

Dakota County Energy Efficiency and Greenhouse Gas Emissions Reduction Report

*Energy Committee Findings and Recommendations for
Government Operations and Community Initiatives*

September, 2009





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Executive Summary

Process Description

In 2008 and 2009, Dakota County Commissioners included planning and action on energy use among their annual goals. In 2009, the goal states: “Achieve a reduction in greenhouse gas emissions and support transition to alternative/renewable energy by adopting and implementing a County energy plan and related sustainability strategies.” The 2009 goal represents a refinement to the 2008 goal, based on the work of an internal energy committee, which has helped to inform its goal-setting process.

Dakota County initiatives that either directly or indirectly impact energy use have been underway for some time for government operations, and to a lesser degree, with partners in the broader community. However, the energy committee process during 2008-09 and this resulting report are the most thorough effort to date to define, research, and evaluate goals and specific strategies related to energy use and greenhouse gas emissions.

Major Findings

The major findings of the energy committee, as a result of its work, are that:

- A common purpose is necessary to coordinate activities and to make collective progress on energy priorities. A framework for this purpose includes a vision, goals, and specific principles to guide future decision-making on energy issues.
- Baseline and ongoing data collection is important for defining and quantifying energy use and emissions, as well as for measuring changes due to policy and practice. In 2009, Dakota County staff completed a baseline greenhouse gas emissions inventory for government operations and will next complete a comparable external inventory for county-wide emissions.
- Setting specific targets to reduce greenhouse gas emissions focuses effort and supports measurement when selecting energy strategies the County plans to implement. Targets currently used in Minnesota include a 15% reduction in emissions by the year 2015, 30% reduction by 2025 and 80% reduction by 2050. The five-year (2010-2015) target is achievable using fewer than ten of the 75 strategies researched as part of this process.
- Strategies selected to meet the 2015 target also provide modest cost savings to Dakota County, estimated at \$40,000 annually.
- Dakota County government operations represent a minor part of total energy use and greenhouse gas emissions in the county. To demonstrate leadership and make tangible progress, partnering with others on external strategies is important to consider next. Strategy research yielded important information about the costs to Dakota County to engage in broader community efforts, as well as the potential for greater impact on greenhouse gas emissions through collective action.

Dakota County can reduce emissions from government operations 15% by 2015 and save an estimated \$40,000 annually.

Recommendations

Short-Term Actions

As a result of these findings, recommended action by the Board of Commissioners and senior administration is described below.

Adopt written energy principles as future decision framework: The statement of energy principles, organized into five broad energy initiatives, demonstrate County commitment and should serve as the framework through which departments and programs can develop more specific policies and practices. The statement of principles is as follows:

Dakota County will reduce energy consumed and greenhouse gas equivalents emitted, use renewable resources, and sequester carbon. To do so will require ongoing commitment and leadership as demonstrated by implementation of the following principles:

- 1. Reduce energy use and greenhouse gas emissions from buildings through design, construction, operations, and user habits.*
- 2. Reduce energy use and greenhouse gas emissions in transportation through transportation fuel alternatives, fleet related business practices, and transportation system design and use.*
- 3. Manage waste, land, and water to conserve energy and sequester carbon.*
- 4. Increase renewable energy use to reduce greenhouse gas emissions and reliance on fossil fuels.*
- 5. Inform, advocate, and anticipate the future with others to collectively conserve energy, transition to renewable resources, and sequester carbon.*

Adopt a 15% reduction target for government operations greenhouse gas emissions by 2015: Dakota County is the first county in the state to complete a government operations greenhouse gas emissions baseline inventory. The next step is to establish a reduction target for emissions associated with government operations. To be consistent with state actions, Dakota County will reduce greenhouse gas emissions from government operations 15 percent below 2005 levels by 2015. This plan does not recommend adopting longer-term goals at this time. Between now and 2015, national and state legislation on climate change and greenhouse gas emissions will likely be finalized, and the County can assess the potential impact.

Authorize staff to begin implementation: To meet the stated 2015 target, eight strategies are proposed in this report, each chosen based on standardized evaluation criteria. As it becomes necessary or desirable to seek alternatives to these eight strategies, data and rankings for all seventy-five strategies researched are provided with this report. Staff should then be authorized to begin implementation of specific strategies, returning to the Board with greater specificity on cost-benefit analysis, before and during implementation as necessary.

Monitor progress and report back regularly: Staff should continually monitor and report on County government operations emissions and strategy implementation, ensuring that we are meeting defined targets, that strategies implemented are effective, and that new strategies are effectively evaluated before, during, and after implementation. The greenhouse gas inventory for governmental operations should be updated every five years. The next update would ideally occur in 2011 or 2012 to provide a 2010 benchmark.

Begin an external/community strategy review process: Strategies considered “external” have impact beyond government operations, where benefit might accrue to the public or to partners. An exploration of whether and how the County could implement some of these strategies requires discussion and analysis with potential partners, as well as the public. Based on these discussions, as well as the county-wide baseline greenhouse gas inventory to be completed in the near future, recommendations on whether, when, and how to implement strategies beyond government operations will be developed.

Support a staffing infrastructure to sustain work: Staffing is needed to sustaining many components of the work yet to be done, including implementing the government operations strategies, the external review process, and continued benchmarking and coordination. Although a new position does not have to be created to fill this need, both dedicated staff time and a focused coordination of effort across County departments are essential.

Ongoing or Future Activities

The following activities are recommended for the future, with more specificity developed by staff for the Board of Commissioners, once the first phase of implementation is approved and underway.

Develop future targets: With the approval of a reduction target and strategies for 2010-2015, it will be important to also consider whether and when to set future targets and revisit the many strategies/practices available to meet those targets. Although many identified practices will continue to be relevant in the future, certainly new ideas and technologies will also unfold over time.

Identify and address future opportunities and obligations: Energy information is changing constantly, as are the opportunities (such as funding) and potential obligations (such as mandates), that surround it. An important component is being able to respond efficiently and effectively to both opportunities and obligations through a staffing infrastructure that is sufficient and flexible enough to respond.

I. Background Information

Purpose and Charge

On December 18, 2007, the Dakota County Board adopted its 2008 Board Goals (Resolution No. 07-625). One of the goals was to develop and adopt a County energy policy. The impetus for this goal came from the County's initial participation in the High Performance Partnership Greening Initiative, a partnership with cities, as well as issues identified in the Dakota County 2030 Comprehensive Plan and other local efforts. The volatility of energy pricing and escalating costs to the County, as well as larger contextual issues such as rising energy demands and State greenhouse gas legislation in the Next Generation Energy Act, were also factors in the timing of this goal.

This Board goal launched the formation of an internal energy committee, comprised of Dakota County staff. Because of the cross-cutting nature of energy issues, expertise from the Physical Development (PD) and Operations, Management, and Budget (OMB) Divisions was engaged in the process. A Steering Committee that included the PD and OMB Division Directors was initially formed and a committee of approximately 25 staff was subsequently formed in February 2008. This committee was charged to identify major topics for evaluation and potential inclusion in the policy, including suggestions for both government operations (internal) and the broader county community (external).

This committee organized into three sub-committees: Buildings and Operations, Natural Resources, and Transportation. (Subcommittee members can be found in Appendix A.) Their primary charge was to identify and research specific strategy options to be considered within the context of an energy framework. While each subcommittee was focused topically, they used common principles and research questions.

For its 2009 Board goals, Dakota County Commissioners further refined the 2008 goal to state: *"Achieve a reduction in greenhouse gas emissions and support transition to alternative/renewable energy by adopting and implementing a County energy plan and related sustainability strategies."* The refinement occurred because energy work helped to form a more specific goal.

