
3. Market penetration rate for average case 10 percent, for above-average cast 30 percent.
4. Future costs and savings do not consider impacts of population growth, inflation, etc.

Energy Efficiency Assessments

Category	Implementa-tion Cost	Electricity Savings	Natural Gas Savings	Penetration Rate	Savings Depreciation Rate
Residential	$1,200/HH + $75,000 staff	260 kWh/yr/HH	30 therms/ yr/HH	1%	10%
Commer-cial	$1,800/HH + $75,000 staff	10%	5%	2% + 30% Implmnt Rate	10%

1. Residential data from EPA regional examples.
2. Commercial cost and rate of penetration data from EPA regional examples.
3. Commercial savings data from experience with similar programs
4. Only include commercial properties under 100,000 square feet.
5. Future costs and savings do not consider impacts of population growth, inflation, etc.

Direct Implementation Support for Low-income Residents

Low Income Households	Implementation Cost	Electricity Savings	Natural Gas Savings	Savings Depreciation Rate
19,260	$1,598/HH	8.7%	14%	5%

1. Number of low income households based on Salt Lake City income stats; poverty level assuming 3 people per household; definition of low income as 150% of poverty level.

2. Annual percent penetration based on Utah Division of Housing and Community Development state-wide weatherization program.
3. Cost and savings from average of similar programs with reported results.
4. Future costs and savings do not consider impacts of population growth, inflation, etc.
5. Five percent savings depreciation rate applied, year-over-year.

Support for Large Institutions

Size	Electricity Consump-tion	Natural Gas Consump-tion	Electri-city Savings	Natural Gas Savings	Implementa-tion Cost	Savings Depreciation Rate
40,000 sq ft	8.5 kWh/sq ft	54.7kWtu/sq ft	7%	3%	$500,000	1%

1. Includes support for 36 schools in Salt Lake City School District.
2. Average size and energy consumption data from Commercial Buildings Energy Consumption Survey.
3. Energy savings and implementation cost scaled to a 10-year simple payback; actual potential is unknown.
4. Future costs and savings do not consider impacts of population growth, inflation, etc.
5. Full project implemented in 2010.

Lights Out Program

Impacted Hours	Hardware Costs	Enforcement Costs	Savings Depreciation Rate
4,000	$400/bldg	$75,000/yr	0%

1. Used modeling rule-of-thumb for exterior lighting density (0.1 W per square foot); less than 2009 IECC for small commercial building.
2. Fifty percent of commercial lighting already shut off at night (manual or automatic).
3. Future costs and savings do not consider impacts of population growth, inflation, etc.
4. Full project implemented in 2010.

Code Modification

Cooling & Lighting Savings	Heating Savings	Implementation Costs	Savings Depreciation Rate
$0.04/sq ft	$0.05/sq ft	$0.39/sq ft	0%

1. Residential square footage growth based on Salt Lake City Generalized Future Land Use Plan.
2. Savings potential based on DOE modeling of 2009 IECC versus 2006 IECC.

3. Linear rate of implementation between 2010 and 2020.
4. Future costs and savings do not consider impacts of population growth, inflation, etc.

Municipal Opportunities in Renewable Energy

1. Benefits of Solar Salt Lake City are already projected under Existing Practices.
2. Wind potential in Salt Lake City is outstanding. This strategy is based on implementing 5MW of wind by the city ($2,100/kW installed cost, $20/kW annual O&M, $0.04/kWh avoided electricity rate, 27 methane capacity factor).
3. More than 99 percent of methane at wastewater treatment plants already used for thermal or electric energy generation.
4. Hydroelectric at Mountain Dell Dam is being studied by the city.
5. The city's current investment in RECs has a minimal monetary value for application to on-site renewable projects.

Biofuels on Unused City Lands

1. Three thousand acres of unused land in Salt Lake City.
2. All unused land would be used for growing safflower biofuel crop starting in 2010.
3. Data to calculate cost and savings from Utah State University Freeways To Fuel program.
4. Diesel and biodiesel emissions factors from TCR.

Increased Influence on Electricity Supply

1. Since the means of achieving reduced carbon intensity in electricity are numerous, this strategy generically estimates the benefit of a 15 percent reduction in greenhouse gas intensity of electricity between now and 2020.
2. Reduction is based on Rocky Mountain Power Integrated Resource Plan.
3. Costs and savings are not estimated because the means are not specific.

