

Saint Paul's Path to Carbon Neutrality: ***Buildings Sector***



Draft for Public Review

June 2017

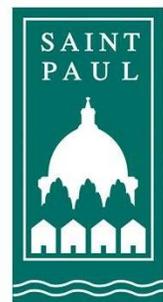


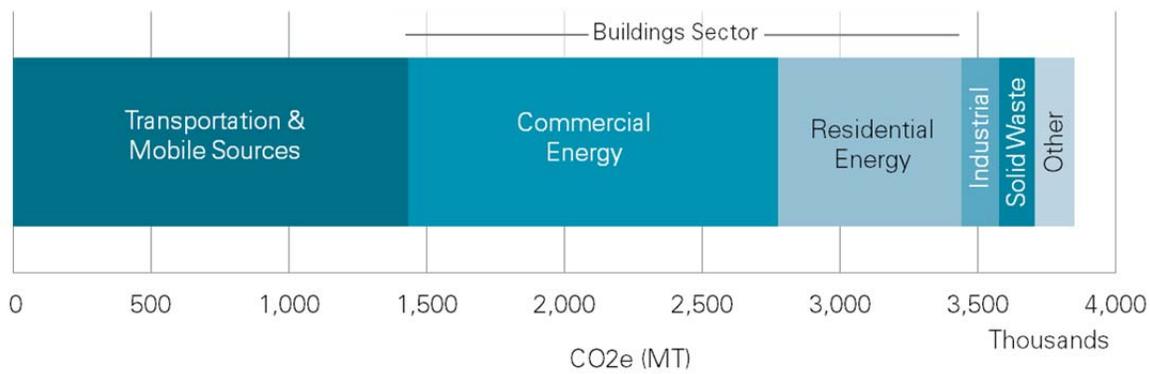
Table of Contents

Executive Summary	i
Saint Paul’s Energy Vision & Goals	i
Near-Term Building Sector Priorities	iii
Next Steps	v
Introduction	1
The City of Saint Paul — Community Background.....	2
Commitment to Climate Change Mitigation	6
Developing the Plan	13
Xcel Energy’s Partners in Energy	13
Saint Paul’s Goals for Partners in Energy	13
Technical Advisory Group.....	14
Planning Process.....	15
Community Engagement Event.....	17
Baseline Energy and Greenhouse Gas Analysis	18
Greenhouse Gas Inventory	18
Community-Wide Energy Consumption.....	19
Community Energy Costs	21
Residential Energy Burden.....	21
Participation in Conservation and Renewable Energy Programs	22
Saint Paul’s 2050 Community Energy Vision	26
Vision for the Future, Summarized.....	26
Vision for the Future: Saint Paul’s 2050 Energy Vision for Carbon Neutrality	27
The Path to Carbon Neutrality.....	28
Near-Term Priorities for the Buildings Sector	29
Priority One: Inspire a Culture of Energy Stewardship.....	29
Priority Two: Reduce Resident Energy Burden.....	30
Priority Three: Engage Major Public and Private Institutions on Climate Leadership.....	31
Priority Four: Engage the Multifamily and Large Commercial Sector	32
Priority Five: Inspire through Municipal Leadership	33
Impact of Near-Term Priorities	34

How Are We Going To Get There? – Strategies.....	36
Priority One: Inspire a Culture of Energy Stewardship.....	36
Priority Two: Reduce Resident Energy Burden.....	38
Priority Three: Engage Major Public and Private Institutions on Climate Leadership.....	39
Priority Four: Engage the Multifamily and Large Commercial Sector	40
Priority Five: Inspire Through Municipal Leadership	42
Longer-Term Strategies	45
Tracking Progress	46
Monitoring and Reporting	46
Evolution of Strategies and Goals	46
Conclusion: The Path Forward	47
Appendix 1: Glossary of Terms	
Appendix 2: Community Engagement Kickoff Meeting	
Appendix 3: Saint Paul’s 2015 Greenhouse Gas Inventory	
Appendix 4: Assumptions Behind Energy Burden Calculations	
Appendix 5: Summary of Near-Term Priorities and Year 1 Milestones	
Appendix 6: Partners in Energy Planning Memorandum of Understanding	
Appendix 7: Xcel Energy Demand-Side Management Program Summaries	
Appendix 8: Saint Paul Conservation Program Participation and Savings	

Executive Summary

This Climate Action Plan lays the groundwork for Saint Paul’s path to carbon neutrality by 2050. The City of Saint Paul formalized its commitment to reducing greenhouse gas (GHG) emissions and increasing resiliency by signing the Compact of Mayors agreement in December 2015. The associated GHG inventory shows that commercial and residential energy accounted for just over half of Saint Paul’s 2015 GHG emissions, making the buildings sector a key focus for climate change mitigation.¹ This plan is one section of Saint Paul’s full set of strategies to address climate change in the community. It will be accompanied by additional sections focused on transportation, waste, natural resources, and climate resiliency.



Saint Paul’s 2015 Greenhouse Gas Inventory

This plan was produced as part of the City of Saint Paul’s participation in Xcel Energy’s Partners in Energy, which supports communities in developing local energy plans. Partners in Energy convened a Technical Advisory Group of local energy and building sector experts, whose goal was to assess the technical feasibility of strategies and advise City staff and officials on impact and prioritization. Additional targeted stakeholder outreach was conducted among individual building sectors, and a public engagement forum was held in February 2017 to launch public engagement in the climate planning process.

Saint Paul’s Energy Vision & Goals

At the beginning of the Partners in Energy planning process, the Technical Advisory Group shared their inspirations for Saint Paul’s energy future and imagined a Saint Paul that has

¹ Commercial and residential energy include all direct energy services to buildings (electricity, natural gas, hot water, or chilled water). The commercial energy category includes electricity and gas service to industrial buildings. Additional industrial emissions represent process emissions and emissions from other delivered fuels. The “other” category includes water and wastewater, process and fugitive emissions, and upstream impacts of activities.

achieved its energy goals as a guide to creating a unified vision statement. Essential to the vision statement is the long-term goal of carbon neutrality and strong community engagement.

Summary Energy Vision

By expanding energy efficiency, conservation, and energy recovery, as well as energy storage, renewable energy, and distributed energy, Saint Paul has achieved carbon neutrality in its built environment and fortified its resilience to climate change by the year 2050. Saint Paul has achieved this remarkable goal by intentionally and consistently engaging the public towards locally relevant solutions. All views — especially those of the traditionally underrepresented — have been heard and respected, and all residents, regardless of housing type or income, have benefited from the clean energy economy transition and are safeguarded from adversity.

Guiding Themes

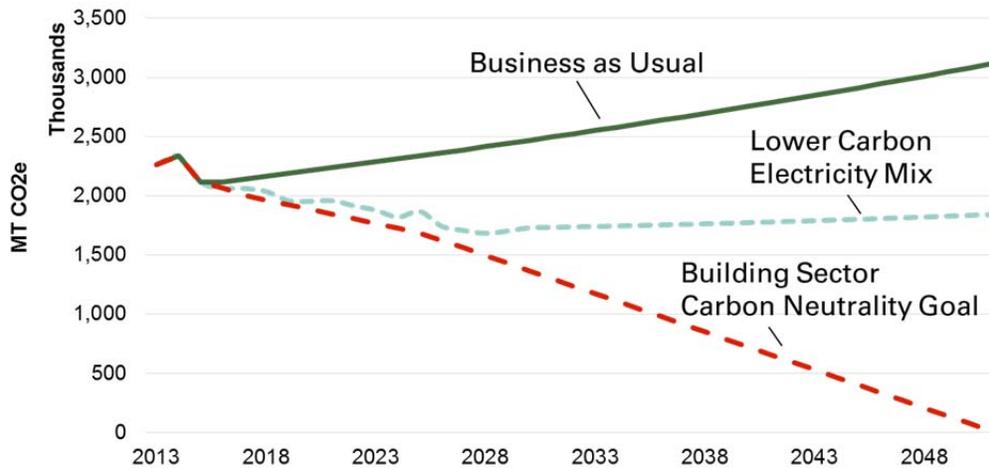
The near-term strategies in this plan were also linked to a number of guiding themes of importance to the City:

- Prioritize conservation, energy efficiency, and energy recovery.
- Prioritize renewable-based distributed generation and energy storage.
- Ensure solutions and opportunities are equitable, particularly in communities and households of color.
- Commit to reducing the energy burden on low- to moderate-income residents.
- Focus on efforts that result in co-benefits (e.g. employment, economic development, other environmental benefits such as water conservation and improved air quality).
- Showcase best practices and innovative solutions.

The Path to Carbon Neutrality

Attaining carbon neutrality in just over 30 years will require aggressive efforts to reduce overall building energy use through efficiency and conservation and convert current energy sources to renewable or carbon-free. The scale of this effort will also depend on how Saint Paul's underlying energy needs are growing and on projections for the carbon intensity of the regional electricity supply. Xcel Energy's current Upper Midwest Resource Plan forecasts significant electricity decarbonization between now and 2030 as the result of planned coal plant retirements and additional renewable energy coming online.² This change alone would bring Saint Paul 40% of the way toward carbon neutrality by 2050.

² By 2030, carbon intensity is projected to reach 521 lbs/megawatt-hours (down from a 2015 value of 1,002 lbs/megawatt-hours). See Xcel Energy's 2016-2030 Resource Plan, Minnesota Public Utilities Commission Docket No. 15-21.



Projected Carbon Emissions under a 1% Business as Usual Growth Scenario

Near-Term Building Sector Priorities

The City identified five near-term priority areas. These priorities were selected because they offer the highest likelihood of early success, reflect necessary foundational groundwork for later stage strategies, or require significant lead time to address.

<p style="text-align: center; font-weight: bold; font-size: 1.2em;">Inspire a Culture of Energy Stewardship</p>	<p>The goal of this effort is to inspire a culture shift that transforms the community’s relationship to energy use, tripling the incremental annual savings from residential conservation and renewable energy adoption within 10 years. Achieving the City’s overall goal of carbon neutrality will begin with those who live, work, and play in Saint Paul embracing the values of energy conservation so that consuming less energy becomes a cultural norm in the city.</p>
<p style="text-align: center; font-weight: bold; font-size: 1.2em;">Reduce Resident Energy Burden</p>	<p>The goal of this priority area is to, within 10 years, lower the energy burden so that no Saint Paul household spends more than 4% of household income on energy costs. Energy burden is defined as the percentage of annual household income spent on energy, and it is felt disproportionately by low-income residents who live in high energy use properties.</p>

Engage Major Institutions on Climate Leadership

The goals of this priority area are to **(1) within three years, win commitments of major institutions to achieve carbon neutrality by 2050 and ensure 80% of institutional buildings are actively benchmarked, and (2) within 10 years, help institutions realize a 35% total GHG reduction, with energy efficiency as a leading strategy.** This work leverages Saint Paul's concentration of public and private institutions and the early action many have taken to reduce carbon emissions.

Engage the Multifamily and Large Commercial Sector

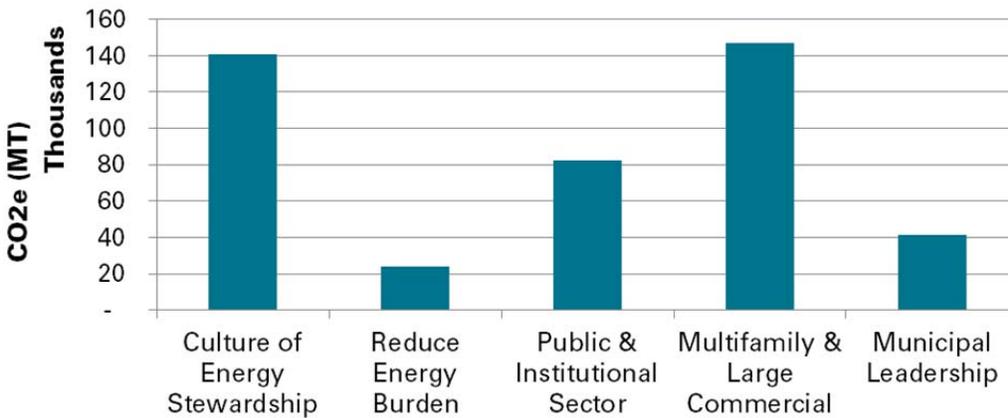
The goal of this priority area is **to adopt multifamily and large commercial sector conservation and renewable energy initiatives that result in an additional 4% annual reduction in GHG emissions for those sectors.** This sector includes a number of the highest energy users in Saint Paul, and the buildings where a large number of Saint Paul residents live.

Inspire through Municipal Leadership

The goal for this focus area is to **achieve carbon neutrality in municipal building operations by 2030.** A specific focus on municipal buildings lets the City lead by example and demonstrate commitment to climate leadership within their own operations. Accomplishing this goal would reduce GHG emissions by an estimated total of 52,000 metric tons below 2015 levels.

Impact of Near-Term Priorities

Combined, the sectors targeted in these five priority areas accounted for 58% of the community-wide electricity use and 74% of community-wide natural gas use in 2015. Within 10 years, the associated strategies will reduce GHG emissions by 435,000 metric tons of carbon dioxide equivalent (MT CO₂e), or 21% below 2015 levels. The carbon savings of each focus area is a result of how much energy the sector is accountable for, the relative use of electricity versus natural gas in that sector, and the relative aggressiveness of each goal.



Projected 10-year Carbon Reductions Below 2015 Levels

Next Steps

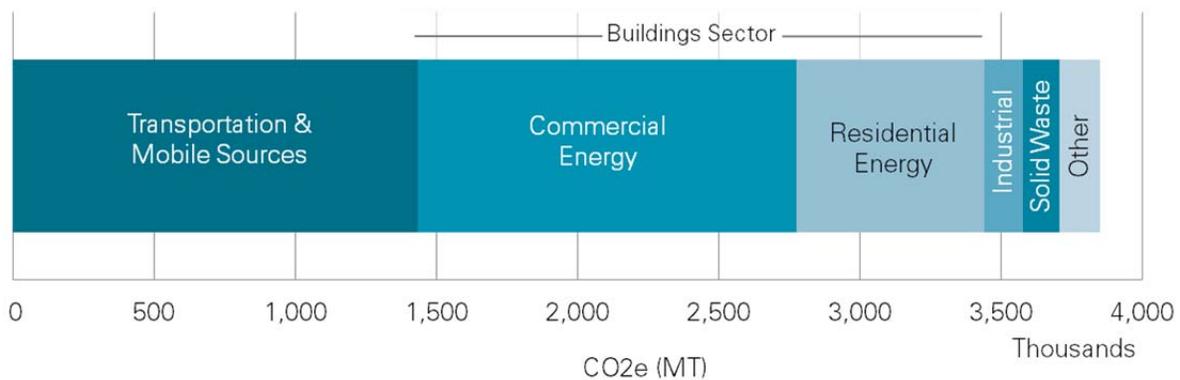
This plan lays out a robust set of near-term strategies that will set the city on a path to achieve its carbon reduction goals, along with major Year 1 milestones and metrics for tracking progress. These strategies call for continued public engagement, local leadership, and commitments from large energy users. There will be a sustained and focused campaign to motivate residents to take action and reduce barriers to investments. Strategies to reach underserved communities will need to include additional resources to support Saint Paul’s residents who shoulder the highest energy burden. Other near-term strategies focus on increasing transparency of energy costs, recognizing leading buildings, sharing best practices, increasing knowledge of and access to resources, incentivizing efficiency in new construction, and increasing opportunities for customers to subscribe to renewable energy.

Xcel Energy will continue to support the implementation of this plan through Partners in Energy. Local partners, many of which have a long history of investing in and contributing to Saint Paul’s energy advancement, were critical to the development of this plan and will continue to be critical to its success.

Introduction

The City of Saint Paul formalized its commitment to reduce greenhouse gas (GHG) emissions and increase resiliency by signing the Compact of Mayors agreement in December 2015. The Compact of Mayors was developed and led by the three global city networks: C40 Cities Climate Leadership Group, United Cities and Local Governments, and ICLEI — Local Governments for Sustainability, of which the City of Saint Paul has been a member since 1993. Over the next three years, the Compact of Mayors commits cities to comply with common reporting processes, establish GHG emissions targets, identify local climate hazards, assess climate vulnerabilities, and develop a climate action and resiliency plan.

An important part of participation is a GHG inventory that informs the development of a citywide and comprehensive climate action plan. Buildings represent just over half of Saint Paul’s 2015 GHG emissions, making energy use reduction in buildings a key component of climate change mitigation.³



Saint Paul’s 2015 Greenhouse Gas Inventory

In September 2016, the City of Saint Paul signed a Memorandum of Understanding with Xcel Energy to participate in its Partners in Energy offering. The outcome of the resulting seven-month planning process is this section of the City’s overall Climate Action Plan, which is focused on the buildings sector. Development of the plan was led by a 15-member Technical Advisory Group convened by the City, with additional engagement of residential, commercial, and institutional stakeholders on specific topics. An important part of the success of this plan is continuing broad community engagement to support buy in and achieve real gains in energy conservation.

³ Commercial and residential energy include all direct energy services to buildings (electricity, natural gas, hot water, or chilled water). The commercial energy category includes electricity and gas service to industrial buildings. Additional industrial emissions represent process emissions and emissions from other delivered fuels. The “other” category includes water and wastewater, process and fugitive emissions, and upstream impacts of activities.

The purpose of this section of the Climate Action Plan is to outline specific goals and action steps that will reduce Saint Paul’s building energy use and increase use of renewable energy as part of a broader set of climate change mitigation strategies that seek to build resiliency. Xcel Energy’s support of this plan also included contributing a more rigorous analysis of Saint Paul’s energy use and tracking recent conservation activities as well as a broader set of opportunities that leverage both utility and community assets.

The top priority in developing this plan was to identify near-term actionable strategies that could achieve tangible energy savings within an initial two- to three-year implementation period, though all will have additional long-term impacts. These near-term actions are grounded in a long-term vision of achieving carbon neutrality and inspiring a culture shift around energy use—recognizing that transformative change will be necessary to achieve carbon neutrality across Saint Paul’s energy system.

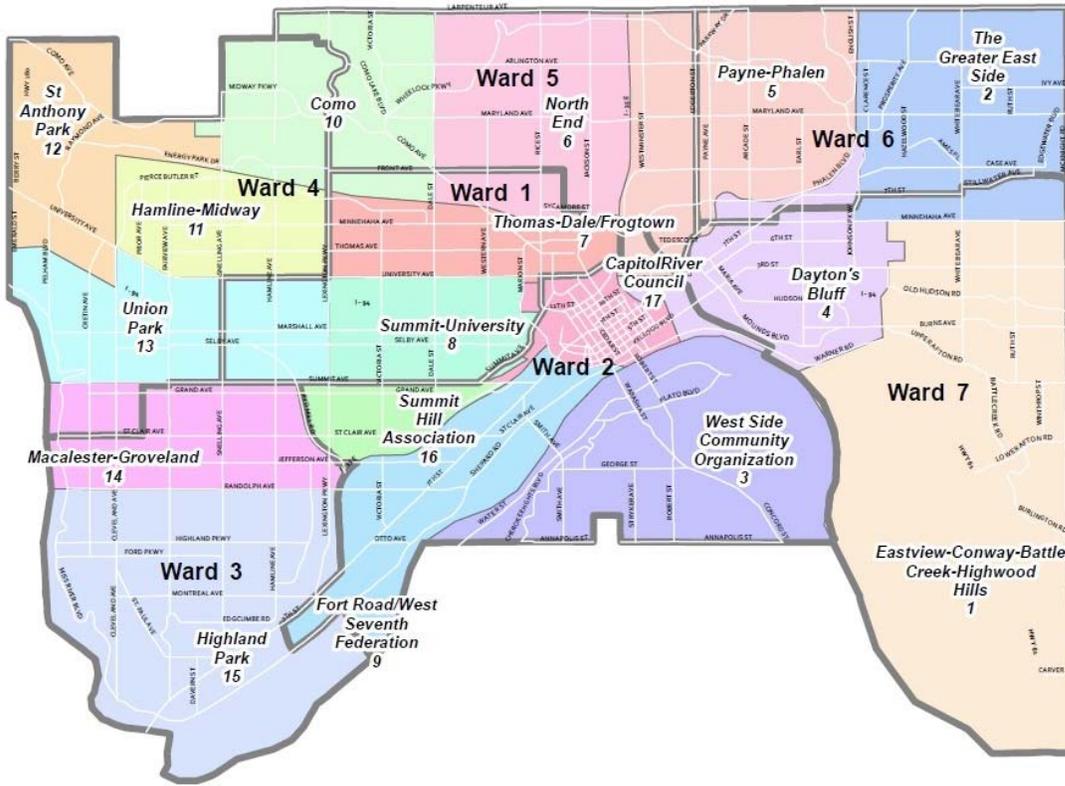
The City of Saint Paul — Community Background

Saint Paul is the second largest city in Minnesota with an estimated population of 304,442.⁴ It is also Minnesota’s state capital, the county seat for Ramsey County, and serves as an employment hub for the larger Twin Cities metro. Saint Paul’s total 2015 workforce is estimated at 180,198.⁵ Saint Paul’s many assets have earned it the motto of “Most Livable City in America.”

Saint Paul is divided into 17 neighborhoods or districts, each of which is governed by a District Council that supports neighborhood participation and governance. Responsibilities of the councils include planning and advising on the physical, economic, and social development of their areas; identifying needs; initiating community programs; recruiting volunteers; and sponsoring community events.

⁴ Source: U.S. Census Bureau, 2015.

⁵ Source: Quarterly Census of Employment and Wages, Minnesota Department of Employment and Economic Development.