In the first half of 2009, the subcommittees completed their research on strategies. They proposed evaluation criteria for the strategies and scored the leadership potential for each, developed a statement of principles, and reviewed proposed targets and other recommendations included in the remainder of this report. The subcommittees concluded their formal role in June 2009.

The purpose of this document is to report the findings and recommendations from the Energy Committee, specifically:

- A set of principles designed to be used by Dakota County policy makers and staff in future decision-making on energy issues;
- A recommended target for reducing greenhouse gas emissions in government operations, to be met using strategies that were researched and evaluated; and
- A range of options for implementing energy principles and strategies in the broader community, in partnership with others in Dakota County.

Summary of Past and Current Efforts

Local Initiatives

Prior to initiating its comprehensive energy planning effort, the Dakota County Board of Commissioners passed a number of relevant resolutions and the County had also undertaken a number of energy reduction and conservation initiatives. Some of these initiatives have been specific to government operations, while others have been partnerships with the broader community and public and private entities. Major categories of initiatives are listed below, but a more detailed description of each can also be found in Appendix B. A summary of relevant Board resolutions is in Appendix C.

Initiatives primarily to save energy/costs	Initiatives with ancillary energy benefit
High Performing Buildings	Electronic Applications for Government Business (E-Government)
Efficient Building Operations	Public Transportation
Lighting Retrofit and Replacement	Infrastructure and Promotion of Non-motorized Transportation
Energy Assistance to Lower Income Residents	Countywide Recycling
County Fleet Management	Natural Area Preservation / Enhancement
Renewable Energy Generation	Park System Plan Collaboration with Others

In addition to specific initiatives undertaken locally to date, Dakota County has also been a member of the Metropolitan Energy Policy Coalition (MEPC) since 1999 (formerly the Metropolitan Energy Task Force). The MEPC is a forum of Twin Cities metropolitan counties assembled to address issues related to energy policy and industry restructuring by identifying key interests and issues to County government. The MEPC has engaged in energy policy matters at the Minnesota Legislature and Public Utilities Commission.

In the Midwest region and nationally, membership in ICLEI, Local Governments for Sustainability, is important to understanding the broader context of energy issues, as well as sharing of information, effective strategies, and collective action. Through services offered as an ICLEI member, Dakota County was the first county in Minnesota to complete and document a government operations greenhouse gas inventory, which is described in the profile section of this report.

Resident Input

In addition to these areas of work, Dakota County has also surveyed residents on the topic of energy and identified support for a county government role. For example, as part of developing the DC2030 Comprehensive Plan, 400 randomly-sampled residents were surveyed in early 2008. Questions answered on a scale of 1-10 with 1 being not at all supportive and 10 being extremely supportive, found that respondent scores averaged 7.6 in response to the question “how supportive are you of the County taking a leadership role to address climate change and promote environmentally friendly practices?” Similarly, in the 2008 residential survey of 700 randomly-sampled residents, 9 out of 10 said it was at least “somewhat important” and 1/3 said it was “essential” for local government to “help people living in DC find ways to conserve energy and reduce reliance on sources that generate GHG.”

Dakota County Government Operations Greenhouse Gas Baseline Inventory

The following material is summarized from the Dakota County Greenhouse Gas (GHG) Baseline Inventory, completed in 2009, to provide context for the remainder of the report.

Nationally and regionally, an increasing number of state and local governments are measuring, reporting and developing action plans for reducing greenhouse gas (GHG) emissions associated with government and community activities. Measuring and planning for reducing GHG emissions is often done as part of a package of broader strategies for increasing energy conservation and reducing demand for fossil fuels. Legislation, regulations, and incentive programs based on reducing GHG emissions are continuing to evolve. As a result, governments that are implementing processes for calculating and reporting emissions are demonstrating leadership and building solid emissions data for future use. By undertaking a GHG inventory, Dakota County is better positioned to respond to future legislation or regulations, as well as to be eligible for new funding and grant opportunities. Additionally, greenhouse gas emissions data is helping inform the strategies identified later in this report.

Specifications from the Baseline Inventory:

Location: Dakota County, Minnesota

Size: 587 square miles

Population: 391,613 (Met Council 2006 estimate)

Employees: 1,807 (2005 estimate)

Climate zone: 6A Cold-Humid (US Department of Energy climate zone)

As directed by the Dakota County Board of Commissioners in 2008, the GHG inventory calculated the emissions associated with Dakota County government operations for the year 2005. This baseline year was chosen as the County's starting point for measurement because of data availability, and its correlation to state-level reporting frameworks. The report offered an initial snapshot of the County's overall emissions, although there were limitations due to the methodology used and amount of

available data. The GHG emissions were calculated and reported as a single weighted unit of carbon dioxide equivalents, or CO₂.

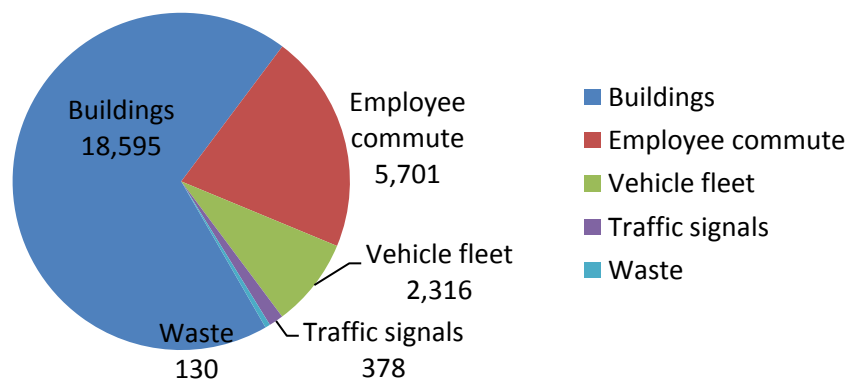
The County's baseline GHG emissions were estimated using the Clean Air and Climate Protection (CACP) software. The software includes analysis for GHG emissions associated with County properties and operations. The sectors included in the standardized analysis provided by ICLEI include buildings, employee commute (to and from home to primary office), traffic signals, vehicle fleet and waste management. Measuring the GHG emissions in government operations allows staff to compare typically unconnected practices and policies through a common unit of measurement. This then allows policy decisions to be based not only on traditional cost/benefit parameters, but also factors in a common energy savings criterion.

The key findings from the baseline inventory were that in 2005, Dakota County government operations emitted *27,120 metric tons of CO₂*. More than *two thirds of these emissions* are attributed to *building energy use* via electricity and natural gas consumption. County *transportation activities*, including fleet travel and employee commute, are the second most significant sources of GHG emissions associated with our internal operations, representing approximately one third of the total. See Table 1.