APPENDIX B: TRANSPORTATION STRATEGY ASSUMPTIONS

TECHNICAL MEMORANDUM

To: Brendle Group

Date: January 27, 2011

From: Fehr & Peers

Subject: Reduction Strategy Quantification UT10-846

Introduction

This memorandum describes the process and methodology used to estimate emission reductions from several strategies proposed as part of the Salt Lake City Community Carbon Footprint (SLCCCF). This memorandum identifies the sources used as reference materials, provides an overview of the quantification of the reductions, and estimates the total amount of vehicle miles traveled (VMT) and greenhouse gas (GHG) reductions associated with the strategies.

Data Sources

To quantify reduction strategies proposed in the SLCCCF, the report *Quantifying Greenhouse Gas Mitigation Measures – A Resource for Local Government to Assess Emission Reduction from Greenhouse Gas Mitigation Measures* from the California Air Pollution Control Officers Association was used. This work incorporated previous research conducted by Fehr & Peers. Supplemental information came from the *Sacramento Blueprint*, *Growing Cooler,* and the *Bicycle Transit Center Study for Salt Lake Central Station*.

Quantification of Reduction Strategies

Using the sources outlined above, Fehr & Peers estimated the amount of VMT and GHG reductions associated with several emission reduction strategies. For the purposes of quantifying reductions, Fehr & Peers grouped strategies into major categories, as described below. Fehr & Peers provided a range of effectiveness in reducing emissions for each major category.

Category 1: Pursue a compact, TOD-supportive, mixed-use urban form

Research shows that implementing land use patterns that are compact and efficient, with a mix of land uses and connectivity to transit networks, can reduce VMT through shorter trip lengths and a greater share of bicycle, pedestrian, and transit trips. Quantification of this strategy required calculating the difference between Salt Lake City VMT in 2005 (the base year) and 2020 (the future year threshold), to determine the amount of VMT attributable to new growth. This was due to the assumption that existing land use patterns would not change significantly between the base year and future year, and that the opportunity for changing land use patterns lay in new developments only. VMT from new growth was then reduced by a range of 7% - 15%, based on review of the data sources listed above.

Category 2: Bicycle Infrastructure

Existing literature on bicycle infrastructure and commuters shows that a 1% increase in bicycle commuters can be expected for every additional 1 mile per square mile of bike lanes implemented by a jurisdiction. Using available information on the number of bike lanes miles in 2005 and proposed by 2020, Fehr & Peers calculated the baseline and future ratios of bike lane miles to city square miles, and applied the ratio to increase the percentage of bicycle commuters. Average trip lengths from the WFRC travel demand model and data sources were applied to the cyclist commuter trips to identify VMT for this category.

Category 3: Park and Ride

Park-and-ride strategies were assumed to apply primarily to work trips of commuters traveling into Salt Lake City from other jurisdictions. Salt Lake City is the major employment center for the region and is also relatively small in area; residents of Salt Lake City are relatively unlikely to use park-and-ride facilities to travel within the city or to outlying areas. The WFRC travel demand model provided information on the average trip length for these incoming work trips. Data sources indicated a range of effectiveness to calculate the percentage of work trips into Salt Lake City that can be intercepted by peripheral park-and-ride lots.

Category 4: Parking Cashout and Parking Unbundling

Parking cashout strategies are most applicable in areas where parking pricing is tied to tenant costs. For this reason, the analysis of parking cashout strategies focused on eligible employees in the Salt Lake City Central Business District (CBD). Work trips made within,

into, and out of Salt Lake City were isolated using the WFRC travel demand model, and Fehr & Peers assumed a range of percentages for workers participating in a parking cashout program (from 5% to 20%), who would mostly be centered in the CBD. VMT reduction was applied to commuting VMT only.

Category 5: Parking Pricing

The strategic pricing of parking supply has the ability to reduce GHG through modal shift to bicycle, pedestrian, and transit modes, and through reducing unnecessary driving while finding available parking. The analysis of on-street parking pricing focused on trips that were attracted to the Salt Lake City CBD, since the CBD is the only place where parking is metered in the City. This strategy assumed a 25% to 50% increase in on-street parking costs, from $1.00 per hour to $1.25 and $1.50 per hour. VMT reduction was based on elasticity of VMT with respect to parking pricing from the literature.

Category 6: Local Circulators and Last-Mile Solutions

Local circulators and other last-mile solutions, such as pedi-cabs and bike sharing, can be integral to long-distance transit trips. The methodology for this strategy assumed an increase in transit network coverage in Salt Lake City of 2% to 10%. Transit mode split was determined from the WRF travel demand model. VMT reduction percentages were applied to all SLC VMT based on literature reviews from the previously-mentioned sources.

Category 7: Transportation Demand Management

Research shows that transportation demand management (TDM) strategies can be effective in reducing VMT and emissions, but the ability to isolate and quantify specific measures is limited because TDM strategies are typically implemented in packages and in tandem with other measures (i.e. parking pricing, park-and-ride lots, transit investments). The literature reviewed for the SLCCCF provided a range of effectiveness for a group of TDM measures, including carpooling, ride-matching, transportation coordinators, end-of-trip facilities, vanpool assistance, and flex scheduling. Fehr & Peers applied reduction percentages to work trips made within, into, and out of Salt Lake City (using information from the travel demand model), and assumed a range of participation of commuters in TDM programs.

Emission Reduction Estimates

The following table identifies the low-range and high-range estimates of emission reductions based on the categories and strategies described above.

Category	Description	VMT Reduction/Day in 2020		GHG Reduction/Day in 2020 (metric tons)	
		Low	*High*	*Low*	*High*
Density, Diversity, and Design					
1	Pursue a Compact, TOD-Supportive, Mixed-Use Urban Form	48,469	103,862	27.24	58.38
Increase Bike Infrastructure					
2	Increase Overall Bike Infrastructure	5,793	14,482	3.26	8.14
Park/Ride					
3	Remote Parking/Park & Ride	689	1,378	0.39	0.77
Parking Cashout					
4	Parking Cashout and Unbundling	3,699	14,795	2.08	8.32
On-Street Parking Pricing					
5	Strategic Management of Downtown Parking Supply	15,069	30,138	8.47	16.94
Expand Local Bus & Other Last-Mile Solutions					
6	Local Circulators for "First Mile/Last Mile" Travel	2,579	12,895	1.45	7.25
TDM Coordination					
7	Commuter Reduction Programs	29,801	59,601	16.75	33.50
Totals					
Total Reduction		106,098	237,151	59.63	133.29
% of Total 2020 SLC VMT		*3%*	*6%*	-	-
Improved CAFÉ standards will effectively decrease emissions by 15%					
Total Reduction with CAFÉ standards		106,098	237,151	463.79	601.39

APPENDIX C: ACRONYMS AND ABBREVIATIONS

- BAU: Business As Usual
- BRAC: Blue Ribbon Advisory Council on Climate Change
- CCAR: California Climate Action Registry
- CNG: Compressed Natural Gas
- CRP: Commuter Reduction Program
- DEQ: Department of Environmental Quality
- ECAC: Energy and Carbon Advisory Committee
- EECBG: Energy Efficiency and Conservation Block Grant
- ETSP: Energy Sustainability Plan
- GHG: Greenhouse Gas(es)
- GWP: Global Warming Potential
- HOV: High Occupancy Vehicle
- ICLEI: Local Governments for Sustainability
- IECC: International Energy Conservation Code
- IOU: Investor Owned Utility
- ITS: Intelligent transportation systems
- MTCO2e: Metric Tons of Carbon Dioxide equivalent
- MW: Megawatt
- TCR: The Climate Registry
- TDM: Transportation Demand Management
- TMA: Transit Management Association
- TSP: Transit Signal Priority
- UDOT: Utah Department of Transportation
- LEED: Leadership in Energy and Environmental Design
- PM: Particulate Matter
- RDA: Redevelopment Agency
- RECs: Renewable Energy Credits
- RMP: Rocky Mountain Power
- TOD: Transit Oriented Development
- UTA: Utah Transit Authority
- USEP: Utah State Energy Program
- USGBC: United States Green Building Council
- VMT: Vehicle Miles Travelled
- WCI: Western Climate Initiative