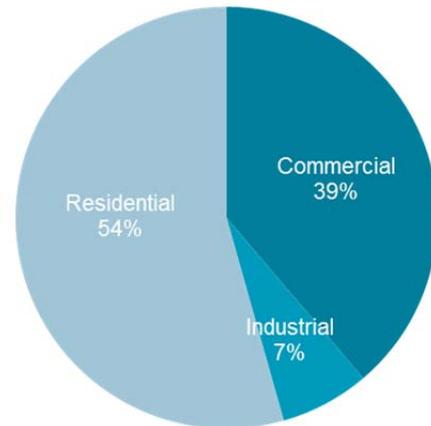


Saint Paul’s 17 District Councils (Source: City of Saint Paul)

The Buildings

Of the total 280 million square feet of building floor area in Saint Paul, 54% is residential, 39% is commercial, and 7% is classified as industrial use.⁶

There are a total of 112,988 housing units in Saint Paul.⁷ Just over half (54%) are single-family homes, one-third are in multifamily (5+ unit) buildings, and the remaining 14% are in 2-4 unit buildings. Just over half of all units are occupied by renters. Saint Paul’s housing stock is older, with 45% of units constructed prior to World War II. Currently, the median home value is \$187,800 and median rent is \$823 per month.



Total Floor Area by Use (Source: Ramsey County)

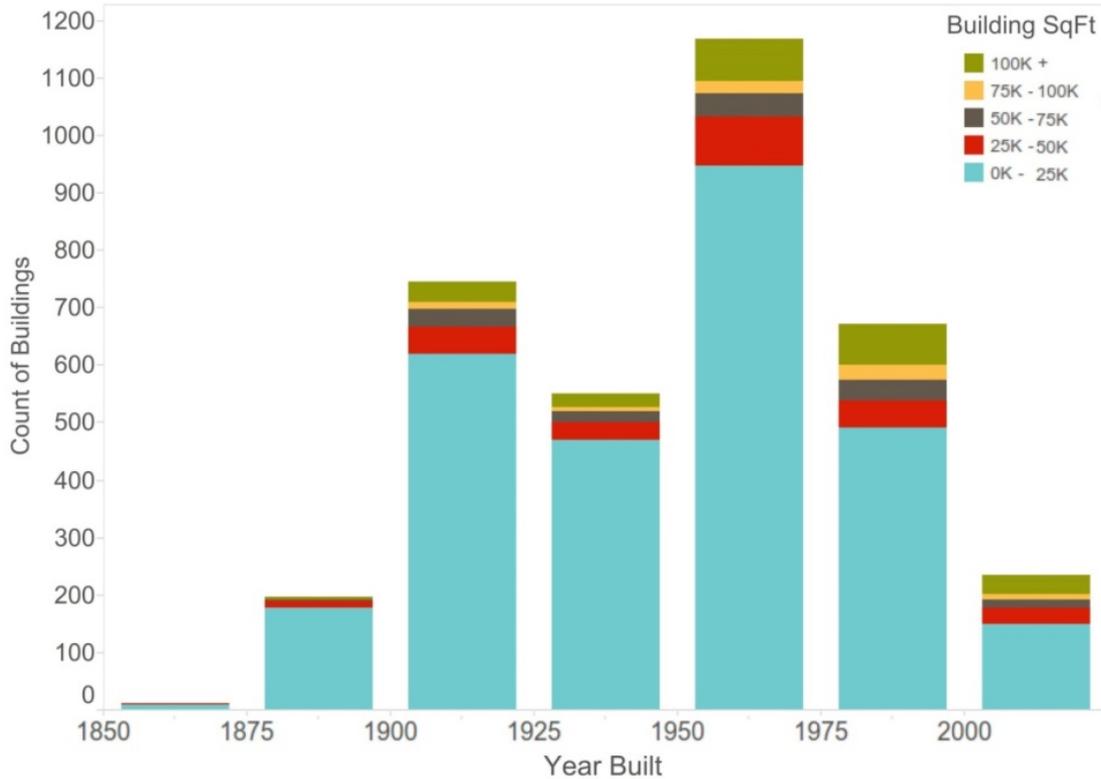
⁶ Unless cited differently, all property data are from the Ramsey County Assessor database, accessed in September 2016.

⁷ Source: MN Compass.

Saint Paul Housing Units by Ownership and Type		
	Number of Units	Percent of Total
Total Units	112,988	100%
Owned Single Family	50,201	44.4%
Rented Single Family	10,881	9.6%
Owned Multifamily (Typically Condominium)	5,348	4.7%
Rented Multifamily (Typically Townhome)	10,480	9.3%
Rented Unit in Apartment Building	35,851	31.7%

Buildings classified as commercial properties include a wide range of use types and reflect the large government and institutional presence in Saint Paul. Of the properties recorded as having over 25,000 square feet, the largest use category are properties classified as generic commercial, such as offices and retail. After that, the largest special use categories by building count are public schools, churches, charitable institutions, municipal services, special tax districts, state property, and colleges and universities.

Saint Paul’s commercial buildings were constructed throughout the city’s 160-year history, though the heaviest construction period, measured by the number of parcels built, occurred between the years 1950 and 1975. Of the buildings over 25,000 square feet, the majority were constructed after 1950.



Size and Year Built of Saint Paul's Commercial Buildings (Source: Ramsey County)

Saint Paul has a large downtown area, with several high-rise commercial buildings including the iconic First National Bank Building, as well as historic buildings including Saint Paul City Hall and Ramsey County Courthouse, the George Latimer Central Library, the Landmark Center, the State Capitol building, and the Cathedral of Saint Paul. Saint Paul's downtown is also home to restaurants, art galleries, entertainment venues, museums, and sports arenas.

A large part of Saint Paul's downtown is served by District Energy St. Paul, a thermal energy grid connected to a combined heat and power generating plant located on the banks of the Mississippi River. District Energy St. Paul uses a mix of biomass and fossil fuels to generate both hot water and chilled water, which is then piped to downtown customers. The majority of the customers served by the grid are in the central business district downtown, with a handful of customers served south of the river and on the peripheral of downtown.

Resident Demographics

Saint Paul's 2016 population grew to 304,442 people, according to recent estimates from the Metropolitan Council. Saint Paul's population is diverse, with people of color representing 45.2%.⁸ Just over 15% of the population is Black or African American, with another 15.9% identifying as Asian or Pacific Islander and 9.5% as Hispanic or Latino. A total of 18.5% of the

⁸ Source: Minnesota Compass

population is foreign born, with the largest immigrant populations from Mexico, Somalia, Ethiopia, and South Eastern Asia (Laos, Thailand, Burma, and Vietnam).⁹

Almost a third of the population (27.6%) speaks a language other than English.¹⁰ Hmong is the most widely spoken, representing 35% of all foreign language speakers. Spanish (24.8%) is the next most commonly spoken, followed by African languages (14.1%), primarily Somali and Oromo.

The median household income in 2014 for Saint Paul was \$48,258, about 29% lower than the median for the Twin Cities region as a whole.¹¹ The poverty rate is 22%, double that of the Twin Cities region. A third of Saint Paul children live in poverty, as do close to 15% of older adults. More than 43% of Saint Paul households have an income below the threshold for eligibility for Xcel Energy's low-income energy conservation programs.

Saint Paul has a growing population of young adults, representing an influx of young families into the city. A quarter of the population is under 18 and another 30% are between the ages of 18 and 34. Saint Paul is home to 11 colleges and universities, including Concordia University, Hamline University, Luther Seminary, Macalester College, McNally Smith College of Music, Metropolitan State University, St. Catherine University, St. Paul Seminary, St. Thomas University, Saint Paul College, and Mitchell Hamline School of Law. The Saint Paul School District has 58 public schools with more than 39,000 students.

The Economy

In terms of employment, Saint Paul's largest industry sectors are health care and social assistance (17% of the city's workforce, representing 20,893 workers) and educational services (11.3% of the city's workforce, representing 13,923 workers).¹² Other major employment sectors include retail trade (8.9%), manufacturing (8.6%), and accommodation and food services (8.2%).

Commitment to Climate Change Mitigation

The City of Saint Paul has already made great strides toward greater environmental sustainability and increased climate resilience. This effort is particularly evident in Saint Paul's work on city buildings and operations, where energy conservation and clean energy generation have been large drivers of building improvements and City policy. The Mayor and City Council of Saint Paul have historically been supportive of sustainability efforts, actively pursuing policies

⁹ Source: American Community Survey 2015.

¹⁰ Source: American Fact Finder 2015.

¹¹ Source: Minnesota Compass.

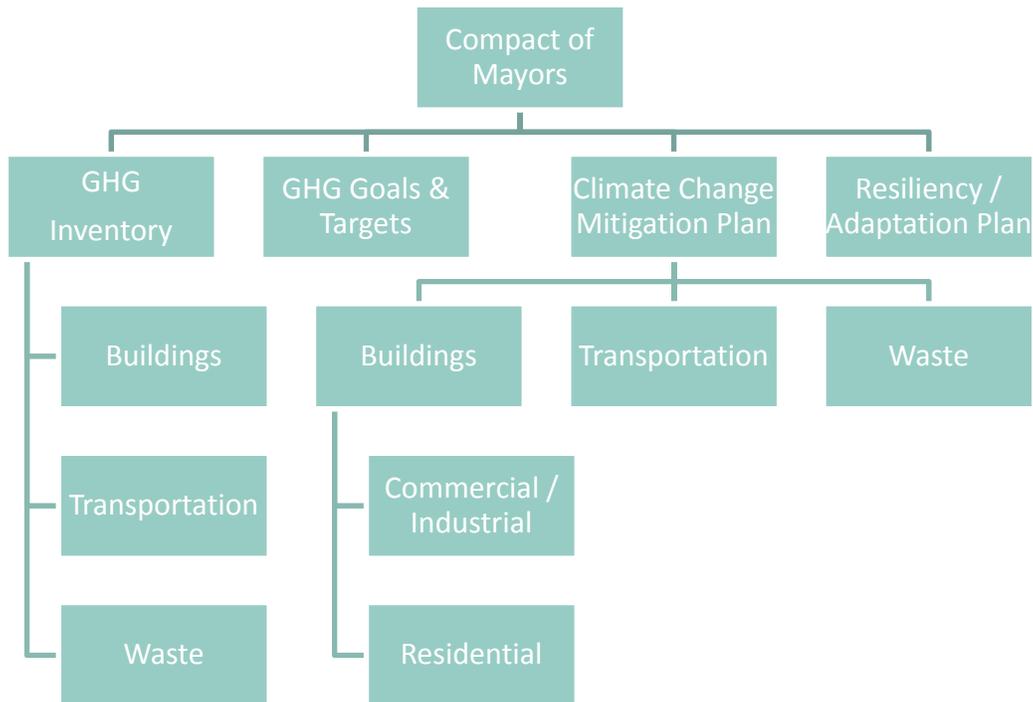
¹² Source: Minnesota Compass.

and initiatives to promote and drive such efforts forward. Some highlights of these various activities and commitments are outlined below.

Compact of Mayors Commitment

As mentioned above, prior to the 2015 Conference of Parties (COP21) climate talks in Paris, Mayor Coleman signed the Compact of Mayors, with the City Council’s support. The City has been actively moving forward to meet these commitments. In 2016 the City completed the first community-wide GHG emissions inventory (see Appendix 3) and proposed an overall goal of carbon neutrality by 2050.

The City is currently partnering with other local, regional, and state agencies; local utilities including Xcel Energy and District Energy St. Paul; and key partners like the Science Museum of Minnesota and academic institutions like the University of Minnesota and Macalester College to develop a citywide resiliency framework completed in 2016. The resiliency framework is funded in part by a grant from the Minnesota Pollution Control Agency. This initiative includes an assessment of climate change shocks and stresses and the formation of multi-discipline, multi-jurisdictional working groups to examine the areas of potential hazards, exposures, and vulnerability across the built, natural, and social environments.



Commitments under the Compact of Mayors Framework

Because of the city’s work on climate change mitigation and adaptation, Saint Paul was selected to host the 2017 National Adaptation Forum — “the preeminent climate change adaptation event for the innovation of new solutions, sharing of tested approaches, and building

societal capacity to prepare for and respond to the effects of climate change.” It is anticipated that the forum will draw over 1,200 participants from all levels of government, non-governmental organizations, community-based groups, academia, and the private sector.

Energy Efficiency in City Buildings

The City of Saint Paul has a dedicated full-time energy coordinator who works with staff from all City departments to identify energy conservation opportunities at municipal facilities and implement efficiency upgrades. Rebates received from Xcel Energy in 2014-2015 totaled \$236,874, with an associated annual energy savings of 2.6 million kilowatt-hours (kWh) of electricity, approximately \$180,000 per year. Below are some examples of recent energy efficiency projects:

- Retrofitting inefficient incandescent lighting with new, lower wattage specialty fluorescent lights and LEDs on the exterior and interiors of buildings, particularly in gymnasiums and parking structures.
- City Hall Annex’s LED lighting upgrade project (see next page).
- Installation of 6,000 LED street lights through the end of 2016, or just over 15% of the City-owned lights.
- Cooling efficiency upgrades in areas like data server rooms.
- Replacing inefficient motors and pumps throughout all departments in the city.
- Installing efficiency controls and energy management systems in over 30 facilities.
- Participating in Xcel Energy’s Energy Design Assistance program to integrate efficiency into all new City buildings.
- Conducting boiler tune ups in City-owned facilities.
- Signing a Joint Energy Efficiency Plan with Xcel Energy for the Como Park campus.

In total, between 2009 and 2016, the City implemented 476 energy efficiency projects. These projects save 12 million kWh and 286 thousand therms of energy per year, or approximately \$1.3 million.

Case Study: Lighting Upgrades at the City Hall Annex



Built in 1931, the 15-story City of Saint Paul Annex is a well-used complex in the heart of downtown. The building had not had a lighting upgrade since 1995. In 2016, City staff initiated a lighting study with funding from Xcel Energy. They also installed new LEDs in a “pilot” area and asked the tenants on each floor to weigh in and explain their needs.

Ultimately, staff opted to upgrade to LED lighting in 100% of the building. They also reduced the total number of lamps, going from 4,600 to 3,300, and installed occupancy sensors to turn off lights in unoccupied space. These changes lowered average weekday lighting peak demand by 61% and average weekday lighting energy consumption by 58%.

Overall, Xcel Energy provided \$49,900 in rebates for the project, and the City will save an estimated \$27,500 per year in energy costs.

City Energy Project

In 2016, Saint Paul was competitively selected as one of 10 new cities nationally to participate in the City Energy Project, a joint effort of the Natural Resources Defense Council and the Institute for Market Transformation, with funding provided jointly by Bloomberg Philanthropies, Doris Duke Charitable Foundation, and The Kresge Foundation. Working in partnership, the City Energy Project and Saint Paul will identify innovative, practical solutions that cut energy waste, boost the local economy, and reduce harmful pollution with the goal of dramatically improving the energy performance of its commercial building stock.

Renewable Energy

The City of Saint Paul has also worked to install and promote various renewable energy projects and programs. In 2008, along with Minneapolis, the City of Saint Paul was recognized by the U.S. Department of Energy as a Solar America City. In partnership with other organizations, Saint Paul has become a leader in the region in installing and promoting solar energy. To date, the City and local partners have installed 13 solar



Source: District Energy St. Paul

thermal and solar photovoltaic arrays. The solar photovoltaic arrays, which were supported in part by the U.S. Department of Energy and Xcel Energy's Solar*Rewards program, are expected to generate over 280,000 kWh of electricity each year. The three solar thermal projects include the nation's largest on the Saint Paul RiverCentre, which was developed and is owned by District Energy St. Paul and was supported in part by a grant from the U.S. Department of Energy. With federal stimulus money in 2010, the City also installed three smaller photovoltaic arrays across its parks and facilities to power electric vehicle charging stations as well as park buildings and kiosks.¹³

The City of Saint Paul is continuing to advance solar energy in a number of ways:

- The City worked with CHS field to secure a \$550,000 grant from Xcel Energy's Renewable Development Fund for a 100 kilowatt solar photovoltaic installation.
- In April 2017, the City announced it is working with GreenMark Solar, LLC, to subscribe to up to 8 megawatts of community solar, enough to cover approximately 25% of municipal building electricity use, saving \$165,000 in annual energy costs.¹⁴

Sustainable Districts

As part of its commitment to sustainability, the City has emphasized district-scale sustainable development and prioritized a tangible community experience of these sites.

Redevelopment of the Ford Site

As part of its plan to redevelop the 135-acre site of the Ford Motor Company's former Twin Cities Assembly Plant, the City solicited community input and has developed a plan to integrate a sustainable, high quality design for energy, buildings, and infrastructure. The City has completed three energy studies to date: Integration of Rooftop Photovoltaic Systems in Saint Paul Ford Site's Redevelopment Plans (2015); Saint Paul Ford Site Energy Study Report (2015); and Aquifer Thermal Energy Storage (ATES) Feasibility Study (2016).¹⁵ The Ford Site



Aerial View of the Former Ford Motor Company Twin Cities Assembly Plant (Source: Zoning Framework Study for the Ford Plant Site)

¹³ More information is at <https://www.stpaul.gov/news/solar-projects-and-initiatives>.

¹⁴ The renewable energy credits on the project were transferred to Xcel Energy.

¹⁵ More information is at <https://www.stpaul.gov/departments/planning-economic-development/planning/ford-site-21st-century-community>.

was recently selected to be one of six nationwide sites to part of the DOE's NET Zero District Accelerator, and the City will be conducting a more detailed energy plan as part of that project. Partners include District Energy St. Paul, Xcel Energy, and Center for Sustainable Building Research.

Saint Paul EcoDistrict

Saint Paul EcoDistrict was launched as a sustainability learning destination in the heart of downtown Saint Paul. It is the only place in the United States where visitors can explore six photovoltaic solar installations and one solar thermal installations, along with district energy, heat recovery, combined heat and power, composting programs, and other renewable energy and advanced technology solutions all within a four-block area. Partners have worked together to develop projects and programs that support renewable energy, energy conservation, and waste reduction and create tools to help visitors learn more about how these work in their community. Additional curriculum for school-age students is under development. Partners of this project include the City of Saint Paul, District Energy St. Paul, the Science Museum of Minnesota, Saint Paul RiverCentre, Xcel Energy Center, and Visit Saint Paul.¹⁶

Energy Innovation Corridor

The Energy Innovation Corridor was a collaboration among numerous partners to bring targeted energy efficiency, electric vehicle charging, and renewable energy along the University Avenue corridor, coordinated with the arrival of the city's new METRO Green Line light rail service. The project in total was estimated to save over 3 billion pounds of carbon dioxide emissions.

Energy Smart Homes and Inspiring Communities

Energy Smart Homes provides no-interest loans to Saint Paul homeowners for the purpose of making energy saving upgrades. Depending on income, homeowners may borrow 50% to 100% of the cost of the improvements. No payments are required for 15 years or until the sale or refinance of the house, at which time the entire loan principal is repaid. The program is a partnership between the City and the Neighborhood Energy Connection with funding from the Department of Energy and the Saint Paul Neighborhood STAR Program.

The Inspiring Communities program is a housing redevelopment strategy that provides focused investment in neighborhoods most impacted by foreclosure and vacancy. Program funds assist developers with development gap financing for construction of new housing on vacant lots or rehabilitation of vacant structures. All rehab projects use the Whole Home Efficiency¹⁷ program to ensure long-term affordability, and newly constructed homes must be certified through the Enterprise Green Communities program.

¹⁶ More information is at <http://www.saintpaulecodistrict.com/>

¹⁷ Previously called Home Performance with ENERGY STAR.

Sustainable Buildings Policy

The Saint Paul Sustainable Building Policy requires that newly constructed City buildings and privately developed projects receiving more than \$200,000 in public investment are designed, constructed, and managed in a sustainable manner and meet high environmental standards.¹⁸

The Saint Paul Planning and Economic Development/Housing and Redevelopment Authority Sustainability Initiative sets requirements that new construction in Saint Paul must seek assistance to design buildings that are more energy efficient. Saint Paul has also worked with Xcel Energy and the Neighborhood Energy Connection, the Port Authority, the Center for Sustainable Building Research, Center for Energy and Environment, and District Energy St. Paul to provide the services that make future development projects in Saint Paul more environmentally and financially sustainable by identifying and incorporating proven and tested practices that demonstrate significant measurable results and return on investment.¹⁹

Deployment of Electric Vehicle Charging Infrastructure

The City of Saint Paul is committed to being a leader in the deployment of electric vehicles and charging infrastructure. As of the creation of this report, Saint Paul has installed about 40 public stations for charging electric vehicles and is working with other private and public entities to install more. The City-owned charging stations include three that are powered by solar, and the City also maintains a webpage dedicated to informing the public about the charging stations and about electric vehicles more generally.²⁰

GreenStep Cities

The City of Saint Paul has participated in GreenStep Cities since 2014. Minnesota GreenStep Cities is a voluntary challenge, assistance, and recognition program to help cities achieve their sustainability and quality-of-life goals. This free continuous improvement program, managed by a public-private partnership, lets individual cities track and compare advancement through five steps based upon 29 best practices. In June 2016 Saint Paul became a Step 3 City (out of five total steps) and had completed 82 actions. Saint Paul's completion and tracking of a GHG inventory prepares the city to advance to Steps 4 and 5.²¹

¹⁸ More information is at <http://www.sustainablebuildingpolicy.umn.edu/saintpaul>.

¹⁹ More information is at <https://www.stpaul.gov/DocumentCenter/View/7/PED%20HRA%20Sustainability%20Initiative.PDF>.

²⁰ More information is at <https://www.stpaul.gov/news/ev-charging-stations>.

²¹ Steps 4 and 5 were recently launched in 2016, and advance cities for measuring and reporting sustainability metrics.

Developing the Plan

Saint Paul chose to develop this portion of the Climate Action Plan by taking advantage of a free community planning service offered by Xcel Energy. Xcel Energy is the electricity and natural gas service provider for Saint Paul residents and businesses and has been offering customized energy planning services to Minnesota and Colorado communities since 2014.

Xcel Energy's Partners in Energy

Partners in Energy is an offering for Xcel Energy communities in Minnesota and Colorado that supports communities in the development and implementation of a customized energy action plan. The service was launched in 2014 and now includes a competitive application process; Saint Paul was selected in April 2016 as the ninth Minnesota community to participate. Other community plans have focused on community-specific strategies to reduce energy use, costs, and promote renewable energy, sometimes with a focus on reducing GHG emissions.

The objective of the Partners in Energy planning process is to allow communities to develop actionable plans that advance their goals while being supported by Xcel Energy's technical expertise, facilitation process, and program knowledge. After approximately six months of planning, Xcel Energy further supports partnering communities by providing plan implementation assistance over another 18 months.

In addition to planning workshops, communities can participate in joint learning opportunities with three to five other Partners in Energy communities, forming an "Exchange." Exchanges meet for office hour calls, webinars, and in-person dialogs developed around topics that support planning and implementation tasks. The goal of these interactions is to allow for collaboration between communities and access to experts in the field.

Saint Paul's Goals for Partners in Energy

The City of Saint Paul submitted an application to participate in Partners in Energy in the spring of 2016. The City was interested in building on its previous work to reduce GHG emissions and increase resiliency. Addressing energy use in the buildings sector is a key component of achieving the goals outlined in the Compact of Mayors, and Saint Paul saw Partners in Energy as an important opportunity to develop a set of strategies to reduce energy use and increase renewable energy adoption.

Specifically, the City looked to Partners in Energy to help provide:

- Access to data regarding energy use by customer class as well as neighborhood, business district, census track, or other local configurations.

- Process, data, and expert support to undertake an inventory, develop the Climate Action Plan, implement the plan (in part with Xcel Energy Conservation Improvement Program offerings), and track success.

An important priority was to ensure the benefits of strategies in this plan were realized across all community populations. As stated in the City’s Partners in Energy application, “the impacts of climate change will not be experienced equally in the world or in our community. Some of the most vulnerable residents include the young, the elderly, racial minorities, immigrant and refugee communities, and families below the federal poverty line... It will be important to design energy efficiency programs that meet the needs of our changing community.”

In addition to integrating with the broader commitments in the Compact of Mayors, the Partners in Energy process and this buildings component of the Climate Action Plan will become part of the City’s revised comprehensive plan, due to the Metropolitan Council at the end of 2018.

Technical Advisory Group

City Council approved formation of the Partners in Energy Technical Advisory Group on June 14, 2016. Committee members, listed below, include City staff, local energy stakeholders, and Xcel Energy representatives.



Members of the Technical Advisory Group at Workshop 4

Saint Paul’s Technical Advisory Group

City of Saint Paul

- a) Anne Hunt, Environmental Policy Director
- b) Jim Giebel, Energy Coordinator
- c) Kurt Schultz, Program Coordinator
- d) Ana Vang, Policy Associate

Community Energy Representatives

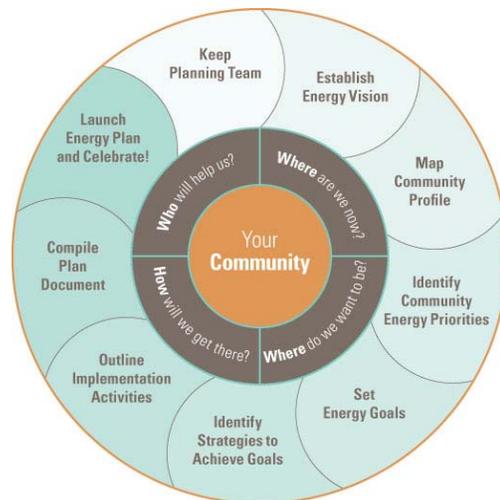
- e) Chris Duffrin, President, Center for Energy and Environment
- f) Nina Axelson, Vice President of Public Relations, District Energy St. Paul
- g) Pam Marshall, Executive Director, Energy Cents Coalition
- h) Peter Klein, Vice President of Finance, Saint Paul Port Authority
- i) Rebecca Olson, Residential Energy Program Director, Neighborhood Energy Connection
- j) Richard Graves, Director, Center on Sustainable Building Research, University of Minnesota

Xcel Energy Representatives

- k) Tami Gunderzik, Program Manager, Partners in Energy
- l) Yvonne Pfeifer, Community Energy Efficiency Manager
- m) Cindy Auld, Account Manager
- n) John Marshall, Manager of Community Relations and Economic Development
- o) Jenny Edwards, Partners in Energy Facilitator
- p) Elena Foshay, Partners in Energy Facilitator
- q) Emma Struss, Partners in Energy Facilitator

Planning Process

The Technical Advisory Group met for a series of four workshops from September 2016 through March 2017. Xcel Energy’s role in the planning process was to facilitate the workshops; provide community energy use data, conservation program participation statistics, and other technical analysis as available; advise on which conservation programs are available to best support strategies; and produce this Climate Action Plan based upon the group’s input and feedback.



Xcel Energy’s Partners in Energy Planning Process

The primary planning objectives were to develop a recommended GHG reduction goal for the buildings sector, a recommended vision for community feedback, and strategies that support each of those frameworks. The Technical Advisory Group was asked to contribute to the plan in the following ways:



- Help create the vision and overall framework for the City’s energy future.
- Use local and technical expertise to advise on near-term priorities.
- Think critically about the effectiveness of various strategies.
- Consider themselves partners in moving the plan forward.

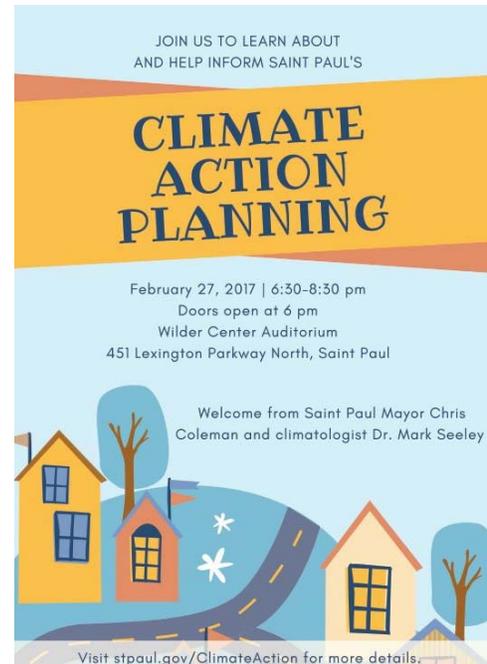
The workshops were led by community facilitators from the Center for Energy and Environment and attended by Xcel Energy staff. A summary of the primary activities at each workshop is listed below.²²

Partners in Energy Workshop Activities	
<p>Workshop 1 <i>September 1, 2016</i></p>	<ul style="list-style-type: none"> • Learn about Xcel Energy’s Partners in Energy process and Saint Paul context. • Share visions for Saint Paul’s energy future. • Review Saint Paul’s baseline energy use data. • Discuss near-term priorities for Saint Paul.
<p>Workshop 2 <i>October 11, 2016</i></p>	<ul style="list-style-type: none"> • Finalize draft of Saint Paul’s energy vision. • Review additional local energy data and discuss data implications for strategies. • Identify draft goals and strategies for near-term priorities.
<p>Workshop 3 <i>December 13, 2016</i></p>	<ul style="list-style-type: none"> • Assess the estimated GHG impact of proposed goals and strategies. • Finalize near-term strategies for the buildings sector. • Finalize draft goals for each near-term priority area.
<p>Workshop 4 <i>March 23, 2017</i></p>	<ul style="list-style-type: none"> • Review input from community engagement meeting. • Final advisory committee review of near-term goals and strategies. • Discuss priorities for subsequent mid-term strategies. • Review team roles in plan implementation.

²² More information is at <https://www.stpaul.gov/departments/mayors-office/mayors-priorities/sustainable-saint-paul/climate-action-planning>.

Community Engagement Event

On February 27, 2017, Saint Paul kicked off public engagement for the Climate Action Plan process with a town hall style meeting. The meeting was the first of several that will focus on different sectors of the City's Climate Action Plan, including buildings (the February focus), transportation, and public health and resiliency. Over 80 stakeholders and residents came to hear from Mayor Coleman about the Compact of Mayors initiative and share their perspectives on what the City could do to tackle climate change. The meeting also included presentations on how climate change is anticipated to impact the upper Midwest, the results of the City's 2015 GHG inventory, and the planning and analysis work conducted through Partners in Energy. More details on the event and comments from attendees are included in Appendix 2.



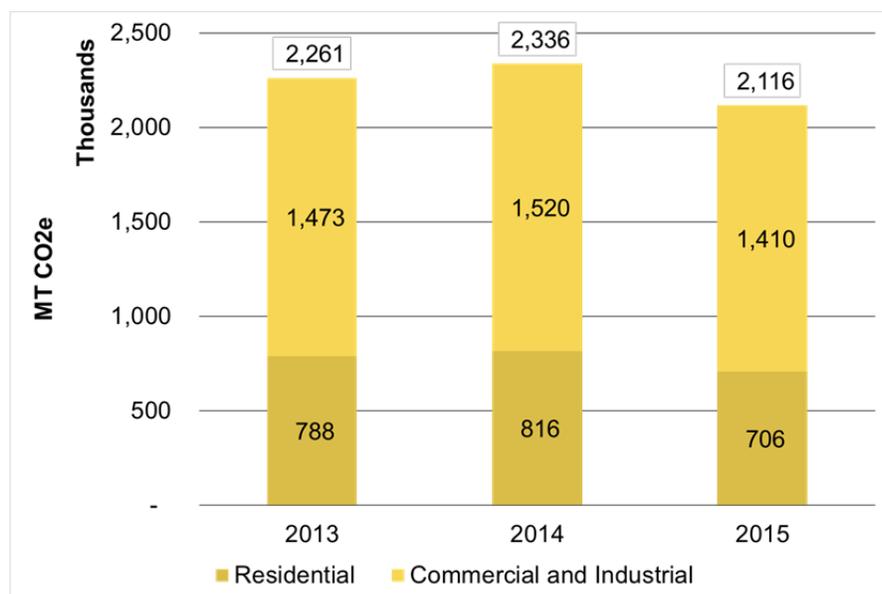
Baseline Energy and Greenhouse Gas Analysis

Saint Paul’s Technical Advisory Group began with a baseline analysis of energy use data. The Partners in Energy facilitation team calculated community electricity and natural gas statistics from the past three years of available data (2013-2015) to help the group understand how and where energy is currently being used.

Greenhouse Gas Inventory

Saint Paul conducted a GHG inventory across all sectors after signing on to the Compact of Mayors initiative. The results show that energy use in the buildings sector (both commercial and residential) was responsible for just over half of community-wide GHG emissions in 2015. (See Appendix 3 for more detail.)

Partners in Energy tracks GHG emissions trends in the buildings sector based on total sales of Xcel Energy electricity and natural gas within the boundaries of Saint Paul. The figure below shows the three-year trend for 2013-2015. Values fluctuate based on changes to sales as well as the annual GHG intensity of electricity generation, based on fuel mix. Overall, residential energy accounts for one-third of building GHG emissions, and the commercial and industrial sectors account for a combined two-thirds. These reports do not include one premise with the largest gas usage, which was removed for privacy considerations.²³

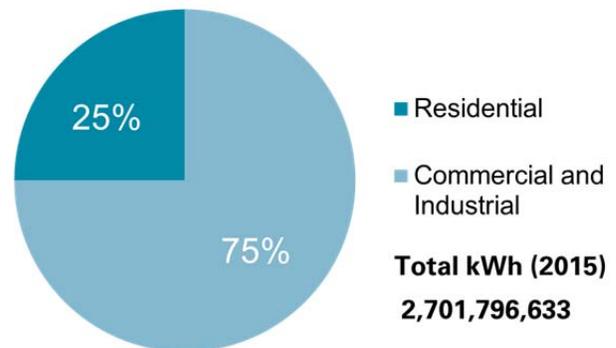


²³ Privacy rules governing the reporting of customer energy use data require that any reporting must be aggregated to contain at least 15 unique premises, and not contain any single premise that accounts for over 15% of the total use in the reported category. In Saint Paul, all data reported for commercial and industrial natural gas will have one premise removed.

Community-Wide Energy Consumption

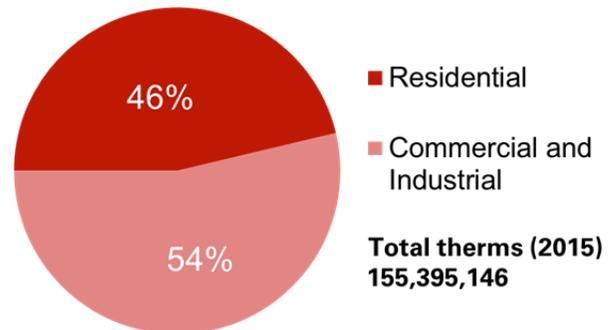
A premise is a unique identifier for the location of electricity or natural gas service. In 2015, Saint Paul had a total of 126,530 premises, 89% of which were residential and 11% of which were commercial and industrial. In most cases a premise is an individual home, business, or facility; though in some cases there can be multiple premises per building and multiple premises per individual customer. A premise is in essence an electric or gas meter and is not necessarily the same as a household. Xcel Energy data is tracked at the premise level.

Saint Paul consumed a total of 2.7 billion kWh of electricity and 155 million therms of natural gas in 2015. The majority was consumed by commercial and industrial premises. They represented 75% of the electricity and 54% of the natural gas consumption in Saint Paul. Residential premises used 25% of the electricity and 46% of the community-wide natural gas.



Electricity Consumption

The commercial and industrial sectors are reported together in part to protect customer data, but also because it is challenging to distinguish between the two types of customers in the available data. The focus areas discussed later in this plan include estimations of energy use from only the large commercial and institutional customers.



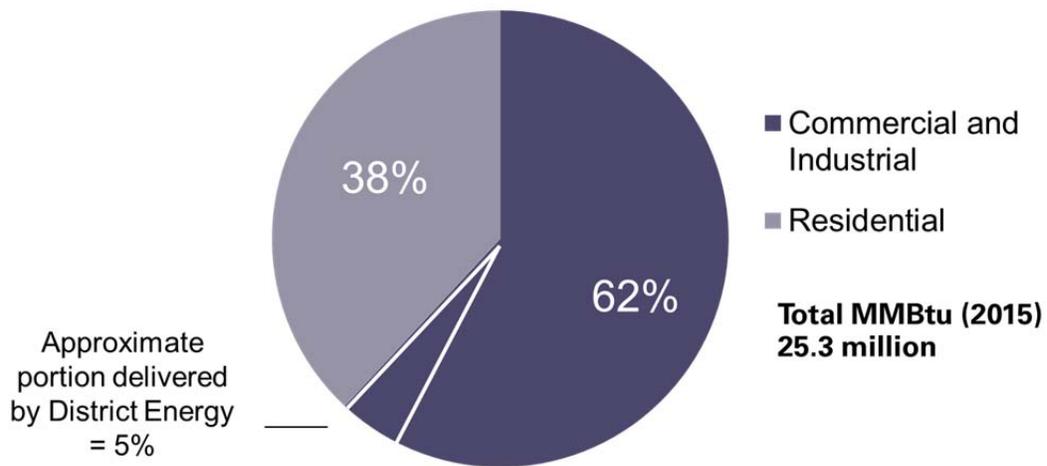
Natural Gas Consumption

While large residential multifamily or mixed use properties are likely counted as residential electric premises, they may be commercial gas accounts, depending on the metering configuration and type of owner account.

Nonetheless, the portion of residential gas use is still much higher than electricity use. This is largely due to the removal of one large gas user, which lowers commercial and industrial gas use. However, it is also in part because space heating is a large load for single-family homes in Minnesota and tends to be a higher proportion of overall use than for large industrial, commercial, and multifamily buildings.

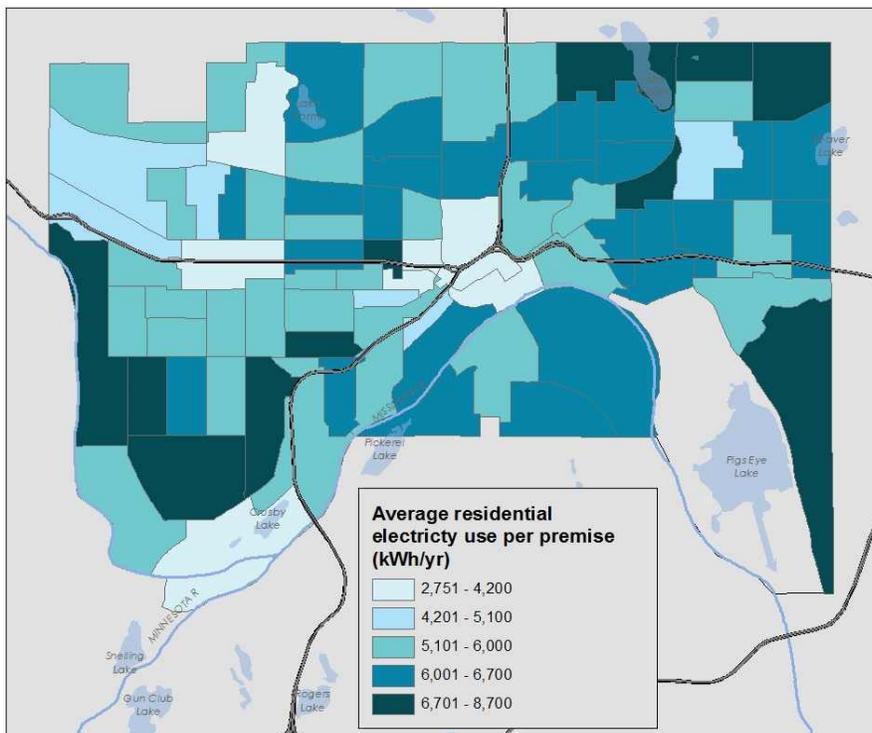
Energy services from District Energy St. Paul are included in the above, to the extent that electricity and natural gas are fuels for hot water and chilled water service. However, energy from additional fuels, such as solar thermal energy or biomass, is not included. Using data from

District Energy St. Paul, an estimation based on total customer sales shows that approximately 5% of energy is delivered by District Energy St. Paul community wide.

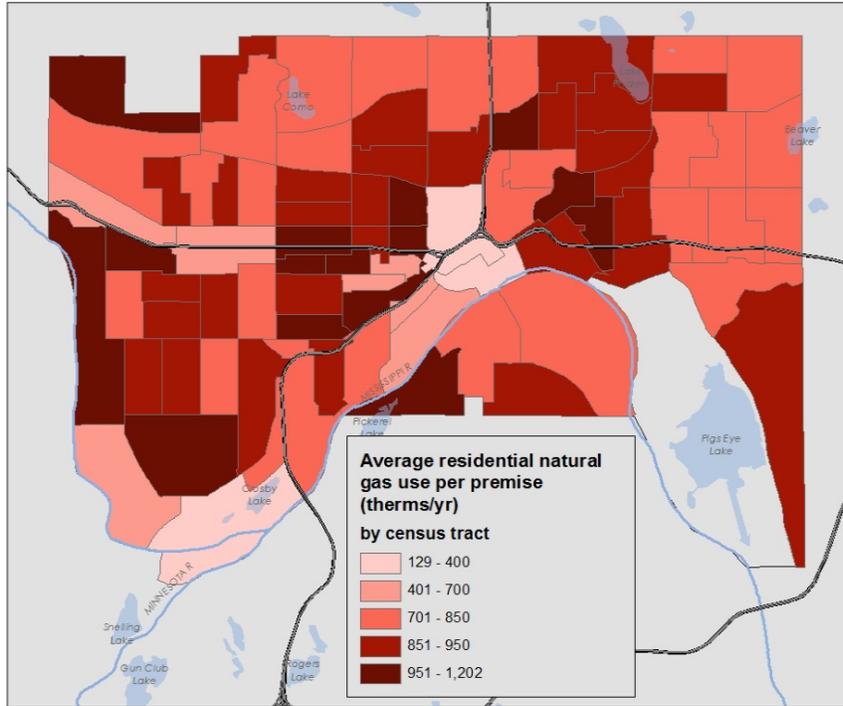


Total 2015 Energy Consumption Including Estimate of District Energy St. Paul Service

The maps below show how the average electricity and natural gas use of residential premises varies across the city at the census tract level. This variation is due to several factors, including the mix of housing stock (including the age and size of homes), previous energy efficiency investments, household size, and the types of energy use activities within a home.



Average Annual Electricity Use for Residential Premises (2015)



Average Annual Natural Gas Use for Residential Premises (2015)

Community Energy Costs

Saint Paul spent a total of \$346 million on energy in 2015, \$128 million of which was spent by residents. On average, residential households spend a total of \$1,424 per year on electricity and natural gas, and commercial and industrial premises spend \$17,208. These costs reflect energy and demand charges only, not taxes, fees, or basic service costs.

Saint Paul Average Energy Costs (based on three-year averages)

Customer Type	Average Electricity Cost (\$/premise/yr)	Average Gas Cost (\$/premise/yr)
Residential	\$ 717	\$ 707
Commercial & Industrial	\$ 13,082	\$ 4,126

Residential Energy Burden

Energy burden is defined as the percent of household income spent annually on energy. Understanding energy burden and how it is distributed across neighborhoods, racial and ethnic groups, and household types can help to better target low-income energy efficiency programs in Saint Paul. According to a 2016 report from the American Council for an Energy-Efficiency

Economy that looked at the Twin Cities metro region as a whole, the median energy burden for a household in the Twin Cities is 2.32%.²⁴ For low-income households, the median energy burden is 5.11% and is as high as 8.20% for some households, according to the report.

To estimate energy burden in Saint Paul, we combined U.S. Census income data with average residential energy cost data at the census tract level. Analysis performed through Partners in Energy shows that the 10 census tracts with the highest median energy burden range from 4.2% to 12%. Note that this number may be conservative, as it only includes dollars spent directly on energy purchases (not taxes or fees) and may exclude indirect residential expenditures on natural gas (as in the case of multifamily buildings that purchase gas on commercial tariffs). The 10 highest census tracts are shown in the table below, along with the percent of households earning less than 50% of the state median income, a common measure for low-income program eligibility. For more information on how energy burden was calculated, see Appendix 4.

Participation in Conservation and Renewable Energy Programs

In addition to energy use, historical participation in Xcel Energy Conservation Improvement Programs (CIP) provided useful data on current trends and future opportunities.²⁵ The data below cover the 36-month time period from June 2013 through May 2016, unless otherwise noted.

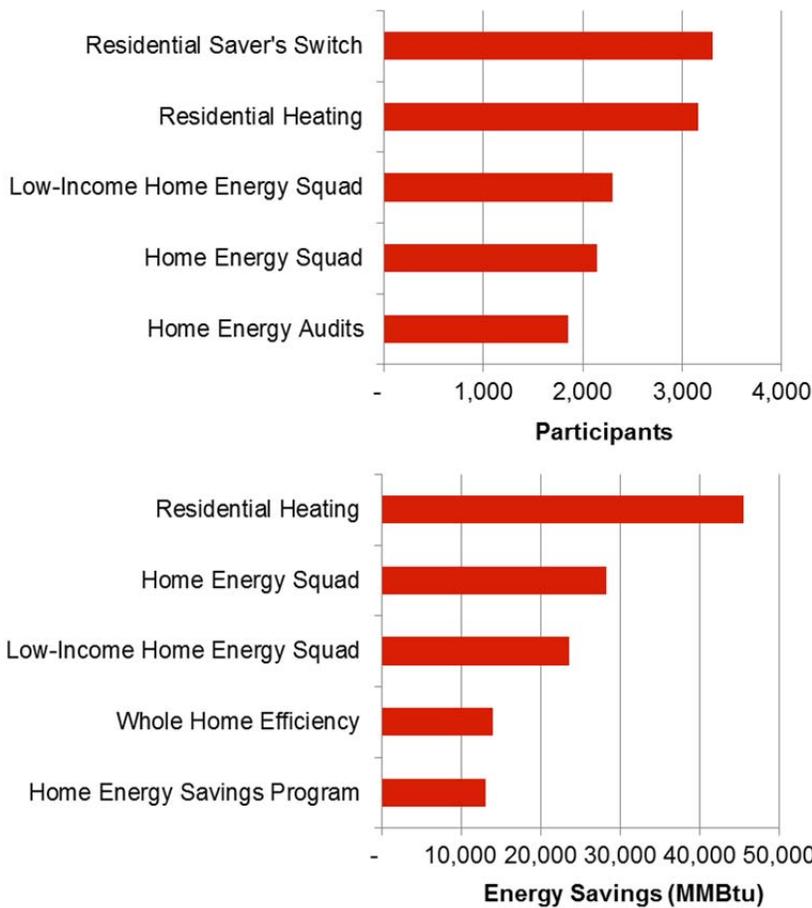
Saint Paul residents took almost 17,000 efficiency program actions over these 36 months. These efforts add up to approximately 7.3 million kWh of electricity and 1.2 million therms of natural gas saved annually, equal to a reduction in energy bills by \$1.68 million per year. When annual savings are averaged over the 3-year period, this is equivalent to 0.5% of annual 2015 residential energy use.

The most popular programs by number of participants were Saver's Switch, Residential Heating, and the Low-Income Home Energy Squad. The top programs by energy savings were Residential Heating, Home Energy Squad, and Low-Income Home Energy Squad. Descriptions of individual Xcel Energy programs are included in Appendix 7, and full detail on Saint Paul's community-wide program activity is included in Appendix 8. Note that participation in

²⁴ Drehobl, A. and L. Ross. *Lifting the High Energy Burden in America's Largest Cities* (American Council for an Energy-Efficiency Economy: April 20, 2016).

²⁵ Conservation Improvement Programs (CIP) refers to the portfolio of approved utility energy efficiency and demand management programs. Minnesota utilities have a goal of saving 1.5% of their total energy sales each year via customer conservation efforts.

“upstream” programs, such as discounts for efficient lighting purchased at retail locations, is not included.²⁶

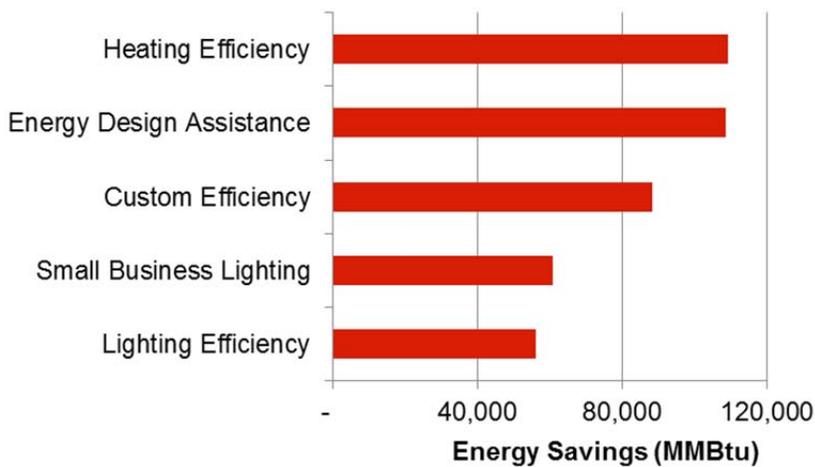
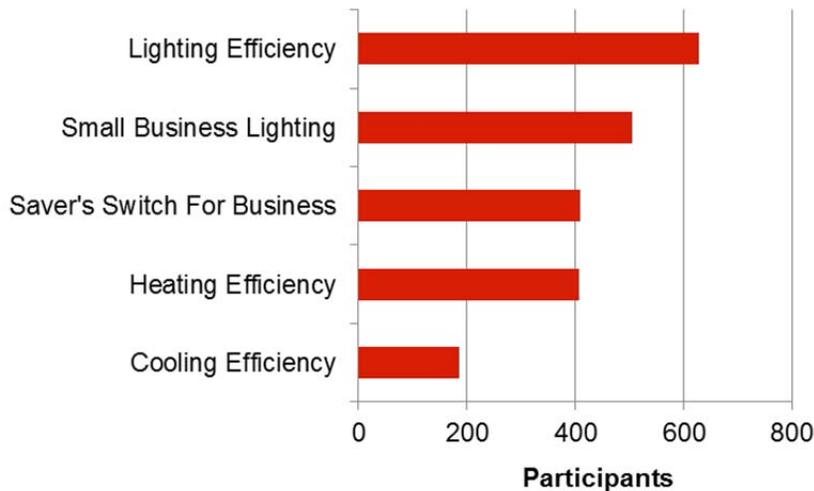


Top Residential Conservation Programs (Data Span 36 months)

Saint Paul businesses took almost 3,000 efficiency program actions over the same 36 months. Combined, these investments save approximately 91 million kWh of electricity and 2.8 million therms of natural gas per year, which amounts to an annual savings of approximately \$8.96 million. When savings are averaged over the three-year period, this is equivalent to 1.3% of annual commercial and industrial energy use.

The most popular programs by participation were Lighting Efficiency, Small Business Lighting, and Saver’s Switch. The top programs by energy savings were Heating Efficiency, Energy Design Assistance, and the Custom Efficiency program. Again, full detail on participation and savings by program is included in Appendix 8 for further reference.

²⁶ These savings are not included because retail and other distributor programs, where rebates for efficient products are applied upstream from the customer, are more challenging to assign to participants within a specific city or community.



Top Business Conservation Programs (Data Span 36 Months)

Saint Paul customers have also been investing in renewable energy. Data for current Windsource® subscribers and estimates of cumulative on-site solar installations in Saint Paul are shown below. At the end of 2016, there were 4,491 customers subscribed to Windsource®, and there were 135 on-site solar customers as of 2015.²⁷ Total renewable energy production from these sources is estimated at 13 million kWh of electricity, which represents about 0.5% of Saint Paul’s 2015 electricity use. Penetration is higher in the residential sector, where customer-purchased renewable energy was more than 1.5% of 2015 electricity use.

²⁷ Windsource® data are from Partners in Energy and are current through 2016. On-site solar installations are from Community Energy Reports and are current through 2015. Community solar subscribers are too recent to be included in these counts.

Renewable Energy Subscribers

	Residential	Business
Windsorce® Subscribers	4,463	28
On-Site Solar Installations (cumulative)	126	9

Case Study: Energy Efficiency at First National Bank

The iconic First National Bank building in downtown Saint Paul is a prominent demonstration of the comprehensive energy efficiency retrofits being undertaken by Saint Paul businesses. The one million square foot building, owned by Madison Equities, recently completed a major equipment overhaul, including new lighting, chillers, and motors, and installed a fully updated building automation system to optimize the building’s energy performance. Along with cost savings, one of the major drivers of the project was to improve occupant comfort.

The project cost an estimated \$6.75 million and received \$929,700 in rebates from Xcel Energy, as well as roughly \$600,000 in tax credits. The project will save \$657,000 in energy costs per year and lower the building’s peak electricity demand by 1.5 megawatts.



Source: Michael Hicks via CC

Saint Paul's 2050 Community Energy Vision

A clearly articulated, transparent, and shared energy vision guides decisions about how to prioritize community resources, including the selection of focus areas, goals, and strategies to achieve those goals. At the beginning of the Partners in Energy planning process, the Technical Advisory Group shared their inspirations for Saint Paul's energy future and imagined a Saint Paul that has achieved its energy goals as a guide to creating a unified vision statement. Essential to the vision statement is the long-term goal of carbon neutrality and strong community engagement.

A summary of this energy vision is below, with the more detailed vision statement on the following page.

Vision for the Future, Summarized

By expanding energy efficiency, conservation, and energy recovery, as well as energy storage, renewable energy, and distributed energy, Saint Paul has achieved carbon neutrality in its built environment, and fortified its resilience to climate change by the year 2050. Saint Paul has achieved this remarkable goal by intentionally and consistently engaging the public towards locally relevant solutions. All views — especially those of the traditionally underrepresented — have been heard and respected, and all residents, regardless of housing type or income, have benefited from the clean energy economy transition and are safeguarded from adversity.



“View from the Highland Park Water Tower” (Source: Fibonacci Blue via CC)

Vision for the Future: Saint Paul's 2050 Energy Vision for Carbon Neutrality

By 2050, Saint Paul has achieved carbon neutrality in the built environment and strengthened its environmental, social, and economic resilience to future dynamic global changes. Partnership, collaboration, and active community engagement have been crucial in allowing the city to reach this impressive goal. Saving energy is an ingrained part of city culture for both residents and business owners.

Saint Paul is recognized by cities globally for its energy efficiency and conservation achievements. Energy efficiency initiatives are designed with replication in mind, and other communities have been able to advance more quickly because they have benefited from Saint Paul's leadership and innovation. The community's support of its aggressive targets with clear business objectives and policy structures have helped it thrive as the local economy has transitioned away from carbon.

Saint Paul has developed local sources of producing and storing renewable energy within its borders, and minimized energy waste through the capture and reuse of waste heat. There are win-win incentives for investing in proven technologies that reduce energy consumption, mitigate negative climate impacts, and enhance resiliency. Early on, several Saint Paul neighborhoods, including low-income neighborhoods and some that had not previously participated in energy efforts, led the charge to move beyond the low hanging fruit and adopt aggressive energy conservation and renewable energy goals. These examples served as tipping points for similar neighborhoods within and outside of the city.

By 2050, Saint Paul has become a global leader in attracting and supporting businesses engaged in the clean energy economy. Local businesses have developed innovative ways to incentivize reductions in energy use, discourage energy waste, and encourage the use of renewable energy. Businesses that take action and exceed carbon savings goals are regularly recognized for those efforts.

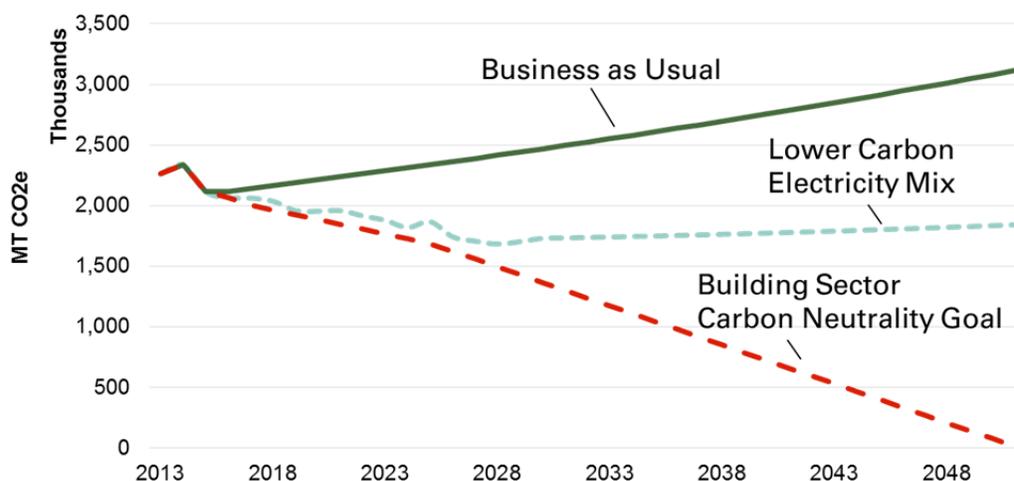
Saint Paul has harnessed the livability benefits of clean energy investments. Our community is a place where everyone has access to high-quality, affordable, and energy-efficient housing and where all residents, regardless of housing type or income, are protected from high energy burdens. Neighborhoods receive direct benefits and additional support for engaging in effectively reducing energy use. Broad-based support and coordination of resources ensure that low-income and disadvantaged residents experience all the additional benefits from these investments, including opportunities for energy sector employment.

The Path to Carbon Neutrality

Attaining carbon neutrality in just over 30 years will require aggressive efforts to reduce overall building energy use through efficiency and conservation and convert energy sources to renewable or carbon free energy. The scale of this effort will also depend on how Saint Paul’s underlying energy needs are growing.

Under a “business as usual” scenario of 1.1% annual energy growth,²⁸ carbon emissions would increase 50% by the year 2050 if nothing else changed. However, Xcel Energy’s current Upper Midwest resource plan forecasts significant electricity decarbonization between now and 2030, the result of planned coal plant retirements and additional renewable energy facilities coming online.²⁹ This change alone would get Saint Paul 40% of the way towards carbon neutrality by 2050, even if the emissions factor plateaued beyond 2030.³⁰

Electricity decarbonization shows the steepest decline between now and 2030. This brings a beneficial boost to the strategy-specific goals outlined in the following sections. But it also reduces the marginal benefit of some strategies, since future electricity savings and renewable purchases will offset less and less carbon. Put another way, decarbonization is a critical underlying strategy to achieve Saint Paul’s goals.



Projected Carbon Emissions under an Assumed 1.1% Growth Scenario

²⁸ Based on recent trends and projections, this assumes 0.8% annual growth in residential energy use and 1.25% growth in commercial and industrial use.

²⁹ By 2030, carbon intensity is projected to reach 521 lbs/megawatt-hours (down from a 2015 value of 1,002 lbs/megawatt-hours). See Xcel Energy’s 2016-2030 Resource Plan, Minnesota Public Utilities Commission Docket No. 15-21.

³⁰ This plan assumes no change in the emissions factor after 2030. This is why emissions projected under the “lower carbon electricity mix” scenario begin to grow again after 2030; there is still growth in underlying energy demand but no grid decarbonization to offset that growth.

Near-Term Priorities for the Buildings Sector

Saint Paul’s near-term priorities reflect sectors or activities that will have high impact and where the City can begin strategy implementation over the next one to three years. While implementation can begin immediately, the incremental impact of these strategies is expected to be realized over at least a 10-year time horizon. However, these priority areas do not account for the full energy footprint across all city sectors, and therefore are not inclusive of all efforts that will need to be put in place over this time period. These priorities were selected because they offered the highest likelihood of early success, reflected necessary foundational groundwork for later stage strategies, or addressed issues that needed significant lead time to get off the ground.

The priority areas were linked to a number of **guiding themes**:

- Prioritize conservation, energy efficiency, and energy recovery.
- Prioritize renewable-based distributed generation and energy storage.
- Ensure solutions and opportunities are equitable, particularly in communities and households of color.
- Commit to reducing the energy burden on low- to moderate-income residents.
- Focus on efforts that result in extra benefits (e.g., employment, economic development, other environmental benefits such as water conservation and improved air quality).
- Showcase best practices and innovative solutions.

The near-term priorities focus largely (though not exclusively) on conservation, following the recommendation of the Technical Advisory Group that the City work first to reduce energy consumption to the extent that it is economically feasible and then deploy strategies to convert the remaining energy use to sources of carbon-free energy. However, taking advantage of growing renewable energy offerings in Minnesota will be important for leading early adopters.

Priority One: Inspire a Culture of Energy Stewardship

Achieving carbon neutrality by 2050 begins with those who live, work, and play in Saint Paul embracing the values of energy conservation so that consuming less energy becomes a cultural norm in the City. Themes that came up along these lines in both the Technical Advisory Group and the public engagement session involved creating “cultural shifts” and the idea of “inclusivity” so that all residents and workers feel included in this effort, both in terms of their own actions and their support of citywide initiatives. Residents talked about pooling community resources so that they could collectively support less affluent residents with access to energy services.

The goal of this effort is to **inspire a culture shift that transforms the community’s relationship to energy use, tripling the incremental annual savings from residential conservation and renewable energy adoption within 10 years.**

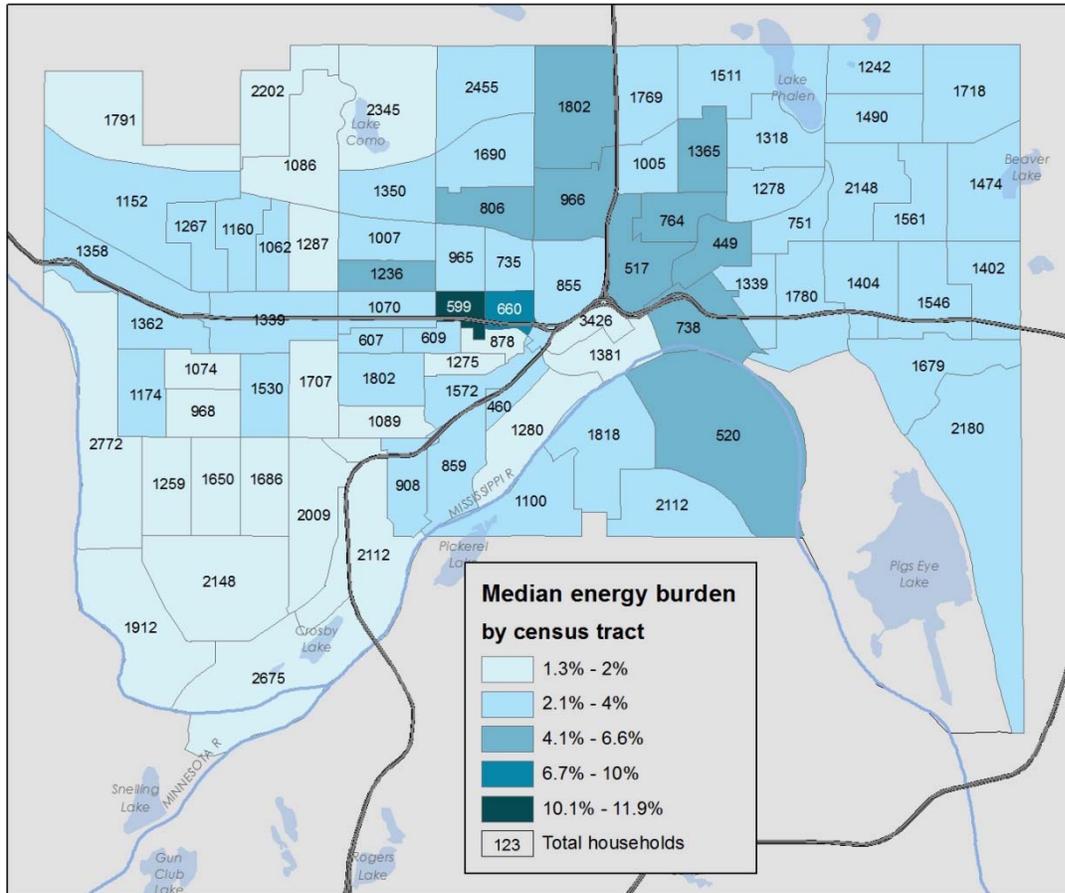
Success in this effort will require consideration of the broad variety of residents, workers, and housing types that exist in Saint Paul, understanding that one size may not fit all. This includes consideration of demographics, in particular the fact that half of all housing units in Saint Paul are rentals while the other half are owner-occupied.

The estimated impact from this goal is based on average historical participation in Xcel Energy conservation programs and renewable energy subscriptions. Assuming the same types of activities, tripling the baseline conservation savings would save an additional 7.3 million kWh of electricity and 1.2 million therms of natural gas each year. Tripling incremental renewable energy subscriptions would lead to an additional 3.4 million kWh of renewable electricity per year. In 2027 these actions will reduce carbon by 141,000 MTCO₂e over 2015 levels.

Priority Two: Reduce Resident Energy Burden

An estimated 38,000 Saint Paul households live below 50% of the area median income.³¹ A baseline analysis of household income and average energy costs shows that 12 census tracts within the city have a median energy burden above 4%, with the highest at 12%. (See Appendix 4 for details on energy burden calculations.) These 12 tracts contain over 10,000 households. Reducing the cost of energy for low-income residents through conservation programs, energy bill assistance, and other means is a high priority for Saint Paul.

³¹ Source: American Community Survey



The goal of this priority area is to, within 10 years, **lower the energy burden so that no Saint Paul household spends more than 4% of household income on energy costs.**

Based on estimations using cost and income data from 2015, using conservation to lower the energy burden to 4% or below for all Saint Paul households would save an estimated 13.5 million kWh of electricity and 1.3 million therms of natural gas use each year, resulting in an average annual cost savings of \$2.5 million. Other strategies such as bill assistance will also be included.

Priority Three: Engage Major Public and Private Institutions on Climate Leadership

Saint Paul is a hub of cultural and institutional activity, as both the state capital and home to numerous universities, museums, and hospitals. Many of these entities are already active in pursuing climate change goals and some subscribe to existing goals (for example, the State of Minnesota goal to reduce GHG emissions to 80% below 2005 levels by 2050).

Saint Paul's public buildings and institutions accounted for at least 11% of the community-wide total energy use and 18% of the city's non-residential energy use in 2015.³²

These customers are also more actively participating in Xcel Energy's conservation programs — approximately 114 of the 199 premises identified have participated in one or more customer-oriented program in the past 36 months, resulting in approximately 7% energy savings based on 2015 use (or an average of 2.3% per year for those three years).



Minnesota State Capitol (Source: Ron Struss)

Public buildings within the city limits include the City of Saint Paul, Saint Paul Public Schools, Saint Paul Public Housing Agency, the State Capitol and other state office buildings, Ramsey County buildings, and federal buildings. Many public entities have been benchmarking their facility energy use, thanks in part to legislation improving access to the B3 (which stands for Buildings, Benchmarks, and Beyond) benchmarking tool for state and local government. This history of tracking energy use in public buildings provides a strong foundation for focusing near-term efforts within this sector.

The goals for engaging major public and private institutions are:

- **Within three years, win commitments of major institutions to achieve carbon neutrality by 2050.**
- **Within three years, ensure 80% of institutional buildings are actively benchmarked.**
- **Within 10 years, help institutions realize a 35% total GHG reduction, with energy efficiency as a leading strategy.**

Once achieved, these goals are estimated to save 83,000 MTCO₂e over 2015 levels.

Priority Four: Engage the Multifamily and Large Commercial Sector

The large multifamily and commercial building sectors contain some of the largest individual energy users. They vary in terms of how actively they have pursued energy conservation or renewable energy strategies. Engaging property owners about their energy use, identifying

³² Based on an analysis of the top 1,000 commercial and industrial premises, of which 175 gas premises and 199 electric premises were identified as public or institutional entities.

options for saving energy, understanding barriers, and assisting with access to resources are all near-term priorities.

County assessor data identifies approximately 200 commercial parcels larger than 50,000 square feet and 250 multifamily buildings with over 50 units. This provisional definition was used to approximate the energy use of this sector at 18% of the community-wide total.³³

The goal of this priority area is **to adopt multifamily and large commercial sector conservation and renewable energy initiatives that result in an additional 4% annual reduction in GHG emissions for those sectors.**

Achieving this goal would reduce annual emissions by an estimated 147,000 MTCO_{2e} in 10 years.

Priority Five: Inspire through Municipal Leadership

While some City strategies will be included within the public and institutional focus, a specific focus on municipal buildings lets the City lead by example and demonstrate commitment to climate leadership first within their own operations. As detailed in the introduction, Saint Paul has already invested in energy efficiency within several of its buildings. The municipal focus area will include continued energy efficiency and renewable energy purchases in buildings, as well as efficient street lighting.

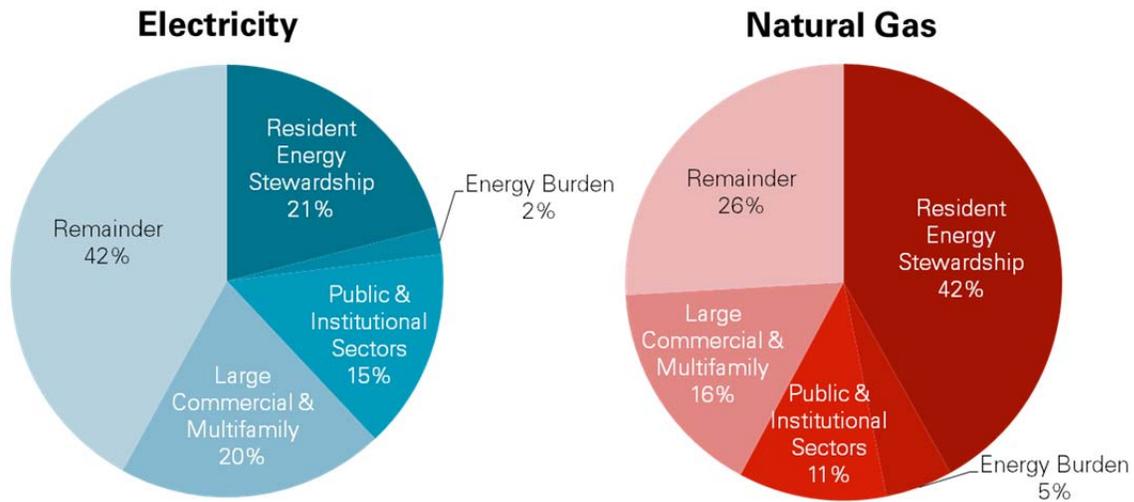
Saint Paul Street Lighting Energy Consumption (2015)		
Category	Consumption (kWh)	Billed Revenue (if applicable)
Non-Metered	13,978,307	\$1,198,873
Metered	4,103,384	\$290,789

The goal for this focus area is to **achieve carbon neutrality for municipal building operations by 2030.** This is estimated to reduce GHG emissions by a total of 52,000 MTCO_{2e}, and 41,000 metric tons within 10 years.

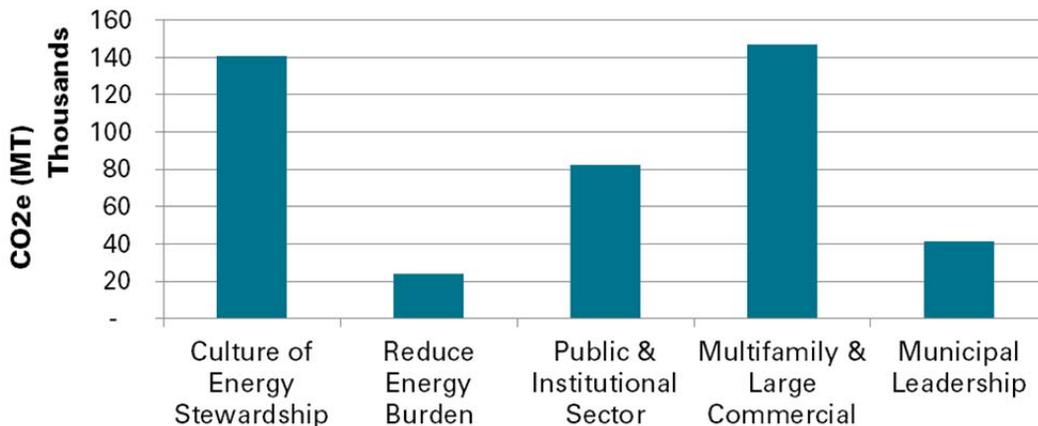
³³ This results in an estimated 25 million therms of natural gas and 540 million kWh of electricity used by this sector. This does not include large industrial users, to the best they can be identified. Results are an approximation for planning purposes.

Impact of Near-Term Priorities

Combined, these five near-term priority areas accounted for 58% of the community-wide electricity use and 74% of community-wide natural gas use in 2015.³⁴ The remainder will include other end-use sectors that are not the target of near-term efforts, but that will be the focus of mid-term strategies, such as industrial energy use.



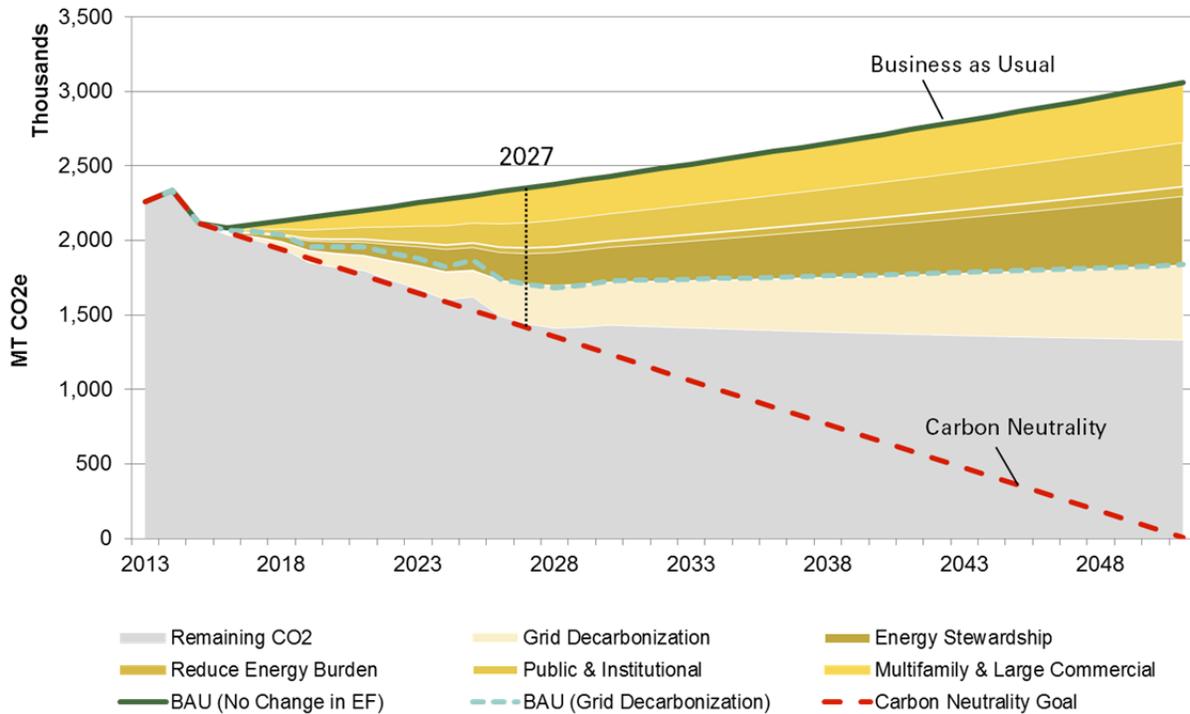
A summary of the carbon savings of each priority area is shown below, based on projections to 2027 (10 years into plan implementation). The carbon savings of each priority area is a result of how much energy the sector is accountable for, the relative use of electricity versus natural gas in that sector, and the relative aggressiveness of each goal. Carbon savings include reductions from grid decarbonization, and are calculated as a reduction over a 2015 baseline.



Projected 10-year Carbon Reductions Below 2015 Levels

³⁴ Municipal energy is included in the public and institutional sectors.

These near-term priority areas provide major acceleration toward overall community GHG goals. By 2027 these priority areas will reduce total community emissions 21% below 2015 levels, and 30% below a business as usual growth rate. This means that the priority goals set forth in this plan, combined with carbon savings from electricity grid decarbonization in the remaining sectors, will achieve Saint Paul’s 2027 straight-line carbon neutrality target. The remaining CO2 emission reductions beyond 2027 must be addressed by additional strategies initiated as part of mid- to long-term priorities.



Gap to Goal Under Business as Usual Growth Scenario³⁵

³⁵ The priority area wedges reflect the impact of goals out to 2027. After 2027, these sectors are assumed to mitigate further growth, but not to continue to reduce GHG emissions without additional strategies.

How Are We Going To Get There? — Strategies

This section outlines in more detail the specific strategies that will be used to meet the goals of each near-term priority. The Technical Advisory Group developed these strategies by examining the state of current energy use and program activity, prioritizing actions that draw on core community strengths, leveraging implementation expertise of group members, and assessing the likelihood that strategies will meet identified goals. The group spent several sessions brainstorming and revising strategies with technical input from the Xcel Energy team.

Priority One: Inspire a Culture of Energy Stewardship

Developing awareness and motivation around energy use within the city will be a foundational strategy to other elements of this plan. Early action focuses on data and transparency to understand the local motivations, and on designing and testing outreach strategies to different demographics.

Strategies

- **Develop a citywide marketing and outreach campaign to triple the current annual savings from residential energy efficiency and triple incremental annual adoption of renewable energy, focusing on underserved populations.**
 - Collect robust data on baseline community knowledge of and motivations for energy conservation, with attention towards target groups, in order to create a relevant and well-informed campaign.
 - Develop outreach methods to target high energy-burden neighborhoods and groups with historically low levels of energy efficiency participation, such as non-native English speaking households, renters, and owners of smaller rental properties (12 units or fewer).
 - Engage District Councils and other neighborhood groups and civic organizations in outreach efforts.
 - Promote tools such as My Energy and smart thermostats that can help people understand energy use and costs and create a continuous improvement culture.
 - Promote renewable energy options, including renewable charging of electric vehicles.

- **Invest resources to target common resident hurdles for energy efficiency upgrades.**
 - Invest additional funds to the Energy Smart Homes program to create a revolving loan fund at an affordable interest rate.

- Provide additional financial incentives to improve uptake of high-impact offerings such as Whole Home Efficiency, insulation, and heating efficiency upgrades.
- Buy down the cost of Home Energy Squad visits.
- **Create transparency and awareness of the energy cost of housing for Saint Paul’s renters.**
 - Create a guide for renters about the average costs of energy and typical ways energy costs are paid for in Saint Paul’s rental housing.
 - Initiate a city information repository to provide average energy costs along with property data for properties where landlords report that data to the state (when landlords pay for all or part of utilities).
- **Use policy levers to motivate energy efficiency during windows of investment in the housing stock.**
 - Strengthen education and enforcement of the existing residential energy code.
 - Consider adding energy efficiency criteria to evaluation and prioritization of city-funded construction projects.
 - Study and make recommendations for restructuring permit fees to incentivize the construction and rehab of energy efficient buildings.

Year 1 Milestones

- Synthesize existing marketing data to create a robust understanding of baseline behavior around energy efficiency and renewable energy.
- Identify resources to conduct an energy literacy and attitudes study of Saint Paul residents.
- Launch a set of new financial resources to address common hurdles.
- Launch community energy campaign along with announcement of new resources and financial incentives.
- Collect additional information about how multifamily buildings are metered, as feasible, to understand common configurations in Saint Paul rentals.
- Produce informational guide for renters to the different ways multifamily buildings are metered and bills paid for, along with energy saving tips.
- Establish a working group to evaluate the feasibility of using energy efficiency criteria on city construction projects and update the permit fee structure to support efficient construction.

Priority Two: Reduce Resident Energy Burden

Strategies to reduce resident's energy burden focus both on access to conservation programs as well as bill assistance and federal weatherization programs.

Strategies

- **Cut energy burden in half for those households with the highest energy burden.**
 - Establish replicable method for measuring and reporting energy burden that captures the highest cases at the household level.
 - Collaborate with high energy burden communities and partner organizations to develop the most effective strategies for increasing energy efficiency action and access to bill-payment assistance in highest energy burden and racially diverse census tracts.
- **Use data to identify opportunities to deepen impacts of existing programs and identify gaps; work with utility and other funders to enhance existing programs to fill those gaps.**
 - Identify the number of households experiencing an average energy burden above 4%, the number of buildings and building types in the highest energy burden census tracts, and the currently available programs serving these building types.
 - Assess current programs to identify additional opportunities for maximizing energy savings and lowering energy burden.
- **Obtain new and coordinate existing public and private resources to invest in reducing energy burden.**
- **Continue to advocate at the state and federal level for increased funding and support for programs that reduce energy burden.**
- **Create a neighborhood-scale retrofit project in a representative low-income neighborhood that integrates all available resources to achieve maximum energy-related outcomes, and then use the project as a model for similar communities.**
- **Develop program models that will increase low-income access to affordable renewable energy.**

Year 1 Milestones

- Define replicable measurement method to track and report on annual energy burden in Saint Paul.
- Launch neighborhood-scale retrofit project by identifying a target neighborhood, developing metrics and a work plan, and piloting outreach approaches.
- Use data gathered from citywide campaign to launch outreach strategies specifically targeting low-income residents.
- Establish an energy burden working group to coordinate outreach actions and resource knowledge among local community entities and trusted leaders.

Priority Three: Engage Major Public and Private Institutions on Climate Leadership

Near-term strategies concentrate on recognizing and learning from the early leadership of many local institutions, coordinating with existing efforts, and supporting action with access to and knowledge of existing resources.

Strategies

- **Promote energy use transparency and leadership recognition as a way to drive greenhouse gas reduction.**
 - Build relationships and trust with institutions and identify key point people within them; catalogue what they have done to date and identify barriers.
 - Develop broad-based institutional understanding of how and why to invest in energy efficiency.
 - Promote case studies and create recognition mechanisms for early leaders.
 - Explore feasibility and impact of energy benchmarking requirement.
- **Support institutions in making renewable energy purchases and energy efficiency upgrades for their facilities, in coordination with existing efforts.**
 - Research best practices for motivating institutions; identify program offerings, incentives, and resources; and disseminate information at an informational meeting
 - Develop informational resources to highlight low-cost/no-cost energy efficiency investments.
 - Offer customized assistance to access available programs, rebates, and incentives
 - Support institutions in assessing readiness for renewable energy and investing in renewable subscriptions and/or local renewable installations.

- **Engage and motivate the energy leaders within institutions.**
 - Seek ways to improve the knowledge and tools of building operators to optimize the efficiency of buildings.
 - Facilitate information sharing among facilities staff of similar institutional types.
 - Create employee/staff incentive programs to encourage energy saving in the workplace.
- **Implement an energy challenge competition to motivate institutional partners.**
- **Explore new tools that increase institutional access to financial resources.**
 - Evaluate feasibility of an on-bill repayment offering for institutions to cover energy efficiency and renewable energy purchases.
 - Evaluate feasibility of City financial incentives to buy into more aggressive energy saving actions.

Year 1 Milestones

- Design goals and tactics for institutional energy challenge, including core approach, messaging, and platform to launch challenge.
- Convene institutions for an educational and collaborative information sharing event, and create an inventory of what's been done.
- Develop a self-assessment guide for institutions to learn what part of their building portfolio is "renewable-ready."
- Sign up five institutions for Xcel Energy's Renewable*Connect® offering.
- Produce a summary of best practices in institutional energy management. (Coordinate with other efforts as appropriate, such as the Sustainable Growth Coalition.)
- Produce case studies of two leading institutions in Saint Paul.

Priority Four: Engage the Multifamily and Large Commercial Sector

These strategies are designed to create baseline knowledge of energy use and current activity among the diverse use types represented by these sectors. There is a near-term emphasis to identify key stakeholders and design tools and resources based on their needs.

Strategies

- **Recognize leadership and foster knowledge sharing across businesses.**
 - Actively promote businesses and organizations that have taken energy saving actions and purchased renewable energy.
 - Develop case studies of leading edge buildings and technologies, including ultra-high efficiency buildings and replicable advanced heat recovery applications.
- **Promote energy use disclosure and transparency to identify energy savings potential and help drive energy savings.**
 - Explore feasibility and impact of the energy benchmarking requirement.
 - Initiate disclosure policy with public buildings leading the way.
- **Enhance the expertise of building operators and code officials to optimize efficient building performance.**
 - Pilot new engagement and training tools to drive efficiency in existing building operations.
 - Partner with energy providers to pilot new technologies and strategies to provide building energy use feedback, targeting specific building types, tenant groups, and energy saving applications.
 - Provide energy tools and resources for commercial building code officials.
- **Implement additional outreach with local partners to increase participation in available programmatic financing options.**
- **Develop and implement a light recommissioning or continuous commissioning requirement.**

Year 1 Milestones

- Assess the value and costs associated with new metering technologies (including sub-metering) to determine value proposition on pursuing metering strategies.
- Actively promote businesses and organizations that have taken energy saving actions and purchased renewable energy.
- Launch recognition tools such as a web platform and case studies for top businesses and multifamily properties taking GHG reduction strategies.
- Develop case studies of leading edge buildings and technologies, including ultra-high efficiency buildings and replicable advanced heat recovery applications.
- Explore feasibility and impact of energy benchmarking requirement.
- Initiate energy disclosure actions with public buildings leading the way.
- Pilot new engagement and training tools to drive efficiency in existing building operations.

Priority Five: Inspire Through Municipal Leadership

These strategies for municipal action are in addition to those described for public and institutional entities generally. They concentrate on the near-term actions needed to convert municipal buildings to carbon neutrality by 2030, as well as policy and workforce initiatives that the City will initiate.

Strategies

- **Track and manage the energy use of City facilities.**
 - Inventory and report energy use across all City facilities.
 - Every five years, conduct energy audits of City facilities and implement all measures with paybacks under 10 years.
- **Update and Expand Saint Paul’s Sustainable Buildings Policy.**
 - Conduct stakeholder outreach to revise and expand the current policy.
 - Develop an expanded program toolset for participants.
 - Establish recommendations for building infrastructure to support electric vehicle charging.
 - Continue to advocate for stretch code allowances in Minnesota, which would allow Saint Paul to adopt a code with higher energy efficiency requirements.

- **Increase municipal purchases and installation of renewable energy.**
 - Pursue options for local installations or subscriptions of renewable electricity, including community solar gardens, Windsorce®, and Renewable*Connect®, to have 50% of the City’s electric use from renewable energy in five years.
 - Expand access to renewable thermal energy.
 - Develop a plan for electrifying the municipal fleet with off-peak, renewable energy.

- **Convert municipal streetlights to low-energy LEDs.**

- **Ensure that the former Ford site becomes a regional, national, and global model for sustainable planning, design, and day-to-day living that protects our air, water, and natural resources for future generations, with a locally generated power from an integrated, renewable, site-based energy system.**



Source: City of Saint Paul

- The City will work with the U.S. Department of Energy, District Energy St. Paul, Center for Sustainable Building Research, and Xcel Energy to develop an energy plan for the site.
- **Work with Ramsey County workforce development efforts to ensure that low-income, disadvantaged residents have a pathway into clean energy jobs.**

Year 1 Milestones

- Inventory municipal building energy use into a data tracking tool and report results to the community.
- Establish a schedule and budget requirements for facility audits and energy efficiency investments.
- Identify and assess financing opportunities for rotating energy efficiency investments in City facilities.
- Present stakeholder recommendations for updates to the Sustainable Buildings policy.
- Create proposed budget for renewable energy subscription or installation options.
- Implement viable recommendations from the Joint Energy Efficiency Study of Como Park.
- Complete LED streetlight conversions.

Longer-Term Strategies

Longer-term strategies are those that, for various reasons, may not be ready for immediate implementation. Some require additional research and planning, resources that are not currently available, or the engagement of sectors where immediate strategies aren't clear. The Technical Advisory Group identified areas below as ones that will be important in the mid-term, when initial groundwork will be required.

Renewable Energy

- Assess feasibility of thermal and natural gas grid decarbonization.
- Identify where strategic electrification of certain loads would assist in decarbonization.
- Identify opportunities to develop large-scale solar installations within city boundaries.

Advanced Technologies and Demonstrations

- Pursue and consider policies to incentivize advanced heat recovery projects.
- Identify opportunities for catalyst or demonstration projects throughout the city in order to showcase and be prepared for new technologies.
- Consider demonstration opportunities to test and demonstrate the value of a smart grid or microgrid, including tie-ins with electric vehicles.
- Continue to bolster the energy planning around the Ford site and look for opportunities to tie development into demonstration projects.
- Consider expanding the eco-district and ensure it can be successful.

New Business Models

- Establish a comprehensive green business program that supports carbon neutrality in the business community.
- Test new frameworks and quantitative methods to make the business case for deep decarbonization and resiliency.
- Purposefully engage the industrial sector to identify strategies that recognize and meet individual customers where they are at.
- Identify the next generation of policies needed to build net-zero new construction.

Residential Homes

- Develop and implement a point-of-sale energy efficiency requirement for all homes to have adequate attic and wall insulation and mechanical systems.
- Implement a policy option that would require energy efficiency at point of rental.

Tracking Progress

City staff, with support from Partners in Energy, will establish appropriate tracking mechanisms to evaluate and report on community-wide progress towards carbon neutrality.

Monitoring and Reporting

The City, Xcel Energy, and other partners will track and monitor progress toward these goals. Xcel Energy will provide annual electricity and natural gas usage for the community, as well as conservation program participation data bi-annually for up to two years and annually after that as part of Saint Paul’s Community Energy Reports. Xcel Energy will also work with the City to provide tracking data for specific sub-sectors. The City will maintain a clearinghouse of the annual metrics that measure progress towards the overall goals.

Goal	Metrics
Carbon neutrality by 2050.	Annual GHG emissions from residential and commercial electricity and natural gas use for citywide inventory (MT CO ₂ e); renewable energy purchases and subscriptions that are included in global inventory protocol.
Triple annual incremental conservation and renewable energy in 10 years.	Program participation and annual savings from conservation programs (count, kWh, therms); new subscriptions or installations of renewable energy.
Reduce resident energy burden to 4% or below.	Median energy burden by census tract (energy dollars spent/median household income).
Institutional commitment to benchmarking and carbon neutrality.	Self-reported commitments (number of institutions).
35% GHG reduction over 10 years in the public and institutional sector.	Annual GHG emissions; self-reported building benchmarking; conservation program savings; incremental renewable energy additions.
4% annual GHG reductions in the large commercial and multifamily sectors.	Annual GHG emissions; self-reported building benchmarking; conservation program savings; incremental renewable energy additions.

Evolution of Strategies and Goals

The goals and strategies outlined in this plan are the result of careful planning by the Technical Advisory Group, and they may need to be adjusted as implementation lessons emerge. Tracking the above metrics will allow the City to evaluate progress and, if needed, shift actions and goals to available resources or a shifting context. Successful achievement of the plan strategies will depend on several key factors:

- Continued involvement of select members of the Technical Advisory Group for continuity during implementation;
- Committed availability of staff coordination time;
- Regular progress tracking and shifting actions and goals as needed;
- Focus on getting strategies off the ground early in implementation;
- Work to continuously engage the community while avoiding burnout; and
- Celebration early successes to motivate the team and the community.

Conclusion: The Path Forward

This Climate Action Plan establishes ambitious goals for Saint Paul to reach carbon neutrality in just over 30 years. The commitment to full carbon neutrality doesn't allow for a release valve; fundamental shifts in local energy use and infrastructure will have to take place. While this plan does not lay out all of the steps needed, it offers ambitious yet achievable near-term goals where progress can begin immediately, initiating a roadmap for the route ahead.

Technical Advisory Group members offered thoughts on strengths, weaknesses, threats, and opportunities that may be on the horizon. A clear strength of this plan comes from Saint Paul's supportive community and elected leadership, committed staff, and a strong history of action-oriented collaboration between the City, local NGOs, and utilities. Xcel Energy's support of the plan and its continued implementation through Partners in Energy, as well as Xcel Energy's efforts to decarbonize the electricity system, give implementation a beneficial tailwind. In addition, a commitment to reduce the community energy burden and an increase of visible efficiency and community-scale projects connect efforts in this plan to the broader resident experience. It will be important to grow continued support through increased visibility.

The group also acknowledged that, as in any energy or climate plan, the challenge of getting beyond early adopters and enthusiasts is real. Partners must be realistic yet creative when designing outreach to residents and businesses who do not think about energy every day. Many of the sectors that are hardest to approach have not been included and will need to be part of second-stage strategies. In addition, while many strategies are not dependent on what happens at the federal level, funding for programs such as federal heating assistance and weatherization face an uncertain future in upcoming federal budget cycles. And while the local and state political climate is currently supportive of energy efficiency and renewable energy, maintaining these as top priorities may be a challenge if no immediate crisis is at hand.

Saint Paul has the opportunity to be a showcase capital city with an aggressive climate action plan. There is inspiration in the great work that several buildings have already demonstrated, resident commitment to the issues, new potential partnerships and funding resources, alignment with regional comprehensive plan efforts, and tangible near-term budget savings from energy efficiency work. Other opportunities will continue to emerge as this plan carries forward.

Appendix 1: Glossary of Terms

CO₂e: Carbon dioxide equivalent. This measure is the standard unit for reporting greenhouse gas emissions. It includes all global warming gases (not just carbon dioxide) by their “equivalent” warming potential.

Conservation Improvement Program (CIP): The portfolio of approved utility energy efficiency and demand management programs. Minnesota utilities have a goal of saving 1.5% of their total energy sales each year via customer conservation efforts.

Demand-Side Management (DSM): Modification of consumer demand for energy through various methods, including education and financial incentives. DSM aims to encourage consumers to decrease energy consumption, especially during peak hours, or shift time of energy use to off-peak periods, such as nighttime and weekend.

ENERGY STAR Homes: A certification program administered by the U.S. Environmental Protection Agency, for new homes that are designed and built to defined high energy efficiency standards.

Greenhouse Gases (GHG): Atmospheric gases that absorb infrared radiation and contribute the greenhouse gas effect, including carbon dioxide (CO₂), methane (CH₄), nitrous oxide (NO₂), and water vapor.

kWh (kilowatt-hour): A unit of energy that is a standard measure of electricity consumption.

Minnesota GreenStep Cities: Minnesota GreenStep Cities is a voluntary challenge, assistance, and recognition program to help cities achieve their sustainability and quality-of-life goals.

MTCO₂e: Metric tons of carbon dioxide equivalent.

The Neighborhood Energy Connection (NEC): A Saint Paul based nonprofit that provides energy conservation information, services, and program to Minnesota residents and communities.

Premise: A unique identifier for the location of electricity or natural gas service. In most cases it is a facility location. There can be multiple premises per building and multiple premises per individual debtor.

Recommissioning: An energy efficiency service focused on identifying ways that existing building systems can be tuned-up to run as efficiently as possible.

Therm: A unit of energy that is a standard measure of natural gas consumption.

Appendix 2: Community Engagement Kickoff Meeting

Event Overview

On February 27, 2017, the City of Saint Paul held its first Community Engagement Night to solicit community input regarding the City's Climate Action Plan. Eighty-seven community members attended the event which featured Mayor Chris Coleman and University of Minnesota climatologist Dr. Mark Seeley. The purpose of



Public Engagement Kickoff Meeting for the Climate Action Plan

the community meeting was early engagement of Saint Paul stakeholders in a Climate Action Plan that addresses the threats and causes of climate change ultimately achieves carbon neutrality by 2050. The event also contextualized the City's efforts in regards to its participation as signatory of the Compact of Mayors and in Xcel Energy's Partners in Energy service.

Event attendees were ready to offer comments regarding the proposed plan, vision, and strategies. Attendees responded to several posted questions about the City's plans and contributed to facilitated small group discussion later in the evening. Comments and discussion throughout the evening showed overwhelming support for a Saint Paul Climate Action Plan, with individuals contributing ideas as to areas of improvement and additional stakeholders to engage.

The event was the first of three sessions, each structured around a different pillar of Saint Paul's Climate Action Plan. The focus of this stakeholder meeting was energy use in buildings. In March 2017 the City hosted a second meeting focused on community resiliency and public health. A third meeting in May 2017 focused on transportation, natural resources, and waste.

Event Speakers

The event featured the following speakers who introduced various topics relevant the City's Climate Action Plan and building energy efforts.

Anne Hunt, office of Mayor Chris Coleman, gave a brief overview of the City's sustainability efforts and introduced the Mayor.

Mayor Chris Coleman, City of Saint Paul, talked about his decision to sign the Compact of Mayors and Saint Paul's commitment to addressing the concerns of climate change. The Mayor thanked the National League of Cities for its support and Xcel Energy for its efforts in promoting action around energy efficiency.

Dr. Mark Seeley, climatologist at the University of Minnesota, presented data regarding climate change and its effect in Minnesota as well as the dangers it poses to Minnesota's health and well-being.

Cooper Martin, National League of Cities, gave a brief presentation on the importance of climate resiliency work in cities and how the City of Saint Paul's Climate Action Plan fits into the year-long Leadership in Community Resilience plan.

Ana Vang, office of Mayor Chris Coleman, presented on the findings of Saint Paul's community-wide GHG emissions inventory that was concluded in December 2016. The data provided the basis for energy work in buildings in the context of the Compact of Mayors, citing that 52% of Saint Paul's carbon emissions are from buildings. The presentation also highlighted sustainability work that the City has already undertaken.

John Marshall, Xcel Energy, gave a brief review of the Partners in Energy offering and the importance of communities developing energy action plans.

Jenny Edwards, Partners in Energy, presented data on building energy use and energy burden in the City of Saint Paul. This presentation provided the data that informs the goals and strategies of Saint Paul's Climate Action Plan.

All presentations, as well as additional information, can be found on the Saint Paul website: <https://www.stpaul.gov/departments/mayors-office/mayors-priorities/sustainable-saint-paul/climate-action-planning>.

Public Comments

The public had opportunities throughout the night to comment on Saint Paul's proposed actions and plans. These comments came both from written commentary on plans displayed on posters throughout the room and from discussion coming out of breakout groups that focused on building energy use as relating to a number of stakeholder groups.

“Think about Saint Paul's Energy Future”

Attendees were asked to respond to Saint Paul's Energy Vision, imagining a Saint Paul that has achieved its energy goals. A summary of the responses is listed below:

- Engage and involve underrepresented and underserved communities, including communities of color and low income communities

- Include energy education in K-12 and post-secondary curriculum
- Identify energy-efficient buildings (e.g. LEED, ENERGY STAR)
- Incorporate carbon offsets as needed
- Work with Xcel Energy

“Vision for a Carbon Neutral Saint Paul”

Attendees were encouraged to respond to the following question: “Saint Paul aims to be carbon neutral by 2050. What ideas are most exciting to you in imagining how Saint Paul can achieve this ambitious goal?”

Transportation

- Encourage public transportation and develop more biking and walking infrastructure
- Make the public transportation fleets more sustainable by adopting new technologies

Education and Outreach

- Integrate climate change education across K-12 curriculum
- Identify and share sources of emissions
- Identify and educate about the costs of the current system

Building Efficiency

- Encourage and promote more energy efficient homes and buildings

Socioeconomic

- Involve all households, regardless of income
- Reducing local pollution leads to better community health
- Adapt in mitigating ways

Clean Energy

- Encourage renewable and zero-carbon energy
- Renewable energy on municipal buildings
- Saint Paul as a clean energy tech destination

Breakout Groups

After the presentations, event attendees divided into seven breakout groups of the categories listed below. Each group was asked to provide answers and comments regarding a number of energy and planning related questions. A brief summary of those comments and answers are listed below.

- Single-family Residential — Owners

- Residential Rentals — 1-4 Units; Landlords/Renters
- Affordable/Low-income — Lowering Energy Burden
- Commercial/Industrial/Institutional
- Multifamily Housing Units — Owners and Renters
- Small Business
- City Operations

Questions

There was consensus among responses that, especially in the perceived absence of state and federal action, Saint Paul has a duty as a city and local government to use its resources to reduce emissions and address climate change mitigation and adaptation.

Climate Change and Efficiency

Attendees voiced many reasons as to what motivates them to fight climate change and what energy efficiency looks like to them. Some of the answers are summarized below.

“What would most motivate you to take action to help fight climate change?”

- The most common responses were:
 - Saving money and improving the economy
 - Helping the environment
 - Strengthening the community now and for future generations
 - Improving the health of the community
 - Improving the health of your family
 - Promoting environmental justice
 - Slowing climate change

“What does energy efficiency mean to you?”

- Being less wasteful with energy
 - “Not wasting energy while achieving desirable living conditions”
 - “Always looking for a better way to do things”
- Productivity and financial savings
 - “Using as little energy as possible to complete as much as possible”
 - “Wise use of limited resources, saving money”
- Using cleaner/less carbon intensive energy

Outreach and Implementation

Each group was also asked to provide feedback regarding Saint Paul’s proposed strategies for outreach and implementation. The following summarizes messages that resonated across groups:

- Provide the community with clear data regarding energy use and climate change and ensure the data reaches the community. The City should be very transparent about what its goals are and highlight efforts it has already undertaken.
 - Particularly highlight potential financial savings
- Utilize a variety of techniques to reduce the carbon footprint of buildings. This includes enforcing building codes, limiting barriers to distributed generation (e.g. rooftop solar), educating homeowners about efficiency options, and expanding access to energy efficiency programs like Home Energy Squad and Energy Fit Homes.
- Ensure that climate change curriculum is taught in K-12 schools, fostering the next generations.
- Engage a diversity of residents. This includes ethnic diversity, income diversity, and age diversity.
- Some of the largest barriers to action are: time, money, lack of education or knowledge regarding efficiency and programs, and split incentives for landlords and renters. Ideas about how to overcome these barriers included:
 - Highlighting success stories
 - Go for the “low-hanging fruit” first

Groups suggested the following messengers to promote the city’s efforts:

- The City and City government — Mayor and City Council
- The utility (Xcel Energy)
- Neighbors and friends
- Other homeowners
- Other businesses
- Environmental and advocacy groups
- Teachers/educators/schools
- Ethnic or religious leaders

Transcription of Individual Responses

Below is the full list of questions and responses received at the public engagement event.

“How important to you is it for Saint Paul to take actions to address climate change and climate change impacts at a local level?”

- With a lack of state and federal action, Saint Paul needs to step up and use its resources to reduce emissions.
- The City has the ability to work locally through education and outreach and better connect with residents and businesses.
 - “We need to build resilience through making connections between people.”
 - “The issue requires behavior change, which happens locally.”

“What would most motivate you to take action to help fight climate change?”

- The most common responses were:
 - Saving money and improving the economy
 - Helping the environment
 - Strengthening the community now and for future generations
 - Improving the health of the community
 - Improving the health of your family
 - Promoting environmental justice
 - Slowing climate change

“What does energy efficiency mean to you?”

- Being less wasteful with energy
 - “Not wasting energy while achieving desirable living conditions”
 - “Always looking for a better way to do things”
- Productivity and financial savings
 - “Using as little energy as possible to complete as much as possible”
 - “Wise use of limited resources, saving money”
- Using cleaner/less carbon intensive energy

“Examining the proposed strategies for the building sector, do you think they’re on the right track?”

- “Providing clear, tangible, actions with clear, tangible outcomes”
 - Data on carbon emissions, money saved, energy use, etc.
- Need to focus on education and invest in K-12 climate change education
- Encourage local adoption of renewable and distributed energy
- Ensure new construction of homes and businesses is energy efficient
- Expand access to energy efficiency programs like CEE’s Home Energy Squad and Energy Fit Homes
- Engage many generations and income levels

“Which strategies do you think will be the most effective?”

- Neighborhood Facebook and social media pages
- “Financing that addresses split incentives and outreach to low income renters”
- Outlining the costs for outreach efforts

“Which strategies will actually work to motivate YOU to take action?”

- Highlighting financial savings
- Competition — comparing to neighbors and peer institutions
- Providing positive feedback and data

- Working towards a better environment

“Who are you most likely to trust or listen to as a messenger to hear about energy saving opportunities?”

- The City
- The City government — Mayor and Council
- The utility (Xcel Energy)
- Neighbors and friends
- Other homeowners
- Other businesses
- Environmental and advocacy groups
- Teachers/educators/schools
- Ethnic or religious leaders

“Are there any strategies missing from the list?”

- Better awareness of City programs that support the environment
- Making renters more aware of energy costs
- Clear city guidelines on efficiency
- Funding mechanisms for energy efficiency

“Speaking from your personal experience, what are the barriers that get in the way of you taking action to save/conserve energy? How can these barriers be overcome?”

- Barriers:
 - Money (up-front costs)
 - Time
 - Split incentives for landlords and renters (business and home)
 - Lack of knowledge about options and opportunities
- How to overcome the barriers:
 - Highlight success stories
 - Be straightforward, “go for the low-hanging fruit first”

Appendix 3: Saint Paul's 2015 Greenhouse Gas Inventory

For the past eleven years, Mayor Chris Coleman, with the support of the Saint Paul City Council, has prioritized making Saint Paul one of the most sustainable cities in the United States, protecting the city's air, water, and urban landscape, and combating one of the world's greatest challenges — climate change.

Prior to the COP21 climate talks in Paris in December 2015, Mayor Coleman signed the Compact of Mayors with the City Council's support. The Compact was developed and led by three global city networks: C40 Cities Climate Leadership Group, United Cities and Local Governments, and ICLEI — Local Governments for Sustainability, of which the Saint Paul has been a member since 1993. The Compact commits the City to establishing GHG emissions reduction targets, identifying climate hazards, assessing climate vulnerabilities, and developing a climate action and resiliency plan. It also commits the City to developing a GHG inventory using a common global reporting process called the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (or GPC)³⁶.

Emissions are segmented into three scopes, based on where they occur. Scope 1 emissions are from sources located within Saint Paul's administrative geographic boundary. In the case of Saint Paul, Scope 2 emissions are those that result from the use of grid-supplied electricity and from district energy systems. Scope 3 emissions are those that happen outside the City boundaries, but are a result of activities taking place in the city. (See figure on next page.)³⁷

The GHG inventory included here includes Scope 1 and Scope 2 emissions for Saint Paul:

- In-boundary transportation.
- Stationary fuel combustion.
- Industrial processes and product use.
- In-boundary solid waste.
- Agriculture, forestry, and other land use.
- Grid-supplied electricity.

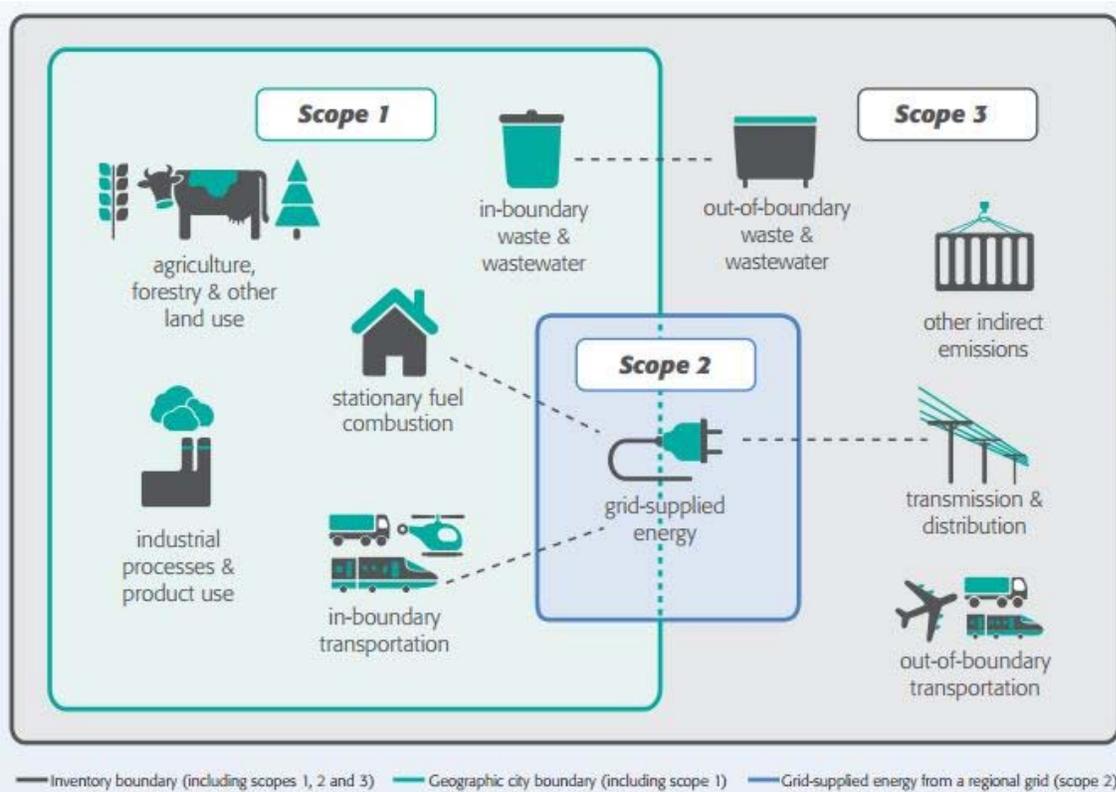
The inventory does not include any emissions from energy generating industries, such as the High Bridge Generating Station located within Saint Paul's geographic boundary, which supplies electricity to the grid rather than directly to activities within Saint Paul.

The sector addressed in this plan, the "buildings sector," includes stationary fuel combustion, which is largely natural gas and other fuels used to supply district or on-site energy, and Scope

³⁶ More information is at <http://www.iclei.org/activities/agendas/low-carbon-city/gpc.html>. When Finalized, Saint Paul's inventory will be available here: <https://www.compactofmayors.org/cities/saint-paul-nm/>

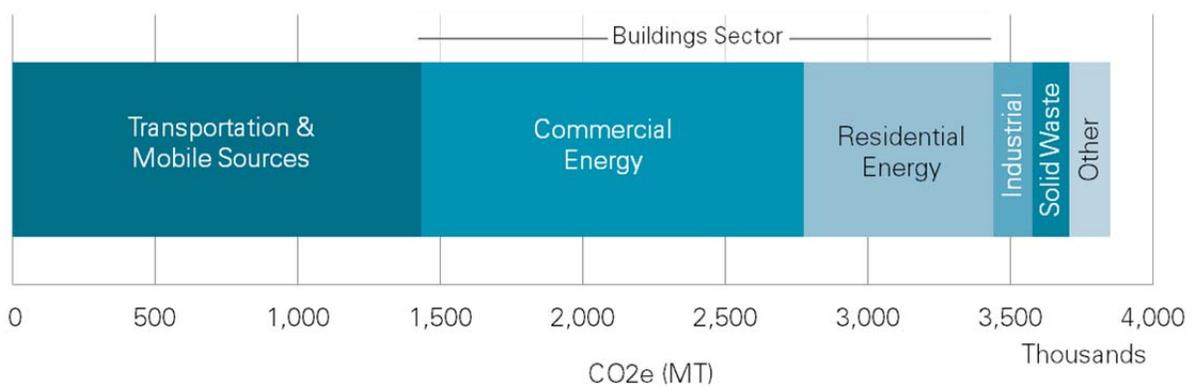
³⁷ Pg. 11 of the [Global Protocol for Community-Scale Greenhouse Gas Emission Inventories](#)

2 grid-supplied electricity. These emissions are categorized broadly into the commercial and residential sectors based on sales information from local utilities.



Greenhouse Gas Emission Sources Categorized into Scopes (Source: GPC)

Results of the inventory are reported in carbon dioxide equivalents (CO₂e). Several greenhouse gasses are rolled into this number.



Results of Saint Paul's 2015 Emissions Inventory (Scope 1 and Scope 2)

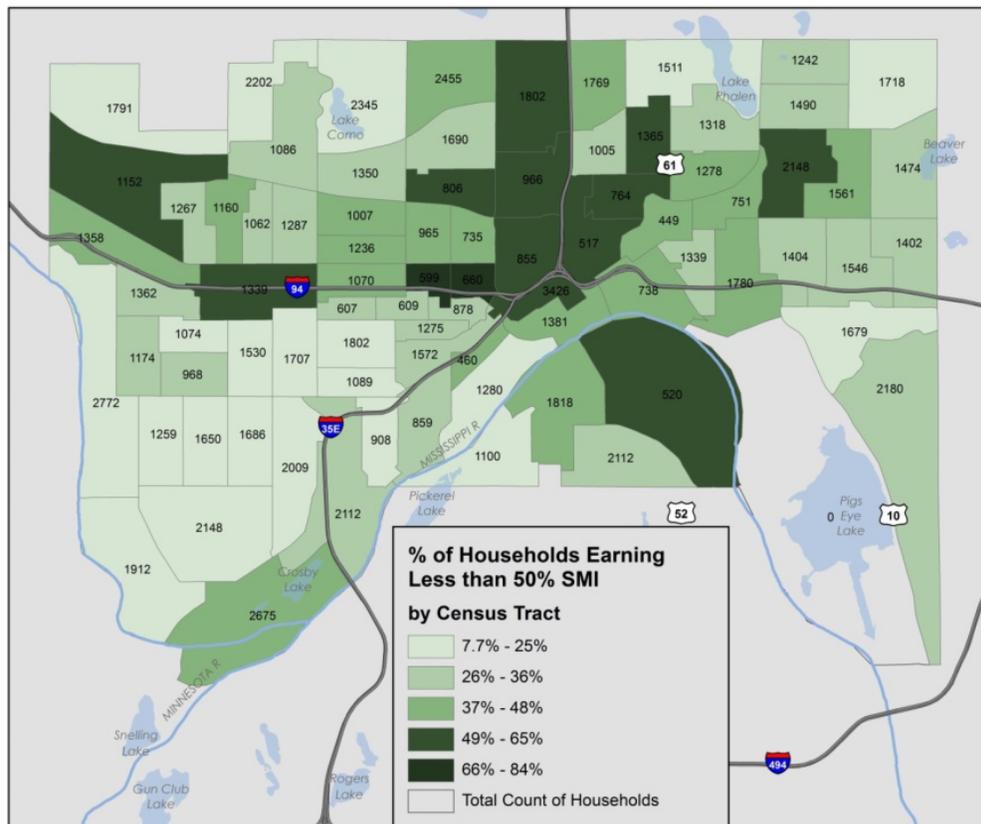
Appendix 4: Assumptions Behind Energy Burden Calculations

Energy burden is the proportion of household income spent on energy. According to a 2016 report from American Council for an Energy-Efficiency Economy that looked at the Twin Cities metro region as a whole, the median energy burden for a household in the Twin Cities is 2.32%. For low-income households, according to the report, the median energy burden is 5.11% and is as high as 8.20% for some households. For African-American households the median energy burden is 4.14% and for Latino households it is 3.14%.

Partners in Energy supported Saint Paul’s focus on resident energy burden by providing detailed data analysis of energy consumption, costs, and household income by census tract. The methodology used for planning purposes is described below, along with known limitations. As part of plan implementation, Xcel Energy and Saint Paul will continue to develop a consistent method to measure and track energy burden.

Methodology

To estimate energy burden in Saint Paul, we first looked at American Community Survey data from 2015 to summarize median income by census tract. The figure below maps the percent of households earning less than 50% of the state median income in 2015.



The average cost of energy per household was calculated for each census tract based on average residential use per premise. An average rate for electricity and natural gas was calculated from 2015 total energy expenditures divided by total sales, resulting in an average electricity and natural gas rate of \$.113 per kWh of electricity and \$.718 per therm. We then multiplied that rate by the average per premise electricity and natural gas use in each census tract to generate an average per premise cost. Note that this approach likely underestimates the total energy costs, as it excludes any taxes and fees paid to local governments and does not include the monthly fixed charge for service.

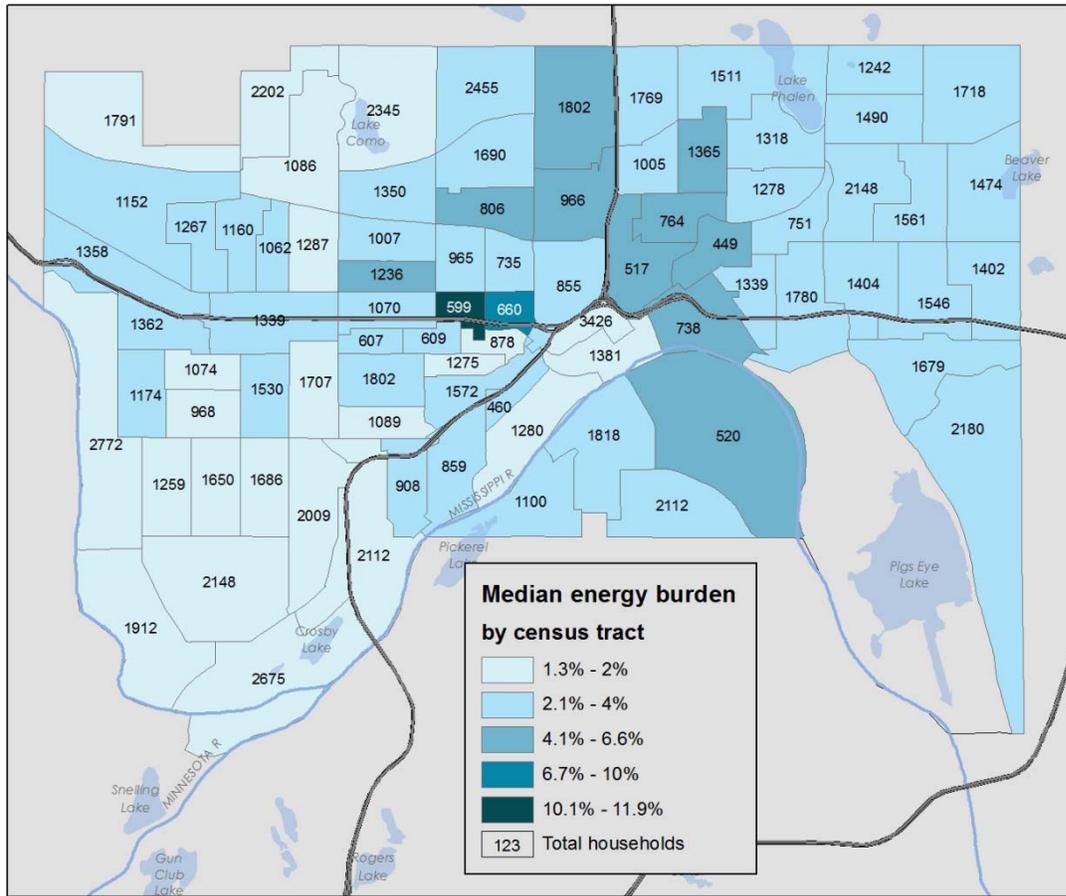
To estimate energy burden, we divided median income in each census tract by average energy costs in each census tract. While this use of average income and energy costs is the best available approach absent proprietary household level data, this method conceals the individual households that likely experience a much higher energy burden than average. Local experience from program implementers indicates that some households may experience an energy burden as high as 25%. It is also possible that some households in a census tract with a low median energy burden experience a high energy burden at the individual level or at certain times of year when heating and cooling needs are highest.

It is also important to note that a premise, which is in essence an electric or gas meter, is not necessarily the same as a household. A multifamily apartment building with a single natural gas meter would only count as one gas premise and may be classified as a commercial premise and therefore not included in these averages. It should be assumed that indirect energy costs are also not included.

To generate a sum of the number of households in Saint Paul that experience an energy burden above 4%, we first calculated the income threshold that would result in a 4% energy burden by dividing average energy costs in that census tract by .004. We then looked at American Community Survey data to identify the number of households in that census tract with an income at or below that threshold.

Based on our calculations, there are approximately 42,124 households in Saint Paul experiencing an energy burden of 4% or above. Lowering energy burden to below 4% for all Saint Paul households would save an estimated 13.5 million kWh of electricity and 1.3 million therms of natural gas each year, resulting in an average annual cost savings of \$2.4 million.

A map of the results by census tract is shown below.



These results for each census tract are listed in the tables below for reference. All energy consumption data are from 2015 and have not been weather normalized.

CITY OF SAINT PAUL CLIMATE ACTION PLAN

Census Tract	Total Residential Electric Premises	Total Residential Natural Gas Premises	Average Residential Electricity Use (kWh)	Average Residential Natural Gas Use (therms)	Estimated Energy Costs (\$/year)	Median Income (\$)	Median Energy Burden
27123030100	1,756	1,352	5,857	981	\$1,366	\$71,607	1.9%
27123030201	2,233	1,665	5,710	902	\$1,293	\$67,857	1.9%
27123030202	1,198	51	3,622	797	\$982	\$52,059	1.9%
27123030300	2,547	2,299	6,624	837	\$1,350	\$77,246	1.7%
27123030400	2,574	1,140	5,125	765	\$1,128	\$36,920	3.1%
27123030500	1,826	1,306	5,777	847	\$1,261	\$23,628	5.3%
27123030601	1,898	932	5,561	838	\$1,230	\$39,476	3.1%
27123030602	1,559	1,346	6,814	908	\$1,422	\$68,698	2.1%
27123030702	1,832	1,806	7,132	822	\$1,396	\$60,577	2.3%
27123030703	1,219	1,106	7,242	843	\$1,424	\$54,631	2.6%
27123030704	1,560	951	5,899	863	\$1,286	\$42,105	3.1%
27123030800	1,816	1,431	6,218	875	\$1,331	\$42,368	3.1%
27123030900	1,178	963	6,643	963	\$1,442	\$45,625	3.2%
27123031000	1,350	1,197	6,156	933	\$1,365	\$26,480	5.2%
27123031100	1,513	1,326	6,446	912	\$1,383	\$47,500	2.9%
27123031200	1,253	966	5,657	850	\$1,249	\$52,083	2.4%
27123031300	836	583	6,177	885	\$1,334	\$22,181	6.0%
27123031400	1,020	782	6,496	895	\$1,377	\$26,417	5.2%
27123031500	988	828	6,145	807	\$1,274	\$26,310	4.8%
27123031600	1,357	997	6,235	919	\$1,364	\$38,154	3.6%

CITY OF SAINT PAUL CLIMATE ACTION PLAN

Census Tract	Total Residential Electric Premises	Total Residential Natural Gas Premises	Average Residential Electricity Use (kWh)	Average Residential Natural Gas Use (therms)	Estimated Energy Costs (\$/year)	Median Income (\$)	Median Energy Burden
271230 31701	896	799	6,785	941	\$1,442	\$43,036	3.4%
271230 31702	2,157	1,198	4,992	714	\$1,077	\$29,427	3.7%
271230 31801	1,750	1,348	6,177	826	\$1,291	\$38,903	3.3%
271230 31802	1,586	1,354	6,566	783	\$1,304	\$48,224	2.7%
271230 31900	882	326	4,483	724	\$1,026	\$29,125	3.5%
271230 32000	1,251	970	5,490	852	\$1,232	\$41,875	2.9%
271230 32100	1,132	850	4,609	739	\$1,051	\$35,091	3.0%
271230 32200	895	842	6,209	944	\$1,380	\$51,364	2.7%
271230 32300	1,499	1,382	5,717	801	\$1,221	\$64,018	1.9%
271230 32400	937	823	6,139	875	\$1,322	\$37,933	3.5%
271230 32500	1,399	1,185	5,939	912	\$1,326	\$32,794	4.0%
271230 32600	979	898	6,198	878	\$1,331	\$34,917	3.8%
271230 32700	851	489	5,551	985	\$1,334	\$34,343	3.9%
271230 33000	603	414	5,586	850	\$1,241	\$29,350	4.2%
271230 33100	568	418	5,915	991	\$1,380	\$31,635	4.4%
271230 33200	1,465	1,040	4,732	502	\$895	\$42,381	2.1%
271230 33300	1,352	1,002	5,300	966	\$1,292	\$41,750	3.1%
271230 33400	1,087	901	3,666	513	\$783	\$22,482	3.5%
271230 33500	1,095	901	6,148	974	\$1,394	\$45,956	3.0%
271230 33600	364	120	8,624	881	\$1,607	\$13,558	11.9%
271230 33700	479	135	3,696	959	\$1,106	\$12,292	9.0%

CITY OF SAINT PAUL CLIMATE ACTION PLAN

Census Tract	Total Residential Electric Premises	Total Residential Natural Gas Premises	Average Residential Electricity Use (kWh)	Average Residential Natural Gas Use (therms)	Estimated Energy Costs (\$/year)	Median Income (\$)	Median Energy Burden
27123033800	713	646	5,827	971	\$1,356	\$51,205	2.6%
27123033900	639	425	5,993	960	\$1,367	\$49,926	2.7%
27123034000	940	543	4,168	410	\$766	\$44,207	1.7%
27123034201	1,593	105	2,751	202	\$456	\$36,250	1.3%
27123034202	3,189	610	3,356	129	\$472	\$30,982	1.5%
27123034400	892	734	5,931	896	\$1,314	\$32,100	4.1%
27123034500	1,422	1,219	6,657	963	\$1,443	\$50,676	2.8%
27123034601	1,630	1,145	6,370	874	\$1,348	\$37,990	3.5%
27123034602	1,450	1,234	6,253	750	\$1,245	\$40,769	3.1%
27123034701	1,627	892	5,684	848	\$1,251	\$51,603	2.4%
27123034702	1,367	1,041	6,248	821	\$1,296	\$46,214	2.8%
27123034900	1,390	1,225	5,387	850	\$1,219	\$55,510	2.2%
27123035000	1,173	1,094	5,564	901	\$1,276	\$65,789	1.9%
27123035100	1,071	926	5,344	898	\$1,249	\$64,444	1.9%
27123035200	1,558	1,404	5,706	925	\$1,309	\$63,250	2.1%
27123035300	1,867	1,680	5,504	834	\$1,221	\$64,712	1.9%
27123035500	1,319	848	4,861	661	\$1,024	\$56,349	1.8%
27123035700	1,145	1,065	7,009	1,202	\$1,655	\$96,063	1.7%
27123035800	1,692	1,080	5,140	1,009	\$1,305	\$57,417	2.3%
27123035900	443	238	5,082	666	\$1,052	\$33,704	3.1%
27123036000	1,227	1,123	6,325	412	\$1,010	\$68,125	1.5%

CITY OF SAINT PAUL CLIMATE ACTION PLAN

Census Tract	Total Residential Electric Premises	Total Residential Natural Gas Premises	Average Residential Electricity Use (kWh)	Average Residential Natural Gas Use (therms)	Estimated Energy Costs (\$/year)	Median Income (\$)	Median Energy Burden
271230 36100	391	361	6,602	792	\$1,315	\$19,929	6.6%
271230 36300	1,238	1,208	6,858	898	\$1,419	\$87,371	1.6%
271230 36400	1,711	1,578	6,387	928	\$1,388	\$88,030	1.6%
271230 36500	1,821	1,521	5,740	794	\$1,219	\$67,277	1.8%
271230 36600	2,104	1,637	6,835	902	\$1,420	\$78,080	1.8%
271230 36700	2,136	1,651	5,627	746	\$1,171	\$60,208	1.9%
271230 36800	1,073	928	6,109	903	\$1,339	\$49,028	2.7%
271230 36900	969	868	5,596	783	\$1,195	\$40,708	2.9%
271230 37000	1,163	1,040	6,202	957	\$1,388	\$62,241	2.2%
271230 37100	1,890	1,571	5,440	832	\$1,212	\$38,056	3.2%
271230 37200	2,195	1,698	6,190	862	\$1,318	\$42,156	3.1%
271230 37402	1,794	879	5,313	825	\$1,193	\$48,406	2.5%
271230 37403	2,297	1,482	6,902	944	\$1,458	\$64,274	2.3%
271230 37500	2,172	1,842	7,775	959	\$1,567	\$93,243	1.7%
271230 37601	1,974	1,560	5,106	622	\$1,024	\$53,672	1.9%
271230 37602	3,042	908	3,507	253	\$578	\$38,534	1.5%
271230 42800	633	564	4,172	268	\$664	\$19,395	3.4%
271230 42900	1,914	1,583	5,663	925	\$1,304	\$64,483	2.0%
271230 43000	2,908	2,496	6,998	960	\$1,480	\$98,824	1.5%

Appendix 5: Summary of Near-Term Priorities and Year 1 Milestones

Below are the major Year 1 activities that are important milestones for progress during the plan's initial launch and year of implementation (through 2018). City staff will assess progress on these milestones and adjust timelines and expectations with key partners if needed.

Priority One: Inspire a Culture of Energy Stewardship

- Synthesize existing marketing data to create a robust understanding of baseline behavior around energy efficiency and renewable energy.
- Identify resources to conduct an energy literacy and attitudes study of Saint Paul residents.
- Launch a set of new financial resources to address common hurdles.
- Launch community energy campaign along with announcement of new resources and financial incentives.
- Collect additional information about how multifamily buildings are metered, as feasible, to understand common configurations in Saint Paul rentals.
- Produce informational guide for renters to the different ways multifamily buildings are metered and bills paid for, along with energy saving tips.
- Establish a working group to evaluate the feasibility of using energy efficiency criteria on city construction projects and update the permit fee structure to support efficient construction.

Priority Two: Reduce Resident Energy Burden

- Define replicable measurement method to track and report on annual energy burden in Saint Paul.
- Launch neighborhood-scale retrofit project by identifying a target neighborhood, developing metrics and a work plan, and piloting outreach approaches.
- Use data gathered from citywide campaign to launch outreach strategies specifically targeting low-income residents.
- Establish an energy burden working group to coordinate outreach actions and resource knowledge among local community entities and trusted leaders.

Priority Three: Engage Major Public and Private Institutions on Climate Leadership

- Design goals and tactics for institutional energy challenge, including core approach, messaging, and platform to launch challenge.
- Convene institutions for an educational and collaborative information sharing event, and create an inventory of what's been done.
- Develop a self-assessment guide for institutions to learn what part of their building portfolio is "renewable-ready."
- Sign up five institutions for Xcel Energy's Renewable*Connect® offering.

- Produce a summary of best practices in institutional energy management. (Coordinate with other efforts as appropriate, such as the Sustainable Growth Coalition.)
- Produce case studies of two leading institutions in Saint Paul.

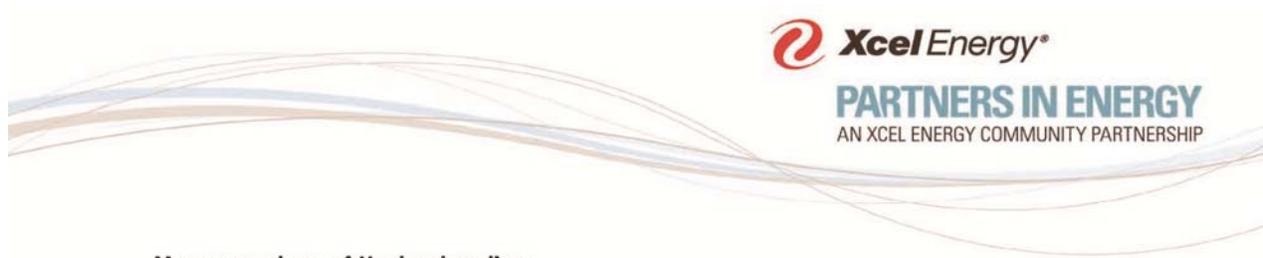
Priority Four: Engage the Multifamily and Large Commercial Sector

- Assess the value and costs associated with new metering technologies (including sub-metering) to determine value proposition on pursuing metering strategies.
- Actively promote businesses and organizations that have taken energy saving actions and purchased renewable energy.
- Launch recognition tools such as a web platform and case studies for top businesses and multifamily properties taking GHG reduction strategies.
- Develop case studies of leading edge buildings and technologies, including ultra-high-efficiency buildings and replicable advanced heat recovery applications.
- Explore the feasibility and impact of energy benchmarking requirement.
- Initiate energy disclosure actions with public buildings leading the way.
- Pilot new engagement and training tools to drive efficiency in existing building operations.

Priority Five: Inspire through Municipal Leadership

- Inventory municipal building energy use into a data tracking tool and report results to the community.
- Establish a schedule and budget requirements for facility audits and energy efficiency investments.
- Identify and assess financing opportunities for rotating energy efficiency investments in City facilities.
- Present stakeholder recommendations for updates to the Sustainable Buildings policy.
- Create proposed budget for renewable energy subscription or installation options.
- Implement viable recommendations from the Joint Energy Efficiency Study of Como Park.
- Complete LED streetlight conversions.

Appendix 6: Partners in Energy Planning Memorandum of Understanding



Memorandum of Understanding Phase 1 – Plan Development

Mayor Chris Coleman
City of St. Paul

Congratulations on being selected to participate in Xcel Energy's Partners in Energy program. This program is designed to provide your community with the tools and resources necessary to develop and implement an energy action plan that reflects the vision your community has for shaping energy use and supply in its future. Program participation is intended to span 24 months with the initial 4-6 months dedicated to developing of a strategic energy action plan and the remaining time focused on the implementing that plan.

The intent of this Memorandum of Understanding is to confirm the City of St. Paul's intent to participate in the initial plan development phase of the Partners in Energy program and outline the commitment that your community and Xcel Energy are making to this collaborative initiative. The primary objective of this phase of the program is to develop your energy action plan.

In order to achieve this Xcel Energy will provide:

- Consulting support to assist in identifying potential community stakeholders, and constructing or delivering an invitation or informational announcement regarding the planning process.
- Data analysis of community energy use and Xcel Energy program participation to the extent that it is legally and technically prudent and feasible. The results can be used to identify potential opportunities to implement plan strategies. Xcel Energy will attempt to integrate data provided by the City of St. Paul into the analysis if feasible.

XCEL ENERGY PARTNERS IN ENERGY

Memorandum of Understanding
Plan Development Phase

- Professional facilitation of 3-5 plan development work sessions with the community stakeholder group to develop the energy action plan's vision, focus areas, goals and implementation strategies.
- Assistance as needed in synthesizing the community and program data collected with the vision of the community to identify attainable goals that align with suitable strategies and tactics.
- Development of the documented energy action plan that will incorporate inputs from the stakeholder planning team and will be accessible to the community.
- Commitment to delivering an actionable and complete energy action plan within seven months of the City of St. Paul and Xcel Energy signing this MOU.

Although participation in the Plan Development phase of Partners in Energy program requires no monetary contribution, the community, the City of St. Paul, does agree to provide:

- A single contact point to work with recruiting stakeholders, coordinating planning meeting logistics, and coordinate distribution of deliverables and lead participation of the community.
- Meeting facilities to host the stakeholder group during development of the plan.
- Identification of existing community energy plans or programs that could be leveraged in successful development and delivery of this plan.
- Good-faith evaluation of the recommendations and analysis provided and fair consideration of the potential strategies and tactics identified that align with the community's goals.
- Commitment to delivering an actionable and complete energy plan within six months of the City of St. Paul and Xcel Energy signing this MOU.
- Public distribution of the work products developed with the support of the Xcel Energy's Partners in Energy program.

XCEL ENERGY PARTNERS IN ENERGY

Memorandum of Understanding
Plan Development Phase

**Resource Commitment Summary
Plan Development Phase**

City of St. Paul	Xcel Energy
<ul style="list-style-type: none"> • Single point of contact • Meeting facilities • Access to existing energy-related plans and programs • Involvement in developing implementation strategies • Commitment to completing the plan development • Agreement that the energy plan resulting from this work will be available to the public 	<ul style="list-style-type: none"> • Assistance identifying and recruiting stakeholders • Analysis of community energy use and program participation • Facilitation of planning sessions • Training and guidance developing goals and strategies • Documentation and delivery of the energy action plan • Commitment to completing the plan development

The Memorandum of Understanding for the Implementation Phase of the Partners in Energy program will be developed upon completion of your energy action plan and will outline your goals and the resource commitment from Xcel Energy and the City of St. Paul.

All communications pertaining to this agreement shall be directed to Jim Giebel, on behalf of the City of St. Paul, and Tami Gunderzik on behalf of Xcel Energy.

Thank you again for your continued interest in Xcel Energy's Partner in Energy program. We look forward to assisting the City of St. Paul in the development of an action energy plan.

For the City of St. Paul:

For Xcel Energy:

Chris Coleman

Patrick Cline

Date: _____

Date: _____

Appendix 7: Xcel Energy Demand-Side Management Program Summaries



Xcel Energy Program Offerings

Minnesota residential studies, audits and services				
Efficiency type	Deliverable	Description	Gas or electric	Study rebate service
Billing and payment	My Account with eBill	My Account is Xcel Energy's online account management service that provides customers with a personalized summary of their account. Features include eBill, eBill payment, usage history, account info, product/program offers, energy efficiency info, and the customer preference center.	E G	Service
Fuel conversions	Switch from propane or fuel oil to natural gas	Convert your primary fuel in your home and save. Potential construction charge for distances from distribution gas line greater than 75 ft and one-time account set-up charge.	G (in area)	Service
Home audits	Home Energy Savings Program	After an in-home evaluation, qualifying residents may be eligible for services and equipment that include CFL bulb upgrades, insulation and weather stripping, appliance replacements and other equipment and appliances.	E G	Service
	Low-Cost Home Energy Audits	Home Walkthrough – Whole-house visual inspection and basic energy bill analysis for \$30. Standard Audit – Home Walkthrough plus blower door test for \$60. Standard audit with Infrared – Standard Audit plus an infrared camera scan for \$100 (where available).	E G	Audits
Home services	Home Energy Squad®	Low-cost service to provide and install efficient items such as compact fluorescent light bulbs, programmable thermostats, weather stripping and more. Must have natural gas service from Xcel Energy or CenterPoint Energy (\$70).	E G (CenterPoint Energy gas)	Service
	Home Performance with ENERGY STAR®	By installing multiple measures after a \$60 energy audit, natural gas customers are eligible for cash rebates.	E G	Audits
	Saver's Switch®	During peak air conditioning use days, participating residents can save 15% off of their electric energy use June through September by allowing a lowering of energy use from their AC units.	E G	Services Rebates
New home construction	ENERGY STAR Homes	Free home performance testing, inspections and consulting services to help meet the ENERGY STAR guidelines set by the U.S. Environmental Protection Agency. We conduct regular site inspections and arrange an independent inspection at completion to ensure homes meet all required builder rebates.	E G	Study

CITY OF SAINT PAUL CLIMATE ACTION PLAN

Minnesota residential rebate programs				
Efficiency type	Deliverable	Description	Gas or electric	Study rebate service
Cooling efficiencies	Central air conditioning and air source heat pumps	Our Central AC Rebate program is designed to generate maximum energy savings for residents by focusing on proper installation practices. Qualifying equipment and installations may earn up to \$450 cash rebates. Must be installed by a contractor registered in Xcel Energy's Cooling program.	E	Rebate
	Ground source heat pumps	Qualifying ENERGY STAR ground source heat pumps are eligible for a cash rebate of \$150 per ton (five ton limit). Must be installed by a contractor registered in Xcel Energy's Cooling program.	E	Rebate
Environmental	Refrigerator/freezer recycling	We pick up resident's old working, second fridge or freezer and recycle it free of charge as well as give a \$50 cash rebate and two compact fluorescent light bulbs.	E	Rebate Service
	CFL bulb recycling	Compact fluorescent lights (CFLs) contain small amounts of mercury that are harmful to the environment. Because of this, they should not be disposed in household trash receptacles. Xcel Energy provides free CFL recycling at participating retailers and Minnesota county recycling centers.	E	Service
Heating efficiencies	Heating/ECM rebates	Qualifying natural gas boiler, gas furnace or factory installed Electronically Commutated Motor (ECM) are eligible for cash rebates.	E G	Rebate
	Water heating rebates	Qualifying energy-efficient water heaters can earn rebates.	G	Rebate
	Insulation rebates	Well-insulated homes can save up to 20% on heating and cooling costs. Rebates for 20% of project cost with a \$300 annual cap. Insulation upgrades existing single-family and multi-unit homes, up to four units, that professionally install insulation. Additional restrictions may apply.	G E (electric heat)	Rebate
Lighting efficiencies	Home lighting	Energy-efficient compact fluorescent light bulbs and light-emitting diodes can be purchased at a discount at participating retailers.	E	Rebate

Some restrictions apply; programs and rebates are subject to change. Please see program application forms official program details, terms and conditions.

Minnesota residential renewable options				
Deliverable	Description	Fuel type	Existing or new	Study rebate service
Solar*Rewards®Community®	A developer or a community installs a solar garden. Residents purchase or lease shares and receive credit on their monthly Xcel Energy electricity bills for their portion of solar energy produced by the solar gardens.	E	E N	Service
Solar*Rewards®	Residents receive incentives for installation of photovoltaic (PV) solar panels. The state of Minnesota may offer an additional rebate if you buy solar panels from Minnesota manufacturers.	E	E N	Service
Windsource®	Residents can purchase renewable, wind energy through Windsource. Subscriptions start at less than \$1 per month for one, 100-kilowatt-hour block*.	E	E N	Service

Some restrictions apply; programs and rebates are subject to change. Please see program application forms official program details, terms and conditions.

Minnesota business audits, studies & services			
Deliverable	Description	Gas or electric	Study rebate service
Business new construction energy design assistance*	An integrated design process that includes whole building computer modeling and verification of measures for new buildings, additions or major renovations. Finished space 20,000 sq. ft. or larger	G E	Study Rebates
Business new construction energy efficient buildings*	Free design review to identify potential rebates and energy-saving opportunities, plus rebates for making efficiency improvements to your new building, addition or major renovation. Finished space smaller than 20,000 sq. ft.	E G	Study Rebates
Commercial efficiency*	Operations and facilities analysis and support to help large commercial operations create a long-term energy management plan. (Designed for energy conservation potential of 1 GWh or 4,000 Dth)	E G	Study Rebate
Data center efficiency study*	Data center energy efficiency analysis and identification of opportunities to improve IT equipment and/or facility systems to run at peak efficiency	E G	Study Rebate
Free online assessment	For businesses unsure of investing in an on-site energy audit, we have a FREE online energy assessment tool that offers a basic report on hidden energy-savings potential: xcelenergy.com/OnlineAssessment	E G	Tool
Fluid system optimization* (compressed air, pumps, fans, blowers, vacuums)	Rebates for a study to analyze your fluid systems to discover no-cost/low-cost improvements as well as identify capital projects to increase your system's efficiency, reliability and performance	E	Study Rebate
Heating efficiency steam trap audits and rebates	Identify failed traps and benefit from cost-saving rebates to repair or replace traps	G	Study Rebate
Heating efficiency system optimization study*	Analyze all or part of heating system to uncover and/or assess natural gas savings opportunities, including no-/low-cost adjustments and/or equipment improvements	G	Study
Lighting redesign study*	A complete lighting analysis to identify ways to improve your lighting efficiency in over-lit or wrongly-lit spaces. (Not for 1-to-1 lighting retrofits; must be performed by a certified lighting professional)	E	Study Rebates
Process efficiency*	Operations and facilities analysis to help create a long-term energy management plan. Industrial manufacturing customers must have cumulative energy conservation potential of 1 GWh or 4,000 Dth	E G	Study Rebate
Recommissioning*	Energy experts conduct a Recommissioning study and provide recommendations for building tune-ups. Many measures have simple paybacks of less than one year. Choose what to implement and get rebates on both the study and implementation measure(s)	E G	Study Rebates
Refrigeration recommissioning*	Rebates for tuning up existing commercial refrigeration systems in grocery outlets, convenience stores and other facilities with refrigerated cases	E	Study Rebates
Turn key services	Low-cost, on-site assessments that identify energy-saving opportunities for community businesses. Includes free project implementation services and 30% bonus rebates on rebate-eligible improvements made within 12 months from assessment date. If businesses already have energy-saving projects identified, they can still take advantage of our free implementation services	E G	Study Service Rebates
My Account with eBill	My Account is Xcel Energy's online account management service that provides business customers with a summary of their account to help manage energy. Features include eBill, eBill payment, usage history, account info, product/program offers, energy efficiency info, and the customer preference center	E G	Services
PERSONALIZED BUSINESS ACCOUNT SERVICES	Our efficiency specialists are your go-to support for your businesses' energy needs, available to: <ul style="list-style-type: none"> • Answer questions • Suggest energy recommendations tailored to your business • Help you navigate program options, requirements and documentation • Discuss different ways to get started Contact your Xcel Energy account manager, or our energy efficiency specialists at 1-855-839-4362 or energyefficiency@xcelenergy.com		Services
Trillion BTU financing	Loan program that leverages public and private money to help businesses make improvements that lower energy costs. Delivered by St. Paul Port Authority.		Service

*Requires preapproval prior to starting the project or study.

Some restrictions apply; programs and rebates are subject to change. Please see program application forms official program details, terms and conditions.

Minnesota Business Rebate Programs			
Deliverable	Description	Gas or Electric	Study Rebate Service
Cooling Efficiency	Rebates for energy-efficient air conditioning equipment including rooftops, chillers, water source heat pumps, zero-loss energy doors, PTACs and more	E	Rebate
Computer Efficiency	Rebates available for virtual desktop infrastructure (VDI) or PC power management software	E	Rebate
Custom Efficiency*	Rebates for energy-efficient technologies or process improvements not covered under our prescriptive programs	E G	Rebate
Data Center Efficiency Equipment Rebates*	Custom rebates for opportunities identified through a Data Center study	E	Rebate
Efficiency Controls*	Rebates for control systems that save energy by automating building systems such as lighting, HVAC and others	E	Rebate
Fluid System Optimization*	Rebates for efficiency improvements from upgraded equipment identified in a fluid system optimization study	E	Rebate
Foodservice Equipment	Cash-back rebates for purchasing and installing qualifying energy-efficient foodservice equipment such as convection ovens, broilers, demand controlled ventilation, ENERGY STAR dishwashers and more	E G	Rebate
Heating Efficiency	Prescriptive rebates for qualifying commercial heating systems used for space heating, domestic water heating and up to 30% additional process load	E G	Rebate
Lighting Efficiency Retrofit Rebates	Rebates for purchasing and installing energy-efficient lighting in an existing building	E	Rebate
Lighting Efficiency New Construction Rebates	Rebates for purchasing and installing energy-efficient lighting for new or significantly renovated facilities	E	Rebate
Motor and Drive Efficiency	Prescriptive and custom rebates for installing variable frequency drives (VFD), adjustable speed drives (ASD) and Constant Speed Motor Controllers. Motor rebates are available for NEMA Premium® enhanced new, upgrade and enhanced upgrade motors	E	Rebate

*Requires preapproval prior to starting the project or study.

Some restrictions apply; programs and rebates are subject to change. Please see program application forms official program details, terms and conditions.

Minnesota Business Renewable Options				
Deliverable	Description	Fuel Type	Existing or New	Study Rebate Service
Solar*Rewards	Rebates based on energy production for installing solar panels on your business. Participation is limited. Additional incentive may be available through the Made in Minnesota program. Additional payment available for excess energy produced.	E	E N	Service
Windsource	Businesses can purchase renewable energy through Windsource. Subscriptions start at less than \$1 per month, for one, 100 kilowatt-hour block.*	E	E N	Service



RESPONSIBLE BY NATURE®

Appendix 8: Saint Paul Conservation Program Participation and Savings

The tables below show the participation and associated savings from Saint Paul resident and business participation in Xcel Energy conservation programs. The tables cover the 3-year period from 2014-2016. Associated energy savings are first year deemed savings, summed for the total 3-year period.

Xcel Energy Residential Program Participation and Savings (2014-2016)					
<i>Program</i>	<i>Participants (2014)</i>	<i>Participants (2015)</i>	<i>Participants (2016)</i>	<i>Total kWh Savings (2014-2016)</i>	<i>Total therms Savings (2014-2016)</i>
Residential Cooling	548	600	744	984,972	0
Efficient New Home Construction	21	21	27	121,234	28,035
Home Energy Audits	869	530	384	0	0
Home Energy Savings Program	512	382	516	411,973	106,545
Home Energy Squad	574	652	669	1,164,963	203,210
Whole Home Efficiency	108	69	52	170,283	98,210
Insulation Rebate	196	127	117	70,547	78,137
Low-Income Home Energy Squad	733	977	465	1,090,112	183,601
Multifamily Energy Savings	303	308	181	304,422	0
Refrigerator Recycling	403	311	247	956,490	0
Residential Heating	876	1,055	1,229	1,289,162	407,113
Residential Savers Switch	1,162	1,166	1,345	29,680	0
Smart Thermostat	0	2	262	0	0
Water Heater Rebates	255	416	512	0	22,761

CITY OF SAINT PAUL CLIMATE ACTION PLAN

Xcel Energy Business Program Participation and Savings (2014-2016)					
<i>Program</i>	<i>Participants (2014)</i>	<i>Participants (2015)</i>	<i>Participants (2016)</i>	<i>Total kWh Savings (2014-2016)</i>	<i>Total therms Savings (2014-2016)</i>
Commercial Efficiency	0	0	2	0	0
Computer Efficiency	1	0	7	406,629	0
Cooling Efficiency	61	56	60	4,859,304	0
Custom Efficiency	14	10	19	8,161,371	439,290
Data Center Efficiency	9	2	1	5,909,040	0
Efficiency Controls	15	13	19	2,654,527	159,481
Energy Design Assistance	19	23	34	12,590,329	1,113,336
Energy Efficient Buildings	5	7	5	628,153	48,809
Energy Intelligence	0	0	0	0	0
Fluid System Optimization	24	29	14	3,841,683	0
Food Service Equipment	2	2	9	184,881	22,013
Heating Efficiency	76	168	136	0	1,321,985
Lighting Efficiency	157	279	388	16,998,204	0
Motor Efficiency	54	71	52	10,511,157	0
Multifamily Building Efficiency	0	2	23	116,779	11,122
Process Efficiency	1	0	0	0	0
Recommissioning	19	8	12	1,558,774	143,189
Saver's Switch For Business	117	264	50	7,385	0
Small Business Lighting	172	167	242	20,760,998	0
Self-Direct	0	0	0	0	0
Turn Key Services	30	28	21	0	0