Table 1: Dakota County Government Operations Greenhouse Gas Emissions, 2005

	CO ₂ (metric tons)	CO ₂ (%)
Buildings	18,595	68.6%
Employee commute	5,701	21.0%
Vehicle fleet	2,316	8.5%
Traffic signals	378	1.4%
Waste	130	0.5%
TOTAL	27,120	100%

Figure 1: Dakota County Government Operations Greenhouse Gas Emissions by Sector in Tons, 2005

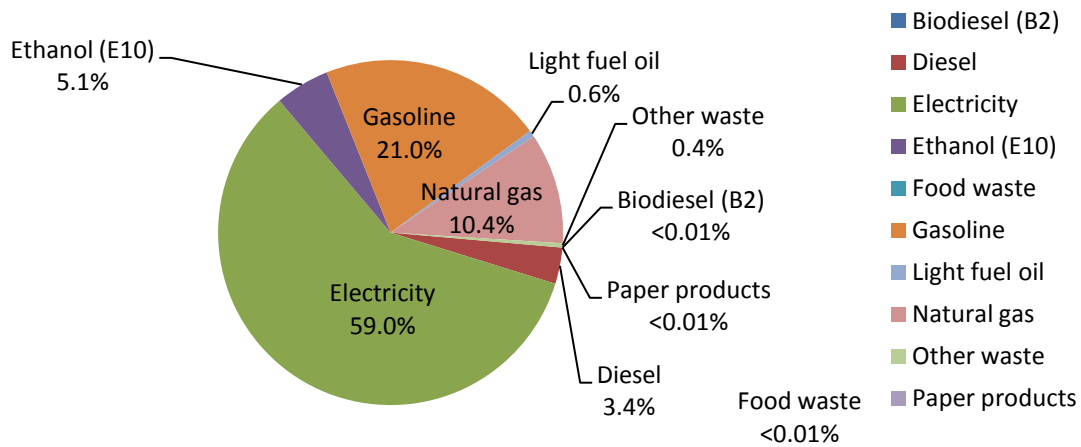


Comparison to Dakota County in terms of total emissions is difficult to find, as not many public sector agencies have yet completed such an inventory. The purpose of the GHG baseline inventory is to provide a point of measure for future energy efficiency and greenhouse gas emission reductions. In addition to emissions being calculated by sector, an analysis was also done by the source of the emissions. Findings can be seen in Table 2 and Figure 2 below.

Table 2: Dakota County Government Operations Greenhouse Gas Emissions by Source, 2005

Source	CO ₂ (metric tons)	CO ₂ (percent)
Electricity	15,991	59.0%
Gasoline	5,701	21.0%
Natural gas	2,810	10.4%
Ethanol (E10)	1,388	5.1%
Diesel	924	3.4%
Light fuel oil	172	0.6%
Other waste	120	0.4%
Paper products	8	<0.1%
Biodiesel (B2)	4	<0.1%
Food waste	2	<0.1%
TOTAL	27,120	100%

Figure 2: Dakota County Government Operations Greenhouse Gas Emissions by Source, 2005



Greenhouse Gas Inventory Next Steps

In order to understand the scale and effectiveness of strategies that may be implemented outside of government operations, staff will be completing an inventory of greenhouse gas emissions, similar to that already completed for government operations, for the county as a whole. This work could present significant opportunities to partner with member cities, as well as opportunities to leverage additional funds that may become available to jurisdictions with a completed inventory.

The county-wide inventory will be completed using the same ICLEI process and software that was used for the government inventory. In addition, a follow-up to the baseline inventory for government operations is planned in five-year increments.

II. Energy Framework Development

Vision, Goals, & Objective Themes

As a result of the work of the energy committee, the following vision, goals, and objective theme areas are the framework for recommendations in this report and future energy work at Dakota County.

Vision

Energy use in Dakota County is sustainable. Energy sustainability: meets current needs without compromising the ability of future generations to meet their own needs; is a continuous effort that integrates environmental, social, and economic goals; and requires public leadership and collective action by government agencies, private and non-profit sectors.

Goals

Reduce (use less energy and maximize its efficiency)

Renew (use renewable energy where feasible and appropriate)

Restore (improve carbon storage capacity through restoration of natural resources)

Objective Theme Areas

The themes below form the basis for a continuous improvement process to sustain efforts long-term.

Advocate Policy Change

Dakota County will use sound evidence to inform and set its administrative policies and to advocate for state and federal policies that enable local planning, decision-making, assessment, implementation, reporting, and accountability.

Make Operational Improvements

Dakota County will implement business practices designed to increase energy efficiency, reduce dependence on non-renewable energy, and promote the development of energy alternatives.

Model Behavior

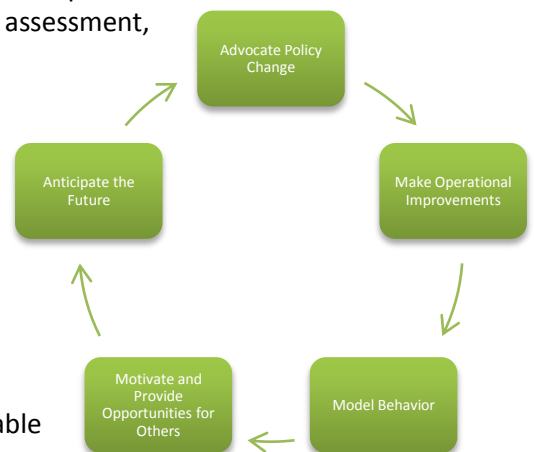
Dakota County will strive to be a model for the application of energy sustainability through cost-effective actions to meet or exceed applicable regulatory requirements, reduce environmental emissions, implement demonstration projects, and encourage the use of a life-cycle cost analysis framework.

Motivate and Provide Opportunities for Others

Dakota County will create opportunities to inform, train, motivate, and as appropriate, incent others to conserve energy.

Anticipate the Future

Dakota County will apply a continuous improvement process, guided by evolving information and facts to establish operational performance targets and anticipate policy, technology or other changes designed to achieve energy sustainability.



Statement of Principles

Following the work done to craft a vision, goals, and objective themes, the following statement of energy principles should be used to guide future implementation of energy plans, policies, and practices.

Dakota County will reduce energy consumed and greenhouse gas equivalents emitted, use renewable resources, and sequester carbon. To do so will require ongoing commitment and leadership as demonstrated by implementation of the following principles:

- 6. Reduce energy use and greenhouse gas emissions from buildings through design, construction, operations, and user habits.*
- 7. Reduce energy use and greenhouse gas emissions in transportation through transportation fuel alternatives, fleet related business practices, and transportation system design and use.*
- 8. Manage waste, land, and water to conserve energy and sequester carbon.*
- 9. Increase renewable energy use to reduce greenhouse gas emissions and reliance on fossil fuels.*
- 10. Inform, advocate, and anticipate the future with others to collectively conserve energy, transition to renewable resources, and sequester carbon.*

III. Greenhouse Gas Emissions Reduction Targets

Local, State and Federal Context

Many other jurisdictions in the state and across the country have been developing plans to reduce greenhouse gas emissions. The State of Minnesota, Hennepin County and the Midwest Governors Accord have all committed to reduce emissions below 2005 levels by the following amounts:

- 15% by 2015
- 30% by 2025
- 80% by 2050

In addition, as of 2009, 969 US Mayors have signed the US Conference of Mayors Climate Protection Agreement, which says they will strive to meet or beat the Kyoto Protocol (description can be found in Appendix G) targets (7 percent below 1990 levels by 2012) for their own communities and urges federal and state governments to reduce emissions by the same amount. Included in this list are the cities of Apple Valley, Burnsville, Eagan, Inver Grove Heights, Rosemount, and Sunfish Lake.

In 2007, the US Supreme Court ruled that greenhouse gases are air pollutants and are therefore covered by the Clean Air Act. The court ordered the Environmental Protection Agency (EPA) to re-examine their policies on limiting emissions. After a scientific review, the EPA issued a proposed finding in April 2009 that greenhouse gases contribute to air pollution that may endanger public health or welfare. While this finding could lead to future regulation of greenhouse gases, the EPA Administrator and President Obama have expressed their desire for Congress to address the issue through legislation. Currently, Congress is working on a number of proposals to address greenhouse gas emissions reduction.

A Target for Dakota County

Dakota County’s past and current energy efforts and public sentiment, along with the changing political landscape of the nation and state, also support the adoption of a target for the reduction of greenhouse gas emissions from Dakota County government operations.

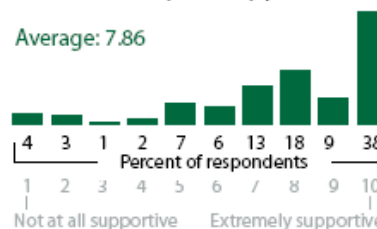
A scientific survey of Dakota County residents that corresponded to the DC2030 Comprehensive Plan process included the question, “How supportive are you of the County taking a leadership role to address climate change and promote environmentally friendly practices?” Responses were positive, with 78% of respondents reported some level of support, and 38% reporting being extremely supportive.

In the 2008 residential survey (another scientific survey of residents), 9 out of 10 said it was at least “somewhat important” and 1/3 said “essential” for local government to “help people living in DC find ways to conserve energy and reduce reliance on sources that generate GHG”.

Residents’ opinions:

Dakota County should take a leadership role in addressing climate change and promoting environmentally friendly practices.

Average: 7.86



400 residents were asked to indicate how supportive (1 to 10) they are of the above statement in February 2008. See full

DC2030, the adopted Comprehensive Plan for Dakota County contains strong language about moving towards carbon neutrality by reducing greenhouse gas emissions, using renewable energy, maintaining public buildings that are energy efficient and reducing waste.

A principle recommendation of this report is the adoption of a target for the reduction of greenhouse gas emissions from government operations of 15% below 2005 levels by 2015.

This target is consistent with those already adopted by the State of Minnesota and a neighboring County, and is consistent with targets adopted by local governments across the country.

This target has influenced the selection of strategies that apply to energy use and greenhouse gas emissions resulting from County government operations (“internal” strategies) identified later in this report. Section IV describes the method by which these strategies (as well as “external” strategies) were developed and evaluated. Section V describes a package of strategies that could be used to meet the reduction target.

Dakota County’s proposed target will strive to reduce greenhouse gas emissions from government operations by 15% below 2005 levels by 2015.

IV. Sound Strategy Development and Measurement

Strategy Research

Approximately 75 strategies were researched by the three subcommittees. Each subcommittee first defined its scope of work and research was monitored for synergy and if necessary, synthesis of ideas.

Research was conducted by reviewing existing policies and practices with the County, statutes that affect the County, best practices and innovative ideas found nationally, and other important pieces of data. A template for strategy research can be found in Appendix E.

Strategy Evaluation

Evaluation criteria for measuring the strategies were developed by the entire energy committee and subsequently reviewed by County senior leadership. The first three criteria listed below form the basis of strategy comparison. The fourth, potential to reduce GHG emissions, is a component of calculating the first measure, but also shows the potential scalability and impact of each strategy.

- 1) Cost per ton of GHG emissions avoided
- 2) Net fiscal impact (as measured in dollars saved or spent by both the County and the public)
- 3) Leadership potential
- 4) Potential to reduce GHG emissions, as measured in metric tons avoided

Dollars Spent, or Saved, Per Metric Ton of CO₂ Avoided

This is a cost-effectiveness measure, and is also the measure typically found in markets created to trade CO₂ credits (such as the Chicago Climate Exchange). Strategies that show negative dollars per ton will save the County money for every metric ton of CO₂ that is avoided.

Annual Net Fiscal Impact

Annual net fiscal impact measures in dollars what the County will spend (or save) annually when a strategy is fully implemented. For each strategy, the best effort was made to include as many areas of cost and savings as could reasonably be measured, including staff time, potential consulting fees, capital costs, and other relevant costs. Capital costs, where applicable, were amortized over a 20-year period (or the expected lifecycle of the product) in order to make comparisons across strategies possible.

When measuring fiscal impact, a positive number represents a savings to the County, whereas a negative number represents money spent.

Leadership Potential

Criterion number three, leadership potential, was measured by a common scoring method used by individual subcommittees, ranking their own strategies only. Each strategy was ranked high (3), medium (2) or low (1) in its potential for each of the following:

- Models energy conservation/ GHG reduction visibly
- Anticipates the future (could include mandates, technology, or other future trends)
- Leverages other resources or public benefit (could include policy advocacy)
- Motivates and provides opportunity for others

These particular leadership aspects were chosen in keeping with the objective themes that frame the energy work, and were intended to help measure the less tangible, but relevant components of some strategies. Scores for each component of leadership were totaled to arrive at a total leadership score, with a maximum score of 12.

Total Greenhouse Gas Emissions Avoided Annually

Total greenhouse gas emissions avoided was also estimated for each strategy. This measure is important because, ultimately, the County is seeking to reduce the total amount of greenhouse gases it emits. Even though a strategy may be very cost-effective, the total reduction potential may be low. This measure gives a sense of the scale of each strategy, independent of cost. This evaluation criterion was also measured on an annual basis.

A summary of the assumptions used to calculate net fiscal impact and greenhouse gas emissions can be found in Appendix D. Whenever possible, the most accurate accounting of costs and savings was used for each strategy. This includes estimates of staff time, capital costs and maintenance costs. Staff time cost was calculated using a percentage of an Full Time Employee (FTE) position equivalent.

Strategy Results

The results of the evaluation of all the strategies, both internal and external, using the four criteria produced a wide range of results. For example, the total potential metric tons of greenhouse gas emissions avoided, measured as metric tons of CO₂ equivalents, reported in this report as tons of CO₂, varied between zero (for strategies that had no measurable impact, but may have been essential to the implementation of other strategies), all the way up to 2,000 – 3,000 metric tons annually for strategies related to renewable energy. For leadership, the majority of strategies received an eight or nine; very few received the maximum 12 points. Overall, internal strategies typically save the County money or are cost neutral, while external strategies frequently cost money for the County to lead or participate in them, but often had greater impact on greenhouse gas emissions and potential savings to the public. Table 3 summarizes the range of results for all strategies based on the four evaluation criteria.

Table 3: Range of Evaluation Results by Criteria

Evaluation Criteria	Range of Results	
	Lowest	Highest
GHG Avoided (metric tons)	0	3,500
Fiscal Impact to County	Cost \$975,000 annually	Save \$525,000 annually
\$ Spent/Ton of GHG Avoided	Spend \$1,400 per ton	Save \$1,300 per ton
Leadership (out of a total of 12)	6	12

Strategy Selection

In choosing strategies for government operations (in the next section of the plan), all criteria were considered and effort was made to represent all three of the energy framework goals. However, should it become necessary to identify alternative strategies to those presented in the report, Appendix F contains four lists of research strategies, ranked by each criterion. Detailed research on each strategy is also on file for future reference.

V. County Government (Internal) Strategy Proposal

From the many strategies developed and evaluated, a package of strategies has been identified that would likely allow Dakota County to meet the 2015 target. The adoption of the recommendations of this report does not necessarily mean that the following strategies will be implemented. However, careful analysis produced a cost-effective and workable proposal to meeting the 2015 target. Strategies were chosen that will be impactful (both fiscally and on greenhouse gas emissions), are supported by strong data, and that have limited barriers to implementation. In addition, the recommended package is intended to be representative of all subcommittees (Transportation, Buildings, and Natural Resources) and major sources of greenhouse gas emissions.

When implemented, the following eight strategies will:

- Reduce greenhouse gas pollution from government operations by over **4,400 metric tons**.
- Save the County over **\$40,000 annually**.
- Support County goals of providing efficient, effective service to taxpayers.
- Demonstrate the County's leadership role in addressing the challenges of global climate change.

Proposed Strategy Package

- Increase employee recycling by 15%.** Currently, County employees recycle 45% of the solid waste produced. Increasing this rate to 60% would cost the County under \$10,000 annually and avoid emitting 32 metric tons of greenhouse gas. It is assumed that an internal campaign to increase employee recycling would have a relatively low cost. No new infrastructure or staffing would be needed. Efforts might focus on awareness-raising and enhanced communication.
- Increase Annual Fuel Efficiency by 10% per Vehicle Class.** The County typically retires 20 vehicles per year in the van, sedan, sub-1 ton truck and SUV classes. A policy to replace these retired vehicles with new vehicles that average 10% better fuel efficiency would save the County \$2,400 in fuel costs and avoid emitting 11 metric tons of greenhouse gas.
- Promote employee transit use.** Dakota County could subsidize 40% of the cost of a transit pass for County employees with the goal of moving 2% of employees from an auto commute to a transit commute. This subsidy is at the same level provided by Hennepin County. This strategy would cost Dakota County \$13,322 annually, and avoid emitting 25 metric tons of greenhouse gas emissions.
- Harvest 40-acres of Biomass production for cellulosic biofuel.** 40 acres of County-owned land would be planted with a mixture of prairie grasses appropriate for biofuel production. Upon maturity, the area would be harvested for ethanol production, which would be handled by an outside processor. This fuel could be used directly in county vehicles that are able to run on E-85. This strategy would cost the County \$5,000 annually if the fuel were used directly in County vehicles to replace gasoline and avoid emitting 160 metric tons of greenhouse gas.
- Implement an Environmentally Preferred Purchasing Policy.** An Environmentally Preferred Purchasing Policy provides a framework to guide purchasing decisions (computers, paper, many

other materials) while considering the environmental impact of these decisions. Products are identified that have similar performance characteristics, but are more environmentally sound than typical products. Using ENERGY STAR qualified computers as an example, the County would save \$22,000 per year and avoid emitting 221 metric tons of greenhouse gas.

- vi. **Implement Energy Efficiency Conservation Block Grant (EECBG) Projects.** At the time of this writing, the County has been awarded formula grant funds from the Energy Efficiency Conservation Block Grant Program, administered by the US Department of Energy. The County has been awarded \$658,000 to complete a variety of energy efficiency projects in County buildings, some in conjunction with other scheduled improvements. The County is also leveraging over \$17,000 in funds from other sources to complete these improvements. These improvements are estimated to avoid 423 metric tons of greenhouse gas emissions.
- vii. **Improve total building energy efficiency by 10%.** A number of measures could be used to address energy use in County buildings. These include employee training, the use of an energy management system, a revolving loan for improvements funded by savings, and building commissioning. This strategy would strive to reduce total energy use of non-park buildings by 10%. This includes energy from electricity and natural gas. This strategy would save the County over \$2,000 annually and avoid the emissions of 1,619 metric tons of greenhouse gas. It was assumed that most of the monetary savings from this strategy would be reinvested in capital improvements; therefore the net annual savings are low.
- viii. **Build a 1 megawatt wind turbine.** The County could install a 1 megawatt wind turbine on county-owned land. This size turbine would produce enough electricity to power the equivalent of around 230 homes, or 14% of the County's annual electricity use. This would likely cost the County \$6,088 annually and avoid emitting 1,950 metric tons of greenhouse gas.

The specific strategies listed here have been researched to the greatest extent possible within the scope of the broader energy plan process. However, implementing any one of these strategies will require additional research and implementation time, and will undoubtedly uncover additional variables which were not considered during this evaluation process.

Each of these strategies is recommended to be considered separately by County leadership and the County Board. The estimates above are intended to provide general guidance about how Dakota County can meet its goal for 2015, which is more important than any one particular strategy.

Strategy Comparison

As mentioned above, each strategy was evaluated using four criteria: dollars per metric ton of greenhouse gas emissions avoided, net fiscal impact, total potential to avoid greenhouse gas emissions, and leadership potential.

Figure 3 shows the amount of money that would have to be spent on each strategy to avoid one metric ton of greenhouse gas emissions.

Figure 3: Dollars Spent (or Saved) per Metric Ton Avoided for Internal Strategy Package

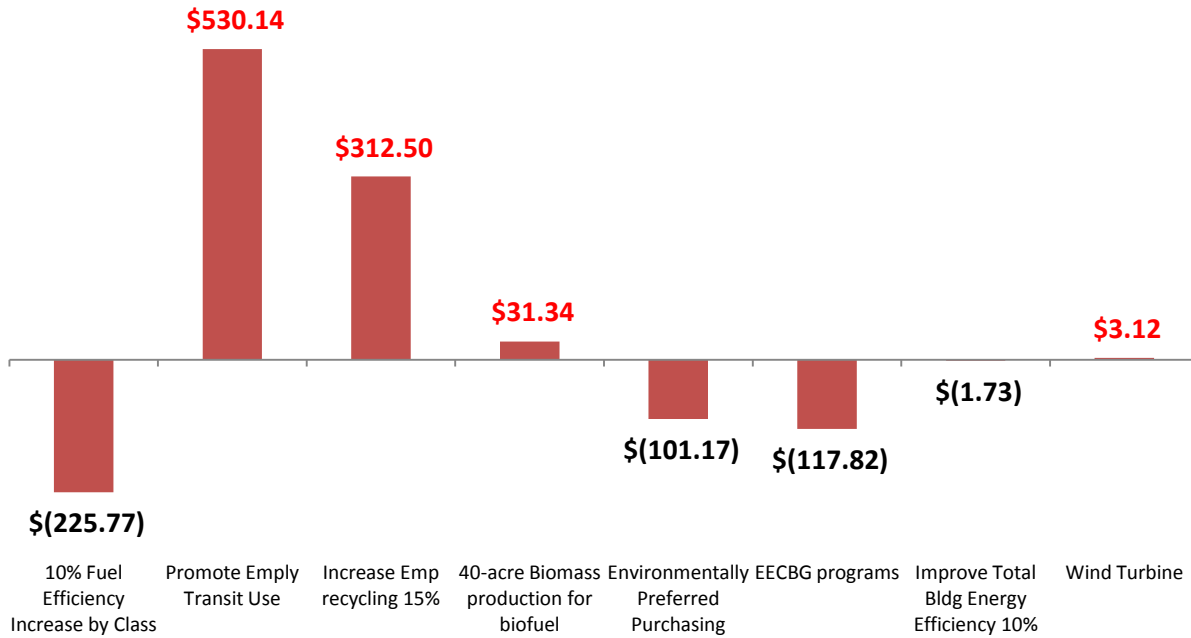
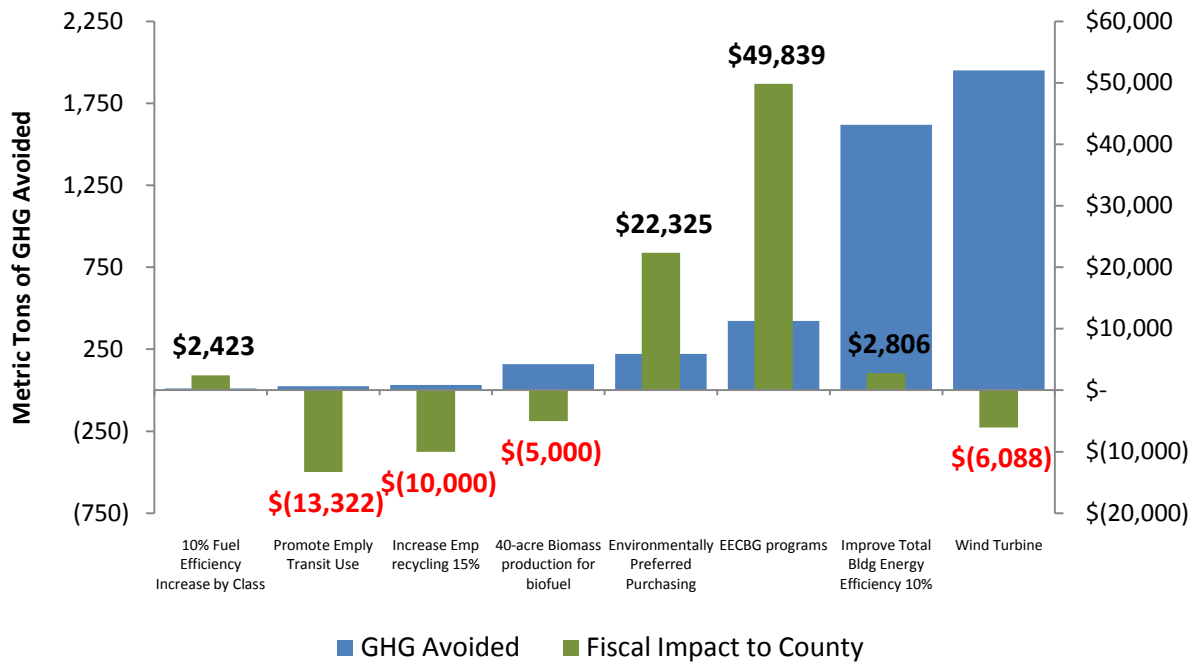


Figure 4 shows the annual net fiscal impact of the internal strategy package. When measuring fiscal impact, a positive number represents a savings to the County, whereas a negative number represents money spent. Figure 4 also shows the total greenhouse gas reduction potential of the strategies in the package. These strategies are shown in combination because they both are measured on an annual basis.

Figure 4: Annual Net Fiscal Impact and Greenhouse Gas Emissions Avoided



Leadership Potential

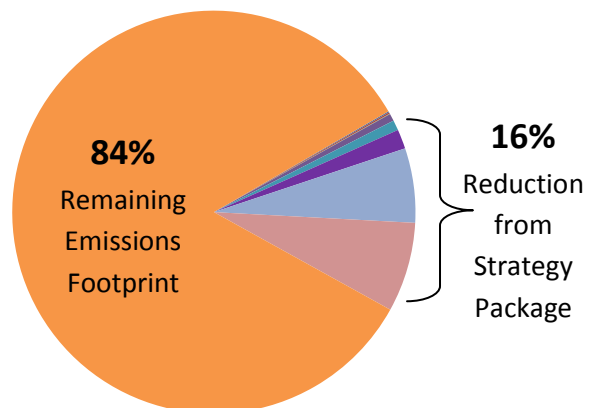
Leadership potential for each strategy was scored based on the process outlined above in Section 2. Out of a total potential score of 12 points, all of the strategies in the package above scored 8 points, with the exception of biomass production. That strategy scored 9 points.

Progress towards the Target

Meeting a 2015 target for greenhouse gas emissions reduction will be an ongoing effort. Assuming emissions from government operations remain flat, **the target for 2015 can likely be met by fully implementing the eight strategies outlined above as well as continuing ongoing energy conservation efforts.** If emissions continue to grow, additional strategies or more intensive efforts will have to be identified in order to meet the target.

Many efforts are already underway that will help Dakota County meet its 2015 target. Lighting retrofits, fleet vehicle purchases and building energy efficiency improvements have been completed since 2005 and their impact on overall emissions have not yet been measured. A full list of previous and ongoing energy initiatives can be found in Appendix B.

Impact of Proposed Internal Strategies



VI. Dakota County (External) Options

The County's Role

Dakota County government operations affect the greenhouse gas emissions footprint of the county through a number of traditional programs such as transportation planning, construction and operations, waste permitting and disposal, and natural resource protection and restoration.

During the development of strategies, the Committee identified some relating to these traditional programs, but also potential strategies that might suggest a different role for County government. For example, the County has a wealth of expertise in the area of building design, construction and operations, likely greater than many city governments. The County has not traditionally been involved in the regulation of, or education about, building construction or retrofitting. However, given this resource and the great potential for energy efficiency in buildings, strategies related to non-County building energy efficiency were included, with the possibility that Dakota County might partner with others.

Example Strategies

No target is recommended for greenhouse gas emissions reduction outside of internal government operations. Clear federal and state mandates are likely necessary to assign responsibility for emissions (and therefore reductions) from particular sources, such as transportation systems, sewer systems, and buildings.

The following strategies represent an example cross-section of those developed during the process. Similar to the package of internal strategies, these were selected because of the strength of supporting data, potential for emissions reductions, leadership, and low barriers to implementation.

If implemented, the following six strategies would:

- Reduce greenhouse gas pollution by over **190,000 metric tons**.
- Save the public over **\$2,000,000 annually**.
- Demonstrate the County's leadership role in addressing the challenges of global climate change.

The example strategies are as follows:

- i. **Develop and Implement a Neighborhood Energy Sweep.** This strategy is modeled after a Boulder County, CO program and is likely best implemented at the city or neighborhood level. Teams would canvass residential neighborhoods, helping willing residents improve the energy efficiency of their home by installing new light bulbs and recommending other changes. A neighborhood energy sweep program in Dakota County, similar in scale to that of Boulder County could reduce 222 metric tons of greenhouse gas emissions at a cost to the County of \$55,000 annually. The public would save \$26,000 annually.
- ii. **Improve Signalized Intersection Efficiency.** The timing of lights at busy intersections on County roads could be assessed to improve traffic flow. These types of studies are common, and can be performed by County staff or by a consultant. In some cases, new infrastructure (such as

sensors) may be installed. Fuel use is reduced because cars stop and start fewer times in the influence area of the intersection. Since many signals in Dakota County have already undergone some optimization, only 5% of intersections were assumed to be improved. Improved intersection efficiency could reduce 447 metric tons of greenhouse gas emissions at a cost to the County of \$6,000 annually. Drivers could save \$100,000 annually from reduced fuel costs.

- iii. **Improve Energy Efficiency in Community Development Agency (CDA) units.** The CDA owns or provides rental assistance to over 4,000 units in Dakota County. In cooperation with the CDA and willing landlords and residents, the County could work to achieve a 2% energy savings in these units through changes to lighting, heating and cooling systems, insulation and weather stripping, and providing energy-saving tips to residents. Improving energy efficiency in CDA units could reduce 1,000 metric tons of greenhouse gas emissions and it could save the CDA \$63,000. The residents who pay energy bills would save \$79,000 annually.
- iv. **Reduce Vehicle Miles Traveled (VMT) on County Roads 1%.** This reduction would be achieved through an increase in the use of non-motorized transportation by expanding the existing trail system, improving road safety, and increasing transit use. It can also reduce vehicle trip demand through increased access to virtual goods and services (i.e., the Internet infrastructure). Reducing VMT on County Roads only could reduce 3,900 metric tons of greenhouse gas emissions, and cost the County \$175,000 annually. Costs are very difficult to estimate for this strategy as some projects are already underway and the effects are difficult to measure. The public could save \$900,000 annually.
- v. **Develop and Implement Green Building Initiatives.** This strategy could improve the energy efficiency of new and existing residential and commercial buildings in Dakota County. The County would work with cities as partners to increase the use of green building rating systems such as LEED and MNGreenStar. An assumed 50 homes per year would be certified, resulting in 9,600 metric tons of greenhouse gas emissions avoided at a cost to the County of \$56,000 annually. The public would save \$1,084,135 on energy annually.
- vi. **Increase Municipal Recycling by 10%.** The recycling rate in the county as a whole has remained at 50% for a decade. However, an additional one-third of refuse could be recycled. Increasing the recycling rate to 60% would avoid over 174,000 metric tons of greenhouse gas and cost the County \$1,000,000 per year. The costs of this type of program are very difficult to estimate, but even at this high cost, the impact per dollar spent, as well as the potential total emissions reduction, is significant.

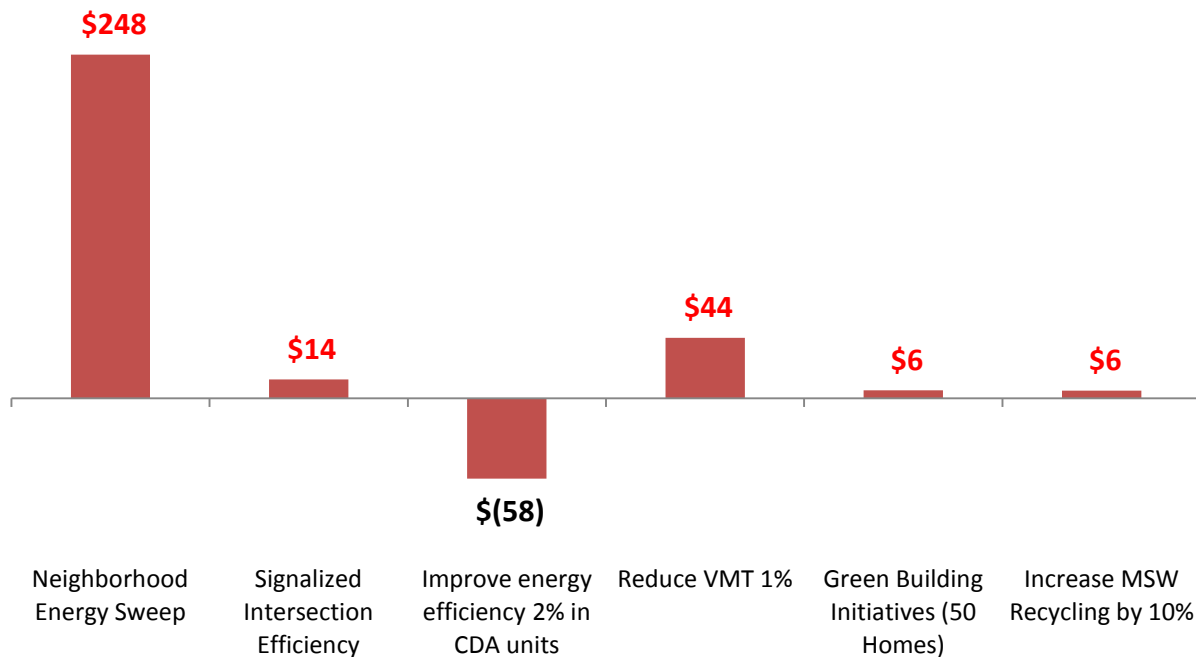
Strategy Comparison

The external strategies were evaluated using the same criteria as the internal strategies: dollars per metric ton of greenhouse gas emissions avoided, net fiscal impact, total potential to avoid greenhouse gas emissions, and leadership potential.

Dollars Spent, or Saved, Per Metric Ton of Greenhouse Gas Avoided

Figure 5 shows the dollars spent or saved per metric ton of greenhouse gas emissions avoided. Negative numbers indicate a savings to the County while positive numbers indicate expenditure.

Figure 5: Dollars Spent (or Saved) per Metric Ton of Greenhouse Gas Avoided for Example External Strategies



Annual Net Fiscal Impact

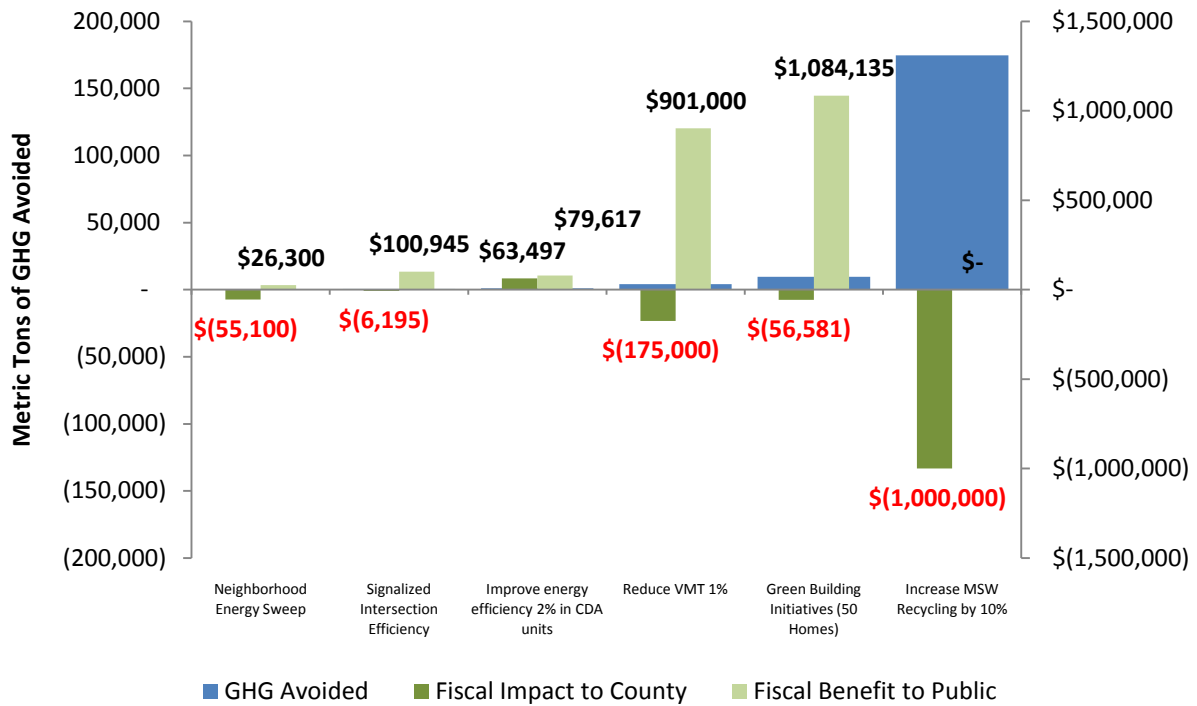
Annual net fiscal impact is a measure of the total amount the County will be spending (or saving) per year once the strategy is being fully implemented. For each strategy, the best effort was made to include as many areas of cost and savings as could reasonably be measured. This includes staff time, potential consulting fees, capital costs, and other relevant costs. Many external strategies also have a net fiscal impact on the public, meaning that they will save money as a result of the strategy being implemented. Capital costs, where applicable, were amortized over a 20-year period (or the expected lifecycle of the product) in order to make comparisons across strategies possible.

Figure 6 shows the annual net fiscal impact of the external example strategies. When measuring fiscal impact, a positive number represents a savings to the County or the public, whereas a negative number represents money spent.

Total Greenhouse Gas Emissions Avoided Annually

Total greenhouse gas emissions avoided was also estimated for each strategy. Even though a strategy may be very cost-effective, the total reduction potential may be low. This measure gives a sense of the scale of each strategy, independent of cost. This evaluation criterion was also measured on an annual basis. Figure 6 shows the total greenhouse gas emission reduction potential of the example strategies.

Figure 6: Annual Net Fiscal Impact and Greenhouse Gas Emissions Avoided



Leadership Potential

Leadership potential for each strategy was scored based on the process outlined above in Section 2. The example strategies shown above scored between 7 and 10 using the leadership scoring method, with all strategies except Reduce VMT and Signalized Intersection efficiency scoring a 9. Those strategies scored 10 and 7 respectively.

VII. Recommendations

Immediate Implementation Activities

The following activities are recommended for action by the Board of Commissioners and senior administration to further the work of Dakota County on energy issues.

1. Adopt principles as future decision framework: The statement of energy principles, organized into five broad energy initiatives, demonstrate County commitment and should serve as the framework through which departments and programs can develop more specific policies and practices. The initiatives as presented today do not provide sufficient detail for the next step of day to day decision-making, but they do provide general direction.
2. Adopt a target for the reduction of greenhouse gas emissions from government operations: Dakota County has taken the first step towards reducing greenhouse gas emissions by being the first county in the state to complete a government operations greenhouse gas emissions baseline inventory. The next step is to establish a reduction target for emissions associated with government operations. To be consistent with state actions, Dakota County will reduce greenhouse gas emissions from government operations 15 percent below 2005 levels by 2015. This plan does not recommend adopting longer-term goals at this time. Between now and 2015, national and state legislation on climate change and greenhouse gas emissions will likely be finalized, and the County can assess the potential impact.
3. Authorize staff to begin implementation: Based on the completed research, the Board would authorize County staff to begin the process for implementation of specific strategies. These could include the strategies identified in this report. Staff would return to the Board with specifics on the costs and benefits of each strategy before and during implementation as necessary.
4. Monitor progress and report back regularly: Staff should continually monitor and report on County government operations emissions and strategy implementation, ensuring that we are meeting defined targets, that strategies implemented are effective, and that new strategies are effectively evaluated before, during, and after implementation. The greenhouse gas inventory for governmental operations should be updated every five years. The next update would ideally occur in 2011 or 2012 to provide a 2010 benchmark.
5. Begin an external/community strategy review process: Strategies considered “external” have impact beyond government operations, where benefit might accrue to the public or to partners. An exploration of whether and how the County could implement some of these strategies requires discussion and analysis with potential partners, as well as the public. Based on these discussions, as well as the county-wide baseline greenhouse gas inventory to be completed in the near future, recommendations on whether, when, and how to implement strategies beyond government operations will be developed.

6. Support a staffing infrastructure to sustain work: Staffing is needed to sustaining many components of the work yet to be done, including implementing the government operations strategies, the external review process, and continued benchmarking and coordination. Although a new position does not have to be created to fill this need, both dedicated staff time and a focused coordination of effort across County departments are essential.

Ongoing or Future Activities

The following activities are recommended for the future, with more specificity developed by staff for the Board of Commissioners, once the first phase of implementation is approved and underway.

1. Develop future targets: With the approval of a reduction target and strategies for 2010-2015, it will be important to also consider whether and when to set future targets and revisit the many strategies/practices available to meet those targets. Although many identified practices will continue to be relevant in the future, certainly new ideas and technologies will also unfold over time.
2. Identify and address future opportunities and obligations: Energy information is changing constantly, as are the opportunities (such as funding) and potential obligations (such as mandates), that surround it. An important component is being able to respond efficiently and effectively to both opportunities and obligations through a staffing infrastructure that is sufficient and flexible enough to respond.

VIII. Appendices

- A. List of Committee Members**
- B. Summary of Past and Current Effort**
- C. Relevant County Board Resolutions**
- D. Summary of Evaluation Criteria Assumptions and Measures**
- E. Strategy Research Template**
- F. Rankings of Strategies by Evaluation Criteria**
- G. Glossary of Terms**

Appendix A: List of Dakota County Energy Committee Members

Steering Committee

Michelle Beeman, Director, Environmental and Natural Resources Section,
Jack Ditmore, Director, Operations, Management, and Budget Division
Taud Hoopingarner, Director, Operations Management Department
Lynn Thompson, Director, Physical Development Division
Heidi Welsch, Director, Office of Planning and Analysis

Buildings & Operations Subcommittee

Tom Burrows, Capital Planning and Project Management
Theresa Di Marco, Environmental Management
Lori Frekot, Environmental Management
Ken Harrington, Capital Planning and Project Management
George Kinney, Water Resources
Mike Lynn, Environmental Management
Steve Nystedt, Facilities Management
James Strommer, Information Technology
Debra Ehret Miller, Convener, Office of Planning and Analysis

Natural Resources Subcommittee

Bruce Blair, Parks and Open Space
Karen Harrington, Operations, Management and Budget Division
Jeff Harthun, Environmental Management
Al Singer, Parks and Open Space
Dave Swenson, Water Resources
Matt Mendenhall, Convener, Office of Planning and Analysis

Transportation Subcommittee

Jim Bell, Transportation
Kurt Chatfield, Office of Planning and Analysis
Theresa Di Marco, Environmental Management
Taud Hoopingarner, Operations Management
Mary Jackson, Office of Planning and Analysis
Sam O'Connell, Transportation
Kevin Schlangen, Fleet Management
Brian Sorenson, Transportation
Heather Aagesen-Huebner, Convener, Office of Planning and Analysis
Brendon Slotterback, Convener, Office of Planning and Analysis

Appendix B: Summary Description of Past and Current Energy Initiatives

High Performing Buildings

The County first implemented high performance building standards for new construction in 1984. In 2001, these standards were expanded to include major renovations and the sustainability portion of the standards was greatly expanded. The County's Design, Construction, and Sustainability Standards have resulted in durable, sustainable energy efficient buildings.

The Lebanon Hills Visitor Center was LEED® Silver certified through the U.S. Green Building Council in 2009. The Visitor Center is the first park building in Minnesota and the only public building in Dakota County to receive LEED certification. ENERGY STAR permits benchmarking of building performance which allows the County to measure the effectiveness of completed energy improvement projects. The Northern Service Center received EPA ENERGY STAR designation in 2008 with a rating of 98 out of 100.. For 2009, the County Board has established a goal of certifying eligible buildings through the ENERGY STAR program. In addition to Design, Construction and Sustainability Standards, the County has implemented a space planning program that provides efficient work space for County employees.

Efficient Building Operations

Most County buildings are controlled through the County's Energy Management System insuring efficient operation of the County's buildings. The system allows Facility Management to minimize the amount of energy required to operate the building and to remotely adjust a building's operation. By 2011, all major County buildings will be connected to the County's Energy Management System.

The County has recently completed a Central Plant study for the Government Center in Hastings. The implementation plan will guide the replacement and retrofit of aging mechanical systems with new high efficient systems. In addition, both the County's Parks and Open Space Department and Facility Management have established a practice of reducing the lawns and open space to be mowed, reducing not only time but fuel costs.

Lighting Retrofit and Replacement

Periodically, the County reevaluates its lighting systems and replaces lamps and fixtures to gain greater energy efficiency. The County is currently replacing its 32 watt lamps with more efficient 25 watt lamps. In addition, the County has implemented a LED lighting demonstration project as part of a library remodeling project. Sixteen LED fixtures were installed in the Wescott Library that will reduce the buildings energy needs and have, thus far, proved to be very successful. LED lights are being considered for another library lighting retrofit project and other office applications. Emergency exit signs are now lit by LED lights.

E-Government

The County is exploring opportunities of conducting more of its business over the Internet, to reduce travel by those who use County services. Numerous departments now provide electronic forms and applications. Park facilities can now be reserved electronically; job applicants are encouraged to submit materials electronically, virtually all RFP's are distributed electronically, construction submittals and

correspondence are transmitted and stored electronically, the use of E-books provided by the County's library system is steadily increasing. The County has recently authorized expenditures that will greatly increase the County's teleconferencing capabilities and the County has a widely used electronic document storage process.

Energy Assistance to Lower Income Residents

The County's Community Development Authority operates the federal weatherization program in Dakota County. Annually, the weatherization program reaches 85 homes. The federal Fuel Assistance program in Dakota County is provided by the Scott / Dakota / