

Rosemount Greenhouse Gas Reduction Plan



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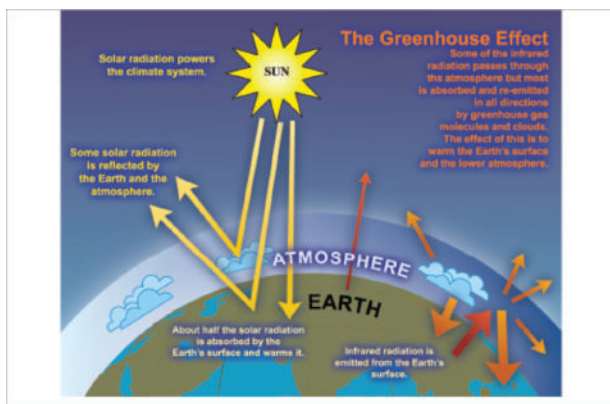
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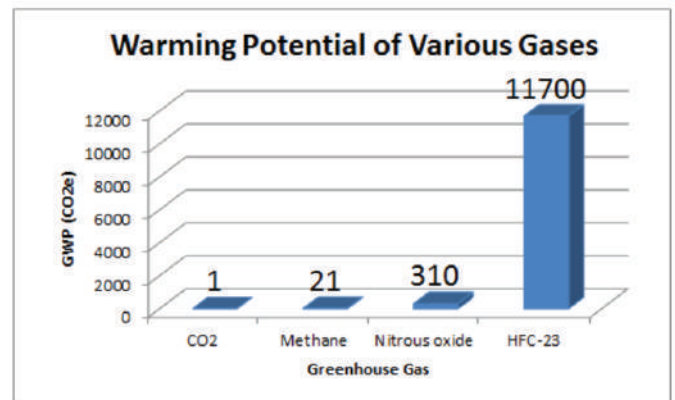
Effects of GHG Emissions

Science of Climate Change

The sun radiates energy, which hits the Earth. Some of this energy is reflected by the atmosphere or Earth's surface upon entry. About half of the energy that hits the Earth is absorbed, warming the planet and emitting infrared radiation. While part of the infrared radiation exits the atmosphere, much of it is absorbed by greenhouse gases such as methane, nitrous oxide, ozone, CFCs, and most importantly, carbon dioxide. These gases re-emit the infrared energy back at the Earth, further warming the planet. While this is typically a part of Earth's natural process and does not cause climate change on a human time scale, the massive increase in greenhouse gases, especially carbon dioxide, emitted by humans since the Industrial Revolution has put the system out of balance. Now, more of the infrared energy emitted by Earth is being captured by greenhouse gases.



(Source: IPCC)



(Source: UNFCCC)

While other greenhouse gases may be more potent than carbon dioxide, CO₂ is released in the largest quantities by far, causing the atmosphere to trap more infrared energy. This extra captured energy is causing the Earth to warm on average and as it warms, different regions have different responses.

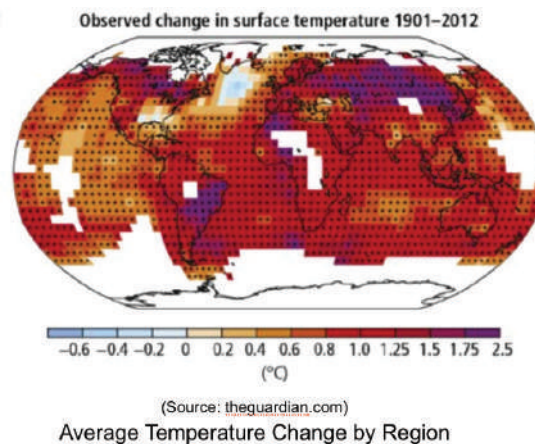
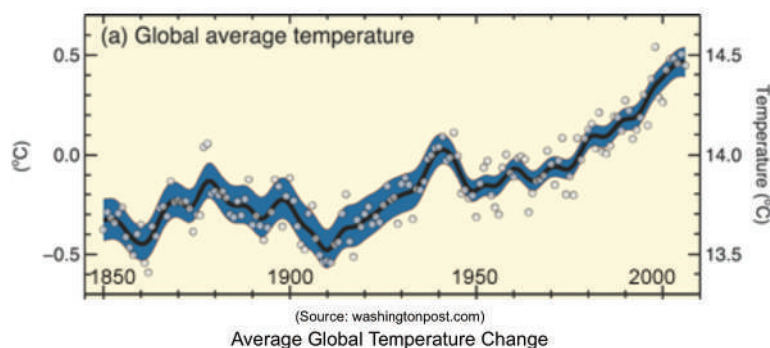
Global Implications

The United Nations Framework Convention on Climate Change (UNFCCC) finds that:

- The concentration of greenhouse gases in the earth's atmosphere is directly linked to the average global temperature on Earth:
- The concentration has been rising steadily, and mean global temperatures along with it, since the time of the Industrial Revolution.
- The most abundant greenhouse gas, carbon dioxide, is the product of burning fossil fuels.

Implications

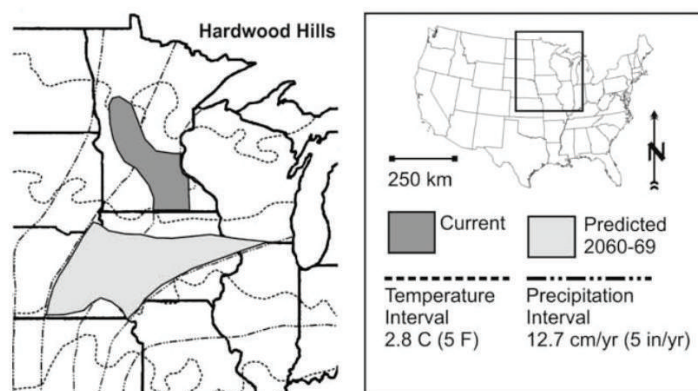
Furthermore, according to the Intergovernmental Panel for Climate Change (IPCC), there is a high confidence that climate change has been responsible for unnaturally high temperatures across the the continent, record amounts of precipitation in parts of North America, and record droughts in others. Agriculture, water supply, and human health are all highly vulnerable to climate change. Sea level rise and increased variability in precipitation will likely cause stresses in these areas. Due to the potential environmental, economic, and social harms “equitable burden-sharing will be necessary if the climate challenge is to be effectively met.”



Local Implications

A Minnesota DNR report found that the average temperature in Minnesota has increased 1.9°F and precipitation has increased by 3.1” since 1895 and it projects that by the end of the century, average temperatures will increase 5-9°F and annual precipitation will increase 6.8-11.5% more. The report predicts that by the year 2069, Dakota County will have a similar climate to western Iowa. This quick change in climate will put a strain on many of the area’s native prairie species.

In addition to the DNR report, the third U.S. National Climate Assessment states that, due to climate change the state of Minnesota will face more frequent extreme precipitation events and due to this increases risks from flooding. Furthermore, though warmer average temperatures and increased CO₂ concentrations will benefit most agriculture, increased weather variability causing more freezes will offset this advantage. Finally, changing precipitation patterns will lead to less efficient water infrastructure, as most infrastructure is designed based on known precipitation patterns. In order to mitigate these risks, carbon emissions must be reduced beyond business as usual.



(Source: Galatowitsch, S., et al.)

Scope of Project

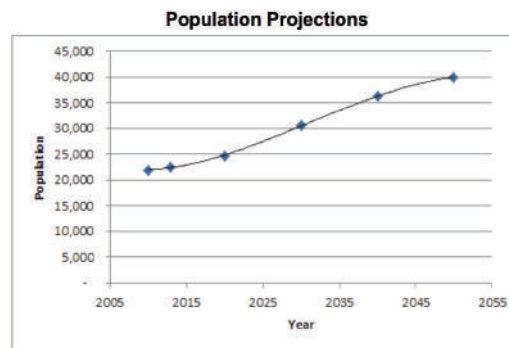
“The City of Rosemount is 15 miles south of the Twin Cities metropolitan area. With land area of nearly 36 square miles, Rosemount residents enjoy the advantages of living in a community with both a small town and large metropolitan city atmospheres. Unusual for a city of its size, Rosemount combines industry, agriculture, and agricultural research with a rapidly growing residential community providing an excellent environment in which to live and work (‘About Rosemount’)”

Historically the area where Rosemount now resides was inhabited by the Santee Sioux tribe until 1851 when a treaty turned the land over to the federal government. After that it began and continues to have a strong Irish tradition. The population of Rosemount as of 2013 is 22,605 people, an increase of 8% since 2007 and projected to at least double in size by 2050. The population density (res./sq.mi)² is 680 an increase of 7.9% since 2007. Rosemount is a unique city as it deals with many different sectors, commercial, industrial, agricultural and residential all within its borders. As a rapidly developing city there is the opportunity to be proactive about GHG emissions and develop sustainable strategies.

As part of the Resilient Communities Project this document serves as:

“A report to city staff recommending locally relevant strategies on how to develop and implement a greenhouse gas reduction plan addressing the entire community and government operations. To the extent possible, the report will include lessons from other developing communities, an analysis of Rosemount’s emissions, and potential strategies the city could consider in the context of a formal climate plan”

- Report guidelines from the Resilient Communities Project



(Source: <http://regionalindicators.mn.uli.org/emissions-chart>)

The population of Rosemount is expected to nearly double by 2050

Note: The trend of population for 2010-2040 is $y = -0.41x^3 + 2,519.94x^2 - 5,117,563.25x + 3,463,905,976.33$. This equation was used to estimate the population of Rosemount in 2050 to be 39,965 people.

GHG Goals

The city has a host of options to choose from when considering different levels of greenhouse reduction. The US Conference of Mayors Climate Protection Agreement, which the mayor of Rosemount signed on to, set the goal of a 7% reduction from 1990 levels by 2012. The city may look to meet this goal before moving onto more aggressive reductions goals. The state of Minnesota has declared the goal of reaching reductions 15% from 2005 levels by 2015, 30% by 2025, and 80% by 2050. Some communities are going even further than the state’s goals, Northfield, MN has agreed to attempt reaching net-zero carbon emissions by 2033, as discussed in more detail later.

Current Efforts

Resilient Communities Project

RCP partners communities with University of Minnesota classes on research assignments designed to promote sustainability and resilience. For the academic year of 2014-2015, RCP is partnering Rosemount with 38 University projects from multiple graduate and upper-level undergraduate classes, one of which is SUST4004 - Sustainable Communities, which this report was created for.

GreenStep Cities Program

The GreenStep program encourages Minnesota communities to follow 28 “best practices” to improve sustainability as well as overall quality of life. Cities are ranked either 1, 2, or 3 stars based on the number and quality of the best practices they have achieved. Rosemount is currently a Step 2 city, meaning they have begun many sustainable habits. While not a small accomplishment, effort is still needed to further their cause. Some of their best practices in progress include conducting a natural resource assessment while protecting 50% of their land that is able to be developed, making land that is set aside to not emit carbon, but rather provide a carbon sink. They also achieved an honorable mention as a bike-friendly community and partner with farmers’ markets to provide local food to the community, reducing transportation-related emissions.

B3 Benchmarking

B3 Benchmarking is a database for public building energy statistics. Communities input their buildings’ energy data and compare against similar buildings. The database calculates energy use intensity as well as potential yearly savings by reaching the benchmark standards. Rosemount has five buildings in the B3 system, two fire stations, the community center, the city hall/police station, and the Rosemount Steeple Center.

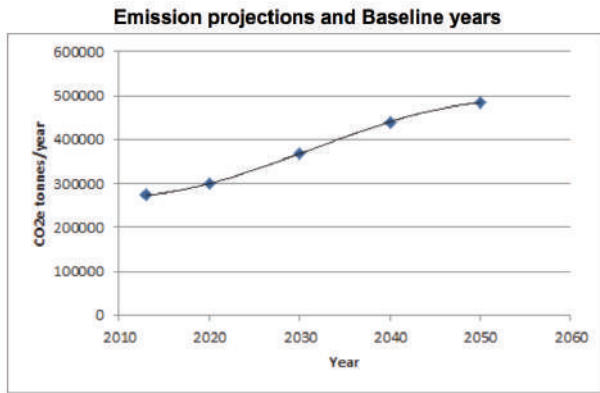
STAR

Rosemount joined Sustainability Tools for Assessing and Rating Communities in January 2014. Being recognized by the STAR program means a community has established a rating system to define sustainability. Using this official system provides a common language for local governments to more effectively strategize a framework for sustainability.

Conference of Mayors

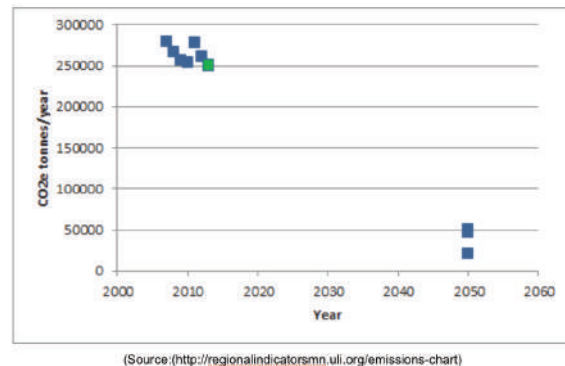
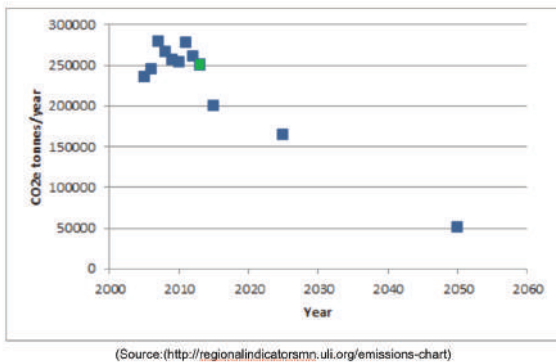
The Mayor’s Climate Protection Agreement binds communities to the United States’ Kyoto Protocol goal of decreasing emissions 7% from 1990 levels by 2012. The program was formed in 2005 to encourage cities to take up the challenge of greenhouse gas reduction which the United States opted out of and was signed by more than 1060 mayors, including the mayor of Rosemount.

Emissions Projections



Projected yearly emissions by the city of Rosemount in a business as usual scenario where the average amount of emissions/person stays constant at 12.1 CO₂e tonnes/person/year, the average of Rosemount emissions from 2007 to 2013.

Note: There is a general trend of falling costs for new technologies causing a yearly decline in emissions/person, however, this trend is not separable from other factors, such as measures that the city took in the previous six years. In reality, the business as usual scenario would have a somewhat lower trend.



Greenhouse Gas Reduction target based on Minnesota Statute 216H, 15% reduction by 2025, 30% by 2025, 80% by 2050 with a baseline year of 2005. The green marker indicates 2013, the most recent year of data collection

Note: As Regional Indicators Initiative Data is only collected after 2007, the GHG emissions of 2005 were estimated by multiplying the average emissions between 2007 and 2013 by the population in 2005.

This chart shows the impact of baseline year selection. The top projected point shows a 80% reduction from a baseline year of 2013 (The most recently collected data), the center shows a 80% reduction from 2005 levels (The baseline chosen in 216H.02), and the bottom a 80% reduction from 1990 levels (The baseline chosen in the Mayor's Climate Protection Program). Choosing 2013 as a baseline year would decrease the amount of reductions by 16% from 2005, while choosing 1990 would increase the amount of reductions by 56%

Note: 80% CO₂e reductions by 2050 based on varying baseline years

Emissions Projections

This report recommends that Rosemount choose a baseline year of 2005, a year shared by Minnesota Statute 216H.02, giving the city a common language to speak in when comparing themselves to other Minnesota communities. Furthermore, as a growing community, Rosemount can truly become a leader by meeting the Minnesota Statutes goals, showing that if a growing community can take on these goals, any community can. If the city is looking to truly set an aggressive GHG reduction goal, 80% by 2050 would be a worthy ultimate objective.

GHG Emissions Analysis

Summary of Community-wide GHG Emissions Results.

This Greenhouse Gas (GHG) inventory explores the GHG emissions in the city of Rosemount, MN from a community-wide perspective (public and private sectors). This inventory also explores data gathered on Government operations, however, the data is not comprehensive and gaps remain that need to be filled. Using data from the Regional Indicators Initiative, the community-wide emissions were broken down into four different categories, energy (electricity and natural gas), water, waste (solid waste and wastewater treatment) and travel. The community-wide emissions are also broken down by residential sector in contrast with commercial and industrial. City operations data includes that of the city-owned buildings, fuel consumption, and energy consumption from street signals.

The table below shows the GHG emissions in tonnes from Community-Wide sources in 2007 and 2014. It also demonstrates the percentage of change in GHG emissions between the two.

Community-Wide Emissions (tonnes)	2007	2013	Percent Change
ENERGY			
<i>Electricity</i>	122,607	91,545	-25.3%
<i>Natural Gas</i>	48,645	69,203	42.3%
<i>Subtotal CO2e Emissions</i>	171,252	160,748	-6.1%
TRANSPORTATION	102,391	84,197	-17.8%
WASTE			
<i>Solid Waste</i>	3,593	4,163	15.9%
<i>Wastewater Treatment</i>	2,399	1,455	-39.4%
<i>Subtotal CO2e Emissions</i>	5,992	5,618	-6.3%
CO2e Emissions Total	279,635	250,562	-10.4%
Weather Normalized	270,159	238,672	-11.7%
Per-Capita CO2e	13.4	11.1	-17.2%

(Source: Kacey Strandemo)

Community-Wide Analysis

Combined Emissions

The overall city wide GHG emissions include energy, transportation, solid waste management and wastewater treatment. The overall city wide GHG emissions decreased by 10.4% from 2007 to 2013. Weather is a large contributor to energy use, and so, in order to realistically collate these two years the data must be weather normalized. In 2013 there was an increase of 11% in cooling degree days and an increase of 9.5% in heating degree days. After normalizing the data for weather, there is an overall 12% decrease in GHG emissions from 2007 to 2013. Below each source of GHG emissions is analyzed along with the city's water consumption.

Heating degree days (HDD): A measure of how much (in degrees), and for how long (in days), outside air temperature was lower than a specific base temperature (or balance point). They are used for calculations relating to the energy consumption required to heat buildings.

Cooling degree days (CDD): A measure of how much (in degrees), and for how long (in days), outside air temperature was higher than a specific base temperature. They are used for calculations relating to the energy consumption required to cool buildings. Source: Degree Days.net (<http://www.degree-days.net>).

Station ID: KSGS, Base temperature: 65F

ENERGY (electricity and natural gas)

City wide electricity consumption, measured in MWh, in 2013 was 2.7% higher than in 2007, and the associated GHG emissions 25% lower. City wide natural gas consumption, measured in therms, in 2013 was 42.3% higher than in 2007, and the associated GHG emissions were 40% higher. GHG emissions change at a different rate than energy emissions because of the different output associated with different types of energy. Considering both the natural gas and electricity data, the GHG emissions in 2013 were 6.2% lower than in 2007. After normalizing for weather the GHG emissions associated with energy were 8% lower in 2013 than in 2007.

WATER

Residential water use accounts for the majority of city wide potable water consumption. Total city wide potable water consumption increased by 2.1% between 2007 and 2013. Precipitation levels increased by 10.7% between 2007 and 2013. Total city-wide water consumption per gallon, per person, per day decreased by 5.3% between 2007 to 2013. Total potable water consumption decreased in the residential sector and increased in the commercial and industrial sector between 2007 and 2013. The potable water consumption in the residential sector has decreased by 4.8% from 2007 to 2013 while total potable water consumption in the commercial and industrial sector has increased by 50.8% from 2007 to 2013. Residential water use per gallon, per household, per day has declined by 15.9% while commercial and industrial water use per gallon, per job, per day has risen by 59% between 2007 and 2013.

Community-Wide Analysis

TRAVEL

Vehicle miles traveled account for most of the city's transportation related GHG emissions at 89%, the city's share of the Minneapolis-St. Paul International (MSP) Airport emissions account for 11% of the transportation related GHG emissions. Vehicle miles traveled refers to miles driven within the city limits, and all of the data was collected by the Minnesota Department of Transportation. Total vehicle miles traveled decreased by 15% between 2007 and 2013, and associated emissions decreased by 17.7%. By sector vehicle miles traveled (VMT) accounts for 31% of the total city-wide GHG emissions. It is also the largest cost to the city at 49% of the total costs. Gasoline car use accounts for the largest portion of the community's VMT at 65% and the largest portion of GHG emissions associated with VMT at 49%. Light gasoline truck use account for the second largest portion of the community's VMT at 27.3%, and the second largest portion of GHG emissions associated with VMT at 29.6%.

WASTE (solid waste management and wastewater treatment)

Solid waste management accounts for less than 2% of the total city wide GHG emissions, and the city's share of wastewater treatment emissions accounts for less than 1% of total city-wide GHG emissions. Of the total municipal solid waste managed 55% is recycled, 37% is landfilled and the remaining 8% is processed by combustion at the HERC, RedWing incinerators and the Newport refuse derived fuel facility. Landfilling accounts for 81.4% of the total GHG emissions from waste. Waste per pound, per person, per day has increased by 8.5% between 2007 and 2013.

COMPARISON TO OTHER CITIES

In comparison with the 2012 trendline for GHG emissions of the outer ring suburbs participating in the regional indicators initiative (RII) of 13.04-tonnes-per-capita Rosemount's 11.42-tonnes-per-capita rate for 2012 was 6th when ranked from highest to lowest. The city of Rosemount doesn't rank in the highest or lowest per-capita rate for consumption of energy when analyzed by sector (residential vs. commercial/industrial) compared to the outer ring suburbs according to the RII data. When analyzed by fuel type Rosemount is the second highest per-capita consumer of natural gas, but ranks neither high nor low in per-capita consumption of electricity when compared to other RII outer ring suburbs. The City's VMT per-capita rate is the lowest of the RII outer ring suburbs at 21.1 VMT per-capita, per day. The City's per-capita share of Municipal solid waste per-day ranks highest (along with Eagan, MN) of the outer ring suburbs at 6.56 pounds.

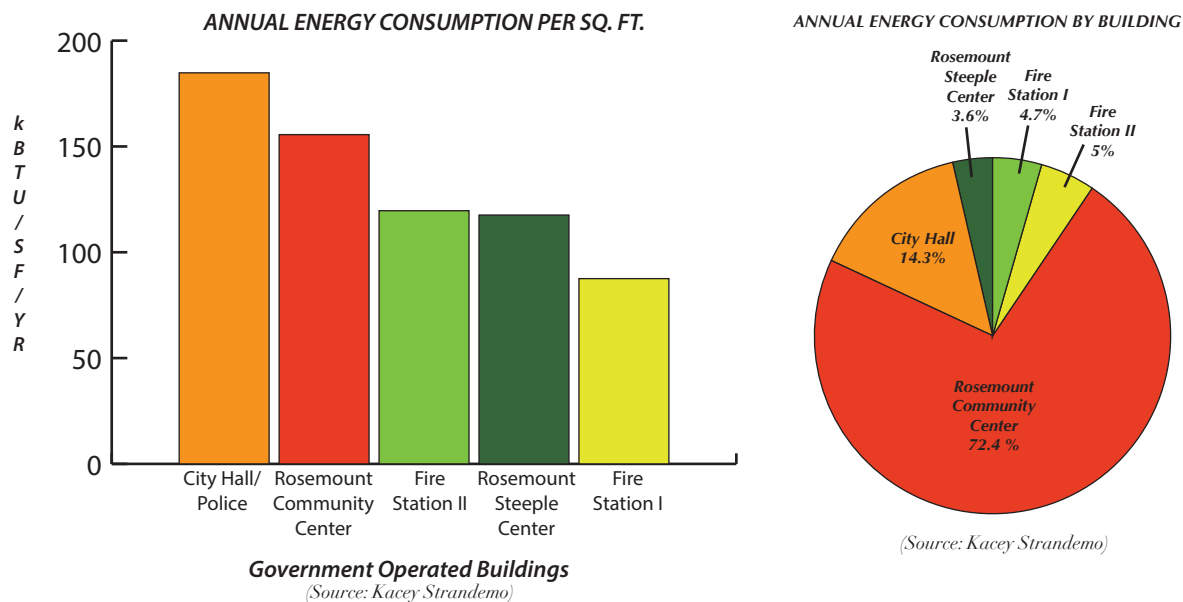
Government Operations Analysis

Summary of Government Operations Analysis

The summary of the current data collection is shown here, by category of city operations which includes: city owned buildings and facilities, transportation fuels used by city vehicles, and energy consumption from public street and highway lighting. This is not a comprehensive analysis of Government Operations and requires further data collection in order to be comprehensive.

BUILDINGS

The city of Rosemount participates in B3 benchmarking and currently has five different sites registered: Fire Station I, Fire Station II, Rosemount Community Center, City Hall/Police Station, Rosemount Steeple Center. They began B3 benchmarking in 2013 and have been regularly updating all of the building information. These Government operated buildings produce a combined 4,721 tonnes of GHG emissions per year. They account for 1.9% of the total GHG emissions in Rosemount and 2.7% of the total GHG emissions from energy in Rosemount. The largest emitter of GHG emissions is the Rosemount community center, however when normalized by kBTU/SF the City Hall ranks as the highest emitter of GHG emissions per sq. foot.



PUBLIC STREET and HIGHWAY LIGHTING

Energy from public street and highway lighting accounts for less than 1% of total GHG emissions city-wide. Total energy consumption increased by 9.5% between 2008 and 2012. In 2012 energy from public street and highway lighting controlled by the city of Rosemount accounted for less than .1% of the city-wide GHG emissions, and less than .2% of city-wide emissions created by electricity. It is our recommendation that the city should work towards replacing all municipal street lights and signals with LED lights, LED lights last up to two decades and require about 1/10th of the electricity which means they are about 90% less costly to use.

Government Operations Analysis

The table below describes the electricity consumption of municipally owned public street and highway lighting from 2008 through 2012.

Energy consumption from Public Street and Highway Lighting (kWh)	2008	2009	2010	2011	2012
Xcel Energy	654,000	665,000	678,000	676,000	734,000
Dakota Electric	307,570	310,747	314,010	313,310	318,650
Total Energy Consumption	961,570	975,747	992,010	989,310	1,052,650
*Total Associated GHG Emissions (tonnes)	480.8	487.9	496	494.7	526.3
*GHG Emission from Municipally owned lights (tentative)	160.3	162.6	165.3	164.9	175.4

*CO₂e emissions based on the conversion factor 1 kWh=.0005GHG (tonnes) given by NSP MN 2010

* About 1/3 of public street and highway lighting is controlled by the city of Rosemount, the rest by MDOT or Dakota County. As the data given (see appendix...)is unclear and poses several questions, these numbers have a large margine of error but serve to show a tentative picture

(Source: Kacey Strandemo)

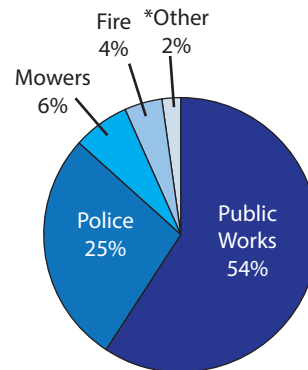
FUEL USAGE

Public works accounts for the majority of fuel usage, followed by the police fleet and together these account for 79% of Municipal fuel usage. Exploring the changes between 2007 and 2013, total fuel usage has decreased by 8.7%. The police fleet has seen the largest decrease in fuel usage, a decrease of 21.1%. Fire truck fuel usage is the only category that has increased its fuel usage, an increase of 9.8%. Fuel usage is only a portion of transportation data, thus, further data should be collected to accurately reflect the total GHG emissions associated with transportation.

Fuel Usage by Category (gal)	2007	2013	Percent Change
Public Works	35,538	34,475	-3.1%
Police	20,176	15,913	-21.1%
Mowers	4,263	3,848	-9.2%
Fire	2,373	2,605	9.8%
*Other	1,452	1,421	-2.1%
Total	63,802	58,262	-8.7%
*Total Estimated Associated CO ₂ e emissions (tonnes)	589.5	538.3	-8.7%

(Source: Kacey Strandemo)

FUEL USAGE BY CATEGORY



(Source: Kacey Strandemo)

* "Other" includes the City Hall minivan, the inspection vehicles, and the Parks & Rec vans.

*Assumes all vehicles use gasoline, and does not take into account that the city fleet uses state required blend of ethanol. These are not exact numbers but give a rough estimate of what actual associated emissions would be.

*Gasoline CO₂e emissions Factor: 1,000 gallons = 9.24 tonnes

TASK

MISSING GOVERNMENT OPERATIONS DATA:

Water Utility:

The City should collect all data associated with electricity and natural gas usage by the City's water delivery facilities. Energy use and GHG Emissions for this section directly correspond to residential and commercial/industrial water usage.

Transportation:

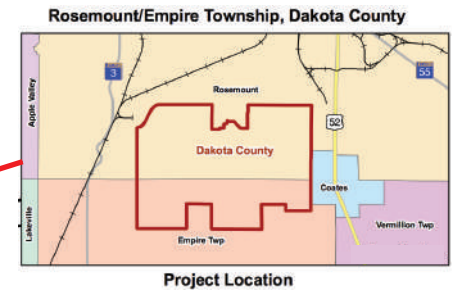
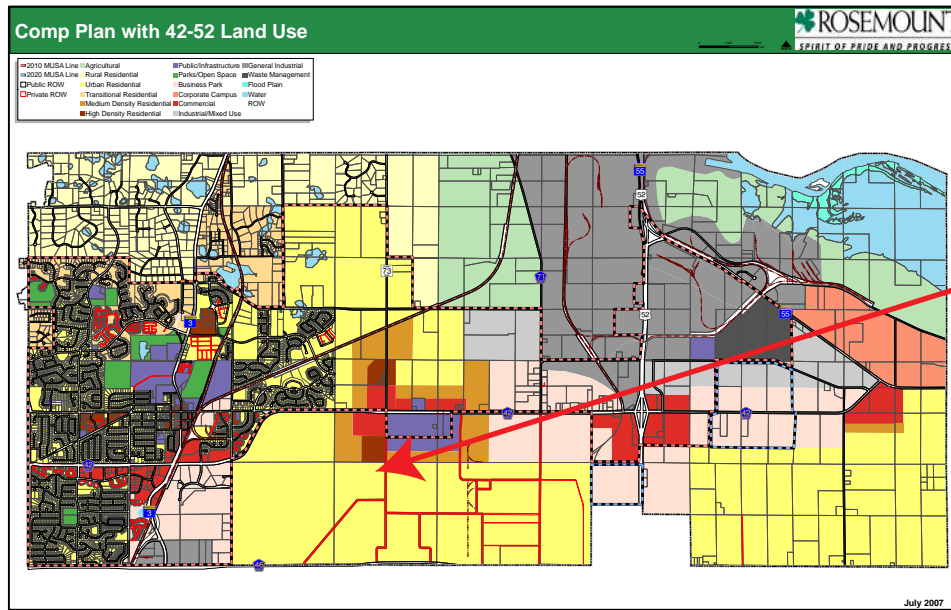
In this report transportation only includes fuel usage. For a more complete analysis of transportation the city should take an inventory on employee commuting. Along with information on employee business travel related to government operations. The city would also benefit from including GHG emissions from railroad operations in this section.

MISSING CITY-WIDE EMISSIONS DATA:

Agricultural emissions are neglected in the RII data cited in the projections above, so the true emissions of Rosemount are somewhat higher. The two most grown crops by far in the state of Minnesota are corn and soybeans, accounting for 78% of the state's value produced, according to the Minnesota Department of Agriculture. According to a study in the Agricultural and Resource Economics Review, corn growing emits about 500 lbs CO₂/ acre, while soybean farming emits about 200 lbs CO₂/ acre, both depending on soil types. Rosemount dedicated 9,270 acres to agriculture in 2005. A more detailed analysis on agricultural emissions could be done with the percentages of different types of crops and livestock raised in Rosemount and equipment used. To make the emissions analysis more complete, we recommend the city collect data related to the GHG emissions associated with agriculture.

There is much discussion as to whether GHG emissions should be the responsibility of the consumer or producer. Who bears the burden? Cities are not self-sufficient and to thrive they rely on a large flow of resources from outside their bounds. Per-Capita GHG emissions for a city can vary on whether the data is consumption based or production based values. The variation in these values highlights the problem with appropriating GHG emissions per capita because there is such disparity depending on which data is collected.

Development: UMORE Park



UMore Park

UMore Park is a 5,000 acre property owned by the University of Minnesota as a research space with about 70% of the property being in southern Rosemount. It is currently being perceived as a 20,000 - 30,000 resident community in Rosemount (doubling the city's current population), maturing 30 - 40 years from its early stages as an idea in 2003.

History

In 1942, the US War Department acquired the property that UMore Park is currently a part of. This was to build an ammunition factory, the Gopher Ordnance Works (GOW) to aid WWII efforts at the time. Nearly 100 farms were displaced and many existing transportation routes were blocked off. When the factory began production in early 1945, it only lasted for about half a year until it was halted due to excess production of ammunition within the United States. Even though the factory was utilized for such a short period of time, resulting effects still remain present on the property. UMore park is strewn with abandoned building remains and underground tunnels from Gopher Ordnance Works.

The University of Minnesota obtained 7,686 acres of the site between 1947 and 1948 for researching different things like polio, cancer, and supersonic aircraft. Part of this land was also used as the University's agricultural experimentation and research area. A large portion of the site was still unused which created an opportunity for the University. In the 1970's, the U began developing ideas on how the area could be populated as a community because the Twin Cities was growing outwards and more people would eventually be moving towards Rosemount. In 2001, early discussion about Umore Park was occurring, and work had begun on the comprehensive master plan in 2003.

UMORE Park

Future

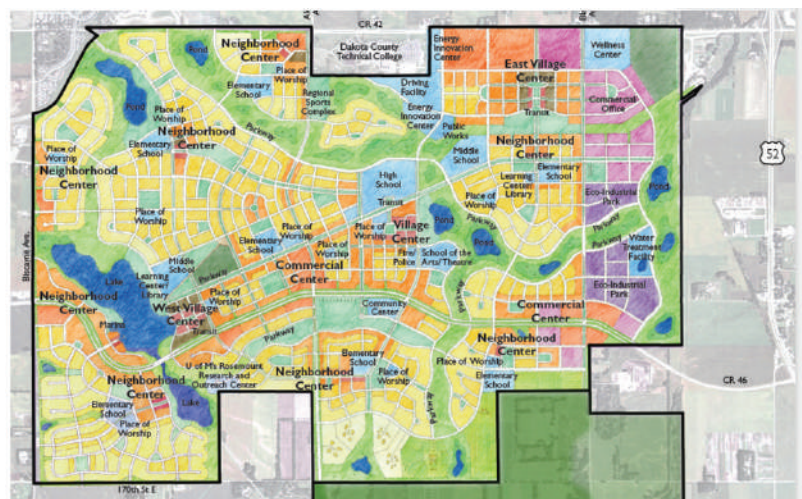
Being in the schematic design step of a design process means that a concept is starting to be understood as a design in the “big picture.” UMore Park fits into this because it is past the initial pre-design of the program of the community, and can be found in the concept master plan finalized in November, 2008. Actions have been taken to further develop the plan and move forward in the design process. In March, 2012, a sustainability report was compiled that focuses on multiple aspects of a climate action plan for UMore Park. Many sustainability action recommendations were influenced by BioRegional during a workshop conducted earlier in the year. This workshop facilitated these ideas through using a program they operate called One Planet Communities and the 10 principles that it's based on.

Sustainability will begin with a higher quality of life amongst the community. This goal can be reached by introducing sustainable best practices into employee training programs and the utilization of environmentally efficient technology in the workplace to create green jobs for local residents. Also, types of housing will vary within UMore park, including 15% of the total housing to be low-moderate income households. 13,000 homes will be developed and 1,000 acres of open space will be spread throughout the property. Food will be locally sourced by using communal gardens to provide fresher food, consumer savings, and local jobs. Education about local and sustainable use of materials and resources are being implemented into teaching programs for all ages. A concrete and soil assessment in 2006 concluded that 70% of the concrete remains from the abandoned ammunition factory could be removed and reused for the development of roadways and new structures. The other 30% was unable to be used because of contaminants.



The abandon amunition factory:

Source: http://farm9.static.flickr.com/8439/7989702563_31955a8599_m.jpg

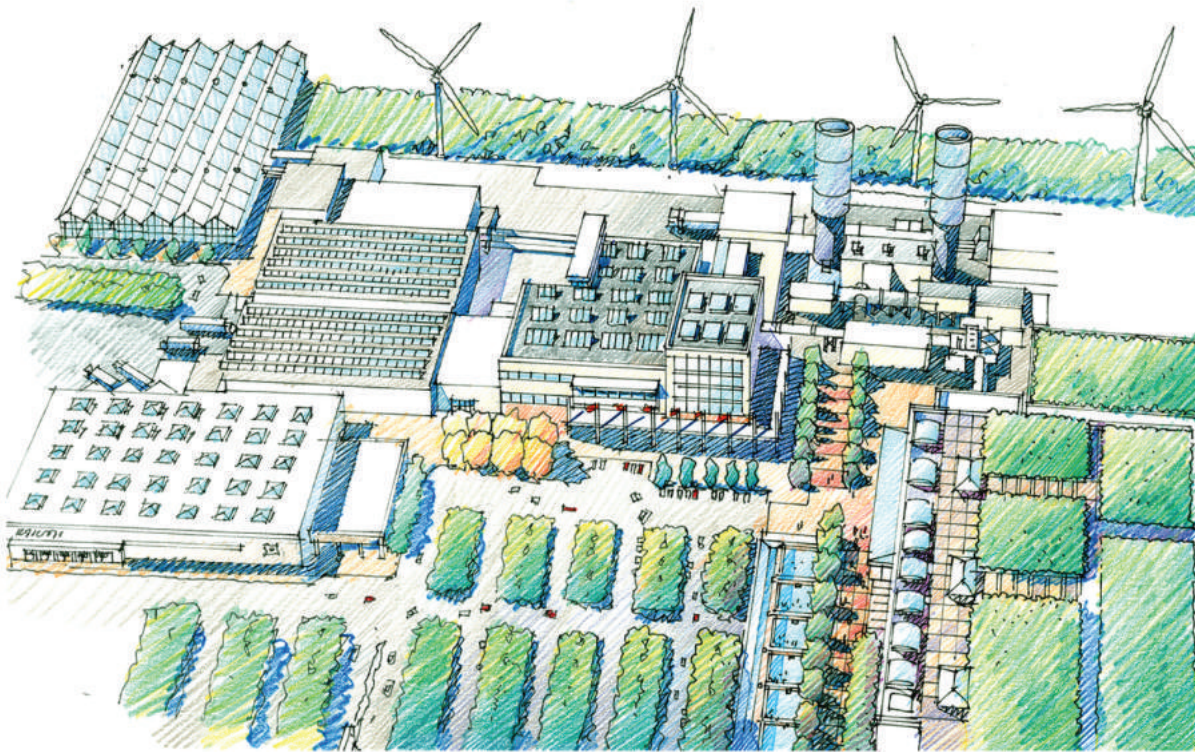


(Source: <http://www.ci.rosemount.mn.us/DocumentCenter/Index/51>)

UMORE Park

A waste management model was created that uses a waste-to-energy process where waste is used to generate electricity or heat for buildings. This will help move UMore park to a zero-waste and zero-carbon community. The process of reaching zero-carbon includes a series of phases to gradually reduce their energy use determined by the SB 2030 Energy Standard Tool (Sustainability Strategies). Planning to reach these reduction goals will require a large integration of renewable resources. Wind and solar energy are planned to be a large energy contributor for the community. There are dedicated spaces for district energy as well as experimental individual solutions for innovative mini-networks of renewable energy. Communal solar plants seem to be a more beneficial option compared to individually owned solar panel equipment because of the minimal maintenance that is required by residents. It would also act as a symbol of how they will thrive together as a community. In the fall of 2011, a 2.5MW wind turbine was commissioned on the property for wind energy research.

An integration plan for UMore Park was developed to communicate all of the sustainable practices and of the community which incorporates BioRegional's suggestions.



(source: <http://www.ci.rosemount.mn.us/DocumentCenter/Index/51>)

Local Businesses

Corporate Sustainability

Sustainability is achieved through efficiency in corporations. There are three main approaches to achieving efficiency in a business, the easiest or “low-hanging fruit” being cost reduction. After that has been accomplished, businesses can then push it further through value adding, innovation, and flexibility. This sort of efficiency reduces the amount of resources being using and even can change the type of resource. It can also change the type of product or service being introduced into the community. Many corporate leaders believe that sustainability equals higher costs and therefore loss of profit; however, sustainable choices that target efficiency actually saves them money in the long run and can provide a wealth of other benefits as well. Reporting also makes sustainability data and statistics easy to get ahold of and forces the company as a whole to see its environmental impact. These are the sorts of strategies and methods considered by the businesses in Rosemount, MN.

Currently, there are almost 7,200 jobs in Rosemount. These jobs are within a broad range of industry types, with some of the most prominent industries being education, manufacturing, retail, transportation, and agriculture. Rosemount’s ten largest employers are:

- Rosemount School District
- Flint Hills Refinery
- Wayne Transports
- Dakota County Technical College
- Intermediate School District
- Cub Foods
- Spectro Alloys Corp
- Cannon Equipment
- Greif Brothers Corp
- Proto Labs

Nearly all of these businesses are currently working toward their own goals set by their established sustainability plans. Although these are larger facilities with larger profits to work with, many of their sustainable strategies are worth taking a look at and possibly attempting to scale them to fit other smaller local businesses.

Local School District

A few of the local school facilities have been Energy Star certified in recent years, such as Rosemount High School in 2010, Parkview Elementary in 2010, and Shannon Park Elementary in 2011, meaning that their energy efficiency surpassed the state requirements and met the Energy Star program standards.

Local Business Sustainability Plans



(Source: www.twincities.com)

Flint Hills Pine Bend Refinery

As second-largest employer, largest taxpayer, and largest GHG emitter in Rosemount, the Flint Hills Pine Bend Refinery is constantly working towards improving their efficiency and lowering their impact on the environment. They are currently averaging production of GHG emissions at 3.6 million tonnes per year since 2010. Since 1997, the refinery has been able to voluntarily reduce their GHG emissions by 71 percent, with reduction of 50 percent between 1999 and 2004. Their emissions per barrel are currently 42 percent lower than the large refinery industry averages in the nation, ranking them at 10th for lowest air emissions per barrel in the 50 largest US refineries. In 2005, the refinery received a Special Recognition Certificate for the Clean Air Awards program from the EPA. Pine Bend also received the MN Conservation Award from Xcel in 2006 for saving 8.7 million kilowatt-hours of electricity.

To continue improving their efficiency and reducing their GHG emissions, in 2013, Pine Bend announced over \$400 million in improvements to several processing units, including replacing three less-efficient heaters, upgrading the existing process heater, and making improvements to cooling towers. Through engaging the MN Center for Environmental Advocacy and the Environmental Integrity Project, they have also agreed to adopt a more energy-efficient design and operation plan for heaters among other recommendations. In 2014, the refinery announced plans to construct a combined heat and power system that would supply roughly 50 megawatts of electricity, or half the total power required to run the refinery. They also have a water conservation and treatment program to recycle and reuse treated water in 2006. The plant processes 3.5 million gallons of water each day, causing them to receive the title of an outstanding wastewater treatment operator by the Minnesota Pollution Control Agency in 2014.

Pine Bend has been involved with multiple local programs that are focused on sustainability, as well. They are the primary sponsor of the Environmental Initiative Clean Air Dialogue and a member of Clean Air Minnesota, both of which are programs focused on sharing sustainable strategies and new green technologies with other businesses and organizations. In 2005, the company became the founding sponsor of Project Green Fleet, an effort to install pollution control equipment in Minnesota school buses, heavy-duty trucks, and other diesel vehicles to keep Minnesota's air clean.

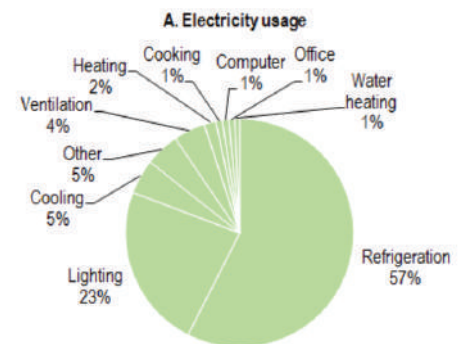


(Source: pinebendrefinery.com)

Local Business Sustainability Plans

Cub Foods

The SuperValu's Rosemount location is another local leader of sustainability. Although the last goal reported by the stores company-wide was to reduce GHG emissions by 10 percent by the end of 2012, they having been pushing to improve their stores' technologies and lower their impact on the environment. The Rosemount location was Energy Star certified in 2004 and 2008 focusing on key areas. Cub Foods is also working to reduce waste by partnering with local food shelves and farmers to use much of the distressed food previously put into the garbage, as well as implementing stricter recycling habits on cardboard and plastics. According to Xcel Energy, the bulk of grocery stores' electricity goes towards lighting and refrigeration, both of which have been made priorities for SuperValu. Rosemount's Cub Foods has been focusing on efficient lighting in refrigeration cases, replacing all of their fluorescents with LED bulbs, and utilizing low-wattage technology.



(Source: <http://xcelenergy.bizenergyadvisor.com/grocery-stores>)



SuperValu is also partnered with EPA GreenChill, a program that aims to reduce refrigerant emissions to decrease their impact on the ozone layer and climate change. They help with benchmarking, outreach, and provide assistance with strategies and goals. GreenChill promotes green technology for refrigeration to reduce emissions, phase out harmful refrigerants, and reduce the amount used to help eliminate leaks. Through this program, SuperValu received the Superior Goal Achievement Award in 2011, which means they reached GHG emission reduction goals every year since joining in 2008. They also earned the Distinguished Partner of the Year Award in 2010.

Spectro Alloys Corporation

Rosemount is home to the largest scrap aluminum recycling plant in the Midwest that employs 120 residents. Spectro Alloys Corp uses 95 percent less energy and emits roughly 3.7 tonnes less carbon dioxide for every metal ton produced than primary aluminum production every year. They also save 4.8 billion kilowatt-hours of electricity and nearly 300,000 tonnes of carbon dioxide emissions each year. For waste reduction, the recycling production saves 11.5 million square feet in landfill space every year.

To put their positive impact in perspective: their aluminum recycling production saves enough energy to power nearly 175,000 homes, more than the entire city of Minneapolis; their reduction of GHG emissions is equivalent to taking about 125,000 cars off the road; and their recycling operations save enough aluminum to fill a box the size of a football field over 200 feet high.

Local Business Sustainability Plans and Available Amenities

Greif Brothers Corporation

This is another large local business that specializes in converted paper product manufacturing and industrial packaging. Greif Brothers met their first goal in 2010 by reducing energy consumption by 10 percent in 3 years. By 2020, they plan to reduce energy consumption by 30 percent per unit of production and GHG emissions by 30 percent for company-wide operations. Greif is also working toward their goal of zero landfill waste by the end of 2020 through various recycling programs. In 2011, they were approved for the installation of solar panels (although there has been no report of finalizing this installation).



AMENITIES AVAILABLE TO BUSINESSES

MN Energy Smart

Local businesses have the option of using MN Energy Smart, a program that helps find ways to save energy and connect to financial incentives. They help find utility rebates for upgrades, such as to lighting, HVAC systems, machines, hot water, and building envelope improvements. The program is funded through state-approved utility conservation programs, so all services are at no cost. In May 2014, they worked with Xcel Energy to change rebate levels for LED lighting, which uses three to six times less energy than the average fixtures and provides a quick payback period with rebates. This increase in financial incentives helps to promote the energy efficient switch for business owners. The types of services offered by the program includes: utility bill analysis, consultation in-person or by phone, project funding assistance, community focus, and customized workshops.

Although multiple businesses throughout the metropolitan area have utilized this free program, there has been no report of Rosemount businesses connecting to MN Energy Smart.

Xcel Energy

- Nearly 96 percent of Rosemount businesses' electricity is supplied by Xcel Energy. By the end of 2012, about 17 percent of Xcel's power supply came from wind, solar, hydro, and biomass resources, providing alternative energy resources to customers. Customers have the option to have either 100 percent of their electricity come from wind power or to buy a set number of 100 kilowatt-hour blocks for their energy usage. These blocks average an additional \$0.48 each for commercial and industrial users and require a three year commitment.
- Xcel announced plans this year to launch a solar garden program, with a location in Rosemount, this upcoming January 2015. Customers can subscribe to these solar gardens for a portion of their energy needs, with a proposed set bill credit rate at six cents per kilowatt-hour for commercial customers.

Available Amenities

- Xcel also offers energy-saving programs for businesses, such as new construction energy design assistance, commercial efficiency, and energy studies. Currently, there have not been reports of major Rosemount businesses utilizing these programs.

Solar Prospects

The production of electricity from renewable energy technologies is growing much faster than the electric power supply as a whole. Solar power is among the fastest growing segments of the renewable energy market. Centralized solar power is produced on large farms and fed into an electrical grid—a network of wires and transformers that allows electricity produced by multiple sources to be transported to industrial, commercial and residential consumers. Grid-connected solar capacity increased an average of 60 percent annually from 2004 to 2009, faster than any other energy source. Solar electricity production grew 15.5 percent in 2009 alone. Today, however, solar power still accounts for less than one-half of one percent of the world's electric power output.

A study from MIT decided to examine a series of studies about how the United States and the world would meet future energy demand without increasing emissions of carbon dioxide (CO₂) or other greenhouse gases. The 2007 MIT study on the “Future of Coal” defines the levelized cost of electricity as;

“...the constant dollar electricity price that would be required over the life of the planet to cover all operating expenses, payment of the debt and accrued interest on initial project expenses, and the payment of acceptable return to investors”

Following the MIT study, Stefan Reichelstein at Stanford University did an analysis on the prospects for cost competitive solar PV power. He found that commercial-scale solar PV power is already economically objective with retail commercial rates. However findings depend on both current federal tax subsidies for solar power and geographic location for solar installation.

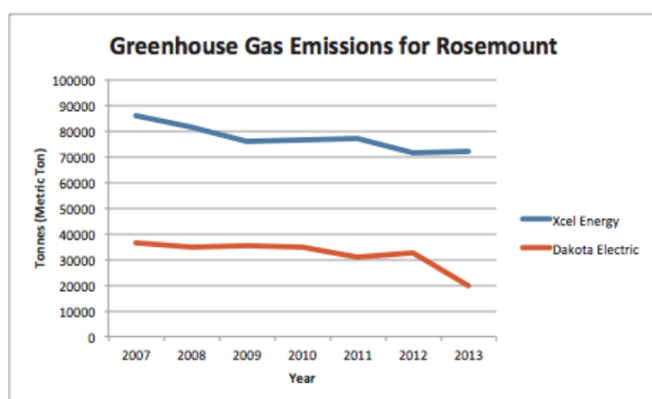
Dakota Electric

Accounting for the remaining energy supply for Rosemount, Dakota Electric also offers renewable energy options. As the first member-driven, voluntary wind program in Minnesota, the wind farm in Chandler, MN, provides wind power to Dakota with nine efficient turbines. Each 100 kilowatt-hour block can be purchased with an additional charge of 40 cents each. In 2010, the average Rosemount household used roughly 928 kilowatt-hours per month, totalling an additional charge of \$3.71. Dakota Electric offers incentives to businesses for buying a certain number of kilowatt-hour blocks per month, such as window decals, a news release, and a plaque to proudly display in their offices.

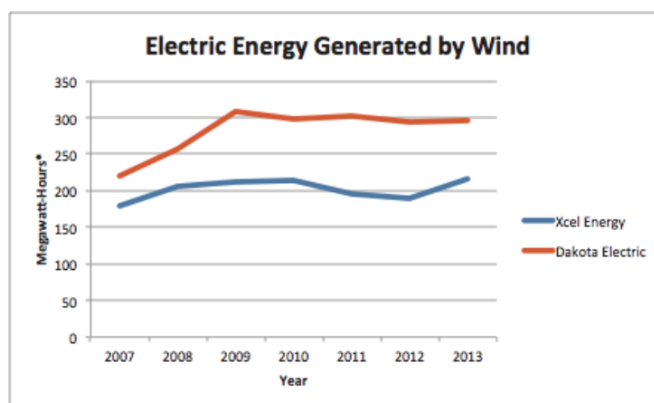
Available Amenities

Dakota Electric is also involved in a joint project with their wholesale supplier, Great River Energy, resulting in a recent installation of a 20 kilowatt solar array in Farmington, MN. They expect more than 600 kilowatts of solar installations to be in use by fall of 2015. Subscribing to this energy source provides businesses with rebates for solar energy projects of up to \$2,000 per kilowatt with a maximum of \$10,000.

With all of these renewable energy options, there is a positive feedback loop. The more energy usage customers switch to renewable resources, the more wind farms and solar gardens will be constructed.



(Source: regionalindicatorismn.uli.org/emissions-chart)



*1 MWh=1000 kWh

(Source: regionalindicatorismn.uli.org/emissions-chart)

Moving Forward

While many of the largest Rosemount businesses are reducing their GHG emissions through upscale and costly improvements, there are still many opportunities for smaller businesses to make sustainable decisions. Informing the community of the abundance of options, such as MN Energy Smart and renewable energy resources, would be extremely beneficial to the city as a whole. It is also important for the city to account for and report the emissions from these local businesses to understand the GHG emission of the whole city. According to ICLEI: Local Governments for Sustainability USA, it is important to include a wide set of activities of community interest, including operations that the government has no influence on, in order to comprehend the story as a whole. The U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions is a tool that communities can use that provides methodologies and best practices for measuring and eventually reducing GHG emissions.

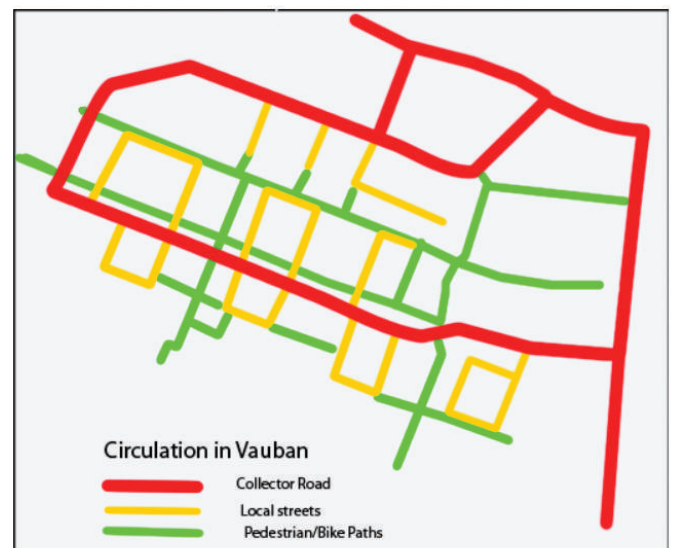
Model Communities: Transportation

Vauban, Germany (Pop. 5,000, newly developed suburb): A Suburb Without Cars

Vauban was built in the 1990s as a community intent on maintain a low ecological footprint and especially its notoriously difficult to reduce transportation footprint. While the city has streets and allows cars, few residents choose to own vehicles other than bicycles, and only 30% of households own a car. Due to the community's "smart planning", pedestrian and bike paths form an efficient transportation network, connecting all residences with one of the nearby tram stops, which goes to the nearby city of Freiburg. The city established a car sharing program for residents who may need to use a car only on occasion. The only places to park cars lie in large garages on the outskirts of the town. Some notable policies implemented in Vauban include a discount on public transportation given to members of the ride-sharing program, a speed limit of 30 km/hr on main roads and 5 km/hr on residential roads (about 18 and 3 mph, respectively), and prohibition of constructing parking space on private property. The town's near elimination of cars is significant as road transport accounts for 15% of Europe's carbon emissions and more of the US's.



(Source: www.solarpedia.com)



(Source: [VaubanTrafficNetwork-Schematic.png](#))

Model Communities: Transportation

Sioux Falls, SD (Pop. 165,000, Medium-sized city)

The city of Sioux Falls, SD is providing an efficient, multi-modal and cost-effective transportation system that offers increasingly clean methods for all users, through their Sustainability Master Plan. The plan has four main goals for transportation reduction; reduce fuel consumption by the city's heavy duty diesel vehicles by 10% by 2015 and light duty vehicles by 20% by 2015, reduce the amount of vehicle miles traveled by 10% per person by 2015, decrease GHG emissions from city transportation operations (municipal waste fleet, school bus fleet, police, etc.) by 15% by 2015, and use walkscore and bikescore to help identify areas of the city that most needs bicycle and pedestrian infrastructure improvements. The city plans on reaching these goals through several tactics:

- Implement city-wide fleet efficient vehicle purchase and diesel retrofit program to reduce emissions
- Implement city-wide fleet vehicle anti-idling policy and tire pressure monitoring program to reduce fuel consumption
- Implement the City's Bicycle Plan that includes more bike lanes, sharrows, trails, and bike parking and storage
- Provide incentives to promote use of alternative transportation
- Provide preferred parking for carpool and hybrid vehicles where feasible
- Implement the Transit Route Analysis Plan that recommends more effective transit accessibility and future transit routes to foster increased transit ridership



(source:<http://www.takingthekids.com/wp-content/uploads/2012/08/Falls-Park-in-Sioux-Falls-SD.jpg>)



(source:<http://www.siouxfalls.org>)

Transportation Replicable Strategies

- Reducing transportation emissions with active forethought
- Through use of car sharing and extensive bike and walking paths, need for cars can be minimized

Model Communities: Renewable Energy

Goldsboro, NC (Pop. 36,000, Small city)

The AM Best solar farm in Goldsboro, NC generates 9,975 mWh of electricity per year, offsetting 5,327 tons of CO₂ emissions. The local college and area middle and high schools have capitalized on the solar farm technologies through a 4 day educational camp for both middle schoolers and high schoolers. This camp, Camp Kilowatt, focuses on areas such as electronics, robotics, and rapid prototyping/additive manufacturing, as well as alternative energy. Camp Kilowatt allows students to learn about their community's local involvement in solar farm technology and looking into other alternative energy sources. The students are tasked with various activities such as building actual engines that are fueled by hot water, making water purifiers, building solar cable cars, and making recycled paper. This kind of community engagement hosted at the Goldsboro local community college is applicable to Rosemount through the Dakota County Technical College.



(source:http://www.waynecc.edu/wp-content/uploads/camp-kill-a-watt_20.jpg)



(source:<http://www.waynecc.edu/wp-content/uploads/CampKilowatt2014-DukeEnergyDonat-web.jpg>)

Rockport, MO (Pop. 1300, Small town) - 100% Wind Powered Community

Although small in size, the town of Rockport, MO population 1,300 has become the first 100 percent wind powered community in the United States. Resident Eric Chamberlain began recording wind data and made a case to wind developers. Eventually, investors saw the potential and built four turbines within city limits. Similar to Rosemount's agricultural landscape, Rockport uses its undeveloped land for farming wind energy. Through four wind powered turbines the city sustains itself with all renewable energy. The city of Rockport needs about 13 million kilowatt hours of electricity a year and is currently producing around 16 million kilowatt hours of electricity yearly. The excess wind energy is sold to the local utility for use in surrounding areas. Although some days Rockport sees little wind and buys off the grid, most days the towns turbines exceeds the amount of energy needed.



Photo Credit: Steve Morse

Rockport's four wind turbines supply nearly all of their electricity

Model Communities: Renewable Energy

Renewable Energy Replicable Strategies

- Making use of a summer camp as a promotional/educational tool to spread knowledge of sustainability to the younger generations
- Recording wind data to make case to potential investors

Summary of Renewable Energy Technologies, Costs, and Capacity

Technology	First Cost	Demonstration Scale Capacity	System Cost
Solar Thermal	\$150 per Square Foot of Collector Area	32 – 700 Square Feet	\$5,000 - \$105,000
Solar PV	\$5,430/kW to	10 kW	\$54,000
Wind	\$6,800/kW	10 kW	\$68,000
Fuel Cells	\$5,500/kW to \$8,000/kW	100 - 400 kW	\$750,000 - \$2,700,000
	\$10,000/kW	5 kW	\$50,000
Geothermal	\$9,000 – 10,000 per ton	3.1 – 40 tons	\$28,000 - \$400,000

Model Communities: Energy and Water Efficiency in Buildings

San Anselmo, CA (Pop. 12,605, suburb of San Francisco)

Energy Efficiency in Buildings

San Anselmo is focusing on reducing electricity and natural gas usage to help lower their overall greenhouse gas emissions. The city found that the most cost-effective strategies to begin lowering their emissions involve providing upgrades for home remodeling, such as increasing insulation and sealing heating ducts, and utilizing green construction strategies, such as new techniques and building materials. They have found that minimum upgrades can demonstrate energy savings of up to 20 percent. San Anselmo requires new residential buildings over 500 square feet, residential additions, commercial, and government buildings to meet specific green building standards as part of a plan adopted in 2010. They then purchase 100 percent renewable energy for the remaining electricity demand.

Their specific strategies implemented include: a town-wide green building promotional campaign; providing incentives to projects that exceed adopted green building standards; adopting an ordinance that informs property owners of recommended energy upgrades; assisting residents in funding and encouraging energy efficient upgrades and renewable energy systems; and replacing street, parking, and traffic lights with LED bulbs. This all amounted to a 13 percent decrease in community-wide GHG emissions and 29 percent in government emissions since 2005 levels.

Water Efficiency

Water conservation has become an increasingly prominent focus in California due to population expansion and rising temperatures. San Anselmo's water district has recently begun requiring that every new building reduce indoor and outdoor water use by 20 percent and to adopt water-efficient landscaping for yards of a certain size and greater. In 2007, their water district adopted a water conservation plan to reduce water usage by 9 percent by 2020 since 2005. By the end of 2010, overall water consumption has decreased 8.7 percent below 2005 levels. They have found that the most effective way to decrease GHG emissions through water use is by decreasing hot water use, which accounts for an estimated 35 percent of energy use in homes.

The city has found effective methods for reducing water consumption, beginning with maintaining or upgrading existing pipes, plumbing fixtures, and irrigation systems in all town buildings, including landscaping, public parks, and other recreational facilities. Other strategies they have implemented include: landscaping with native plants; considering solar hot water and water heater upgrade incentives; conducting water audits; encouraging installation of water conservation measures in current homes and buildings; allowing the use of greywater for irrigation; and providing education about water conservation and available programs.

Model Communities: Energy and Water Efficiency in Buildings

Milan, MN (Pop. 369, Small rural village) and the Sustainable Energy Utility (SEU)

As in many rural communities, Milan, MN had mostly older, less efficient buildings as well as high winter heating bills. Residents were either unaware of financial resources to improve efficiency or could not afford the high upfront costs. In 2009, the Greater Milan Initiative committed to the Sustainable Energy Utility, an independent, self sufficient entity which promotes long term energy sustainability by focusing on reducing energy usages and utilizing on-site energy production methods. By adopting this model, Milan became the first rural community in the country to do so. For residents and businesses, the SEU acts as a point of contact to identify cost saving measures. For community leaders, the SEU sets targets in line with long term community social and economic goals. In order to overcome the high upfront costs, the SEU creates a long-term revolving loan fund, accessible to communities. The utility achieves long term sustainability by lending money to community participants to make energy efficiency and on-site energy production improvements and residents repay the utility as a percentage of their savings from implementing the improvement. Milan utilizes the B3 Benchmarking tool to assess their progress, which has all three community buildings to achieve 4 star out of 5 or greater on the Benchmarking website.



(source: <http://www.milanmn.com>)

Energy/Water Efficiency in Buildings Replicable Strategies

- San Anselmo promotes green construction for new buildings through green technologies and materials in a promotional campaign.
- San Anselmo also provides incentives for solar hot water and water heater upgrades, which accounts for 35 percent of electricity usage in homes.
- The SEU is an independent, self sufficient entity which finances small scale community energy improvements and is paid back through the savings.
- Milan found the B3 Benchmarking tool to be highly useful in reducing the impact of their buildings

Model Communities: Waste Reduction

Boulder, CO (Pop. 100,000, Medium-sized city)

Boulder, CO is currently implementing a Master Plan for Waste Reduction (MPWR) which contains goals, guidance, and policy objectives for waste reduction and recycling programs. A group of 12 investigators over a 6 month period evaluated Boulder on potential waste reduction programs. The investigators provided suggestions and the city of Boulder implemented them into their MPWR. The MPWR focuses on smart material usage and waste minimization strategies. The City Council in 2000, installed a 50 percent waste reduction goal for the year 2005. Boulder's success is shown through statistics of the 5 year plan by reducing single-family residential waste; mostly materials collected through curbside recycling, Spring Clean-up, and the Yard Waste Drop-off Center by 48 percent in 5 years. The city of Boulder also reduced commercial and industrial waste achieved through private collection contracts throughout the Denver area by 25 percent.

Waste Reduction Replicable Strategies

Current Plan

- Single stream recycling
- Residential yard and food waste collection
- Commercial food waste collection
- Ban on electronic scrap
- More aggressive “pay-as-you-throw”

Action Plan

- Minimum recycling for multi-family units
- Increase or rebate business Trash Tax
- Fine for electronic disposal
- Commercial recycling goal
- Vision Plan
- Mandatory source separation ordinance
- Local “take-back” laws

Model Communities: Community Engagement

Northfield, MN and the Energy Task Force (Pop. 21,000, Medium-sized suburb)

In order to combat rising energy costs, economic uncertainty, and climate change, community organizers in Northfield, MN established the Energy Task Force, a volunteer committee whose goal was to find ways to make Northfield more energy independent. The first order of business for the Task Force was a community meeting of nearly 250 residents to brainstorm ideas, which was advertised through the community's newsletter and through word of mouth. The group then split into six subcommittees to focus on different aspects of energy independence, including the Minnesota Energy Challenge, an initiative to provide information and friendly competition to teams seeking to reduce their energy use. Teams can be businesses, schools, congregations, or even entire cities. The subcommittees' research on topics including biomass energy systems, carbon taxes, combined heat and power, and wind turbines was compiled into an energy sustainability action plan. After a year when the Task Force was set to expire, volunteers recommended formation of an Energy Board, reporting directly to the city council. Because the Task Force was volunteer based, funding was not an issue, however, the city did have trouble finding funding to hire a full time Sustainability Coordinator to oversee implementation of some of the city's energy goals. The research done by the Energy Task Force led Northfield to set the aggressive goal of being "Carbon free by '33", with a 50% reduction by 2028". The International Council for Local Environmental Initiatives (ICLEI) created a list of recommendations to create a task force for communities looking to capitalize on Northfield's success in community engagement. They advise prospective communities to:

- Establish a Task Force start and end date and meeting frequency.
- Ask a variety of stakeholders to participate.
- Engage local experts - they are a wealth of knowledge and are vested members of the community.
- Assign tasks to volunteers with clear due dates to make the most of the members' time.
- Host a kick-off meeting to get residents involved and excited.
- Provide a way for residents to share their ideas and a means to contact them should the Task Force want to follow-up (e.g., provide their phone numbers along with their ideas).
- During the research and outreach process continually inform residents and the decisionmaking body of the Task Force's progress.
- Utilize existing forms of communication like the Task Force did through a monthly article in The Commons."

Model Communities: Community Engagement

Evanston, IL (Pop. 75,000, Large suburb)

Evanston is larger than Rosemount, but the ideas in their Evanston's Climate Action Plan (ECAP) to engage the community in sustainability can be replicated at a smaller scale. A lot of their tactics include creating different committees of representatives relating to commercial, residential, and industrial districts. In their climate action plan they outline these specific areas beginning with how to empower the community to take action on climate change. They created a community based committee of representatives from City Members, ECAP co-chairs, and city council. Encouragement of large groups to convene and discuss how to implement strategies that are outlined in the final climate action plan will be an early step in making the public aware of Evanston's movement towards a more sustainable city.

This model community also uses its employers to increase the support of sustainable actions. The city will support efforts to get group gatherings of representatives from each employer, which will discuss sustainability and be on board with the city's actions. Also, public events will be a key element in communicating ways to be sustainable to the community. Public festivals, markets, and celebrations will promote and model "green practices." This supports community based efforts to spread this information and resources on how individuals can be sustainable. Evanston has created an annual event orientated specifically around sustainable practices that community members can go to to be educated on what they can do to be more sustainable at home and in their community. Other ways to disseminate information about sustainability and ECAP are used as advocacy as well, like available workshops that residents and workers can attend, employee training, and public lectures.

Forest Lake, MN (Pop. 19,000, Medium-sized town)

Forest Lake's size and population are very close to Rosemount's, and has a Sustainability Action Plan to help implement sustainable practices throughout the community. Their community engagement portion covers a lot of actions and strategies that Rosemount could adapt to. Like Evanston, an important place to start for Forest Lake is by establishing a committee composed of residents, board members and city staff that is tasked with implementation of their Sustainability Action Plan. They created a position within their government structure that is responsible for monitoring and coordinating what is done to implement the action plan. Another strategy that is discussed is by including sustainability updates in the city newsletter, which will highlight significant things that are being done by the city, residents, and businesses. It will also include sustainability tips for the public. This information will also be available to the community members on the website. The city website is something that Forest Lake uses as a major sustainability advocacy tool. it includes the Sustainability Action Plan's objectives/goals/strategies, links to outside resources for finding information, links for connecting community stakeholders to resources about sustainable possibilities, and allows the website to be a pool for all of the information regarding sustainability within the city that is available to the public.

Model Communities: Community Engagement

Community engagement is heightened through the use of educational facilities, where schools can develop student volunteer and/or academic project opportunities that focus on sustainability in their community. The city can connect the internal sustainability plans with outside facilities by sending representatives to different organizations to help increase awareness through speeches or events. Using bi-annual sustainable events is a strategy that targets large gatherings of the population, and can be annotated on a city calendar that highlights specific things focused on sustainability. Another event that will be supported is “Bike to Work Day,” something can have a ripple effect by making employers want to have more bike accessible facilities. A way that Forest Lake will make their program unique is by holding a competition for designing a sustainability logo and slogan that will be used in identifying their particular program.

Community Engagement Replicable Strategies

- Establish a community based committee tasked with implementing sustainable strategies
- Include residents, board members, city council members, a variety of stakeholders
- Follow The International Council for Local Environmental Initiatives’ (ICLEI’s) list for creating a community task force for more in depth details (http://www.icleiusa.org/action-center/learn-from-others/small-communities-toolkit/CaseStudy_Northfield-MN.pdf)
- Create a government position (Sustainability Coordinator) to monitor and coordinating how the sustainability committee will implement outlined strategies
- Organize representatives from major businesses and employers to convene at meetings discussing actions that they can take towards being more sustainable.
- Use public events to promote sustainable practices
- Introduce an annual or bi-annual green event that focuses on sustainability within a community
- Use city newspaper as an advocacy tool
- Follow the development of sustainable features within the city
- Sustainability tips
- Sustainability resources
- Use city website as an advocacy tool
- Post updates on sustainability
- Provide link to a community calendar highlighting community events with sustainable practices
- Provide link to resources providing information on how individuals can be more sustainable
- Varying ways to educate community members about sustainability
- School programs incorporating student led volunteering
- Public lectures during events or as its own separate event marked on the community calendar
- Provide workshops to individuals who want to learn to be more sustainable, marked on the community calendar
- Employer and businesses support sustainability strategies
- Training new employees about how they can function sustainably in the work place
- Commercial and industrial districts use green technology
- Enroll in Minnesota Energy Challenge, an initiative that uses friendly competition as a tool for encouraging communities to be more sustainable in order to reach energy reduction goals.

Model Communities: Land Use

White Bear Lake (Pop. 24,000, Medium-sized town)

The comprehensive plan for the city of White Bear Lake has a separate land use plan which lists and describes each planning district. It lists potential issues for each as well as recommendations on how to remedy these. The plan ends with key land use objectives and ways to implement these goals. Some of their top goals include: reduced dependence on fossil fuels, protection and expansion of opportunities for solar energy, and reducing activities that encroach on nature. Some of their more relevant implementation strategies include: encouraging compact development to reduce the need to drive, guiding development growth away from existing natural resources, and considering variances to zoning standards to encourage solar energy. Their sustainability minded planning led Green-Step Cities to award them two stars for their comprehensive plan.

Land Use Replicable Strategies

- White Bear Lake's land use plan specifically stakes out its top goals as reducing dependence on fossil fuels and encouraging solar energy

Conclusion

Electricity is the largest contributor to GHG emissions in the city, and if reduced would have the largest impact on GHG emissions. It is important that the government act as a role model for the community and with green development and operation, leading the way in sustainability. It is also important that the local government encompasses the entire community to begin to reduce their impact on the environment, including all sectors in their GHG emissions inventory. Community engagement is arguably the most important part of sustainability, when the community becomes involved sustainability can become integrated into everyday life. It is important to note that community engagement is heightened through education and communication.

Rosemount is in a unique situation to reimagine itself as a model low GHG emitting suburb as it has the opportunity to plan out its growth in the coming decades. Rosemount also has the additional benefit of learning from the successes and failures of UMore Park, a planned sustainable community inside the city limits. First and most importantly, Rosemount should take its knowledge gained from the Resilient Communities Project and other sources to design and implement a Climate Action Plan with goals and strategies. Secondly, Rosemount should create a community-based committee comprised of residents, board members, city council members, and key stakeholders. They should be responsible for implementing the strategies that are outlined in Rosemount's Climate Action Plan.

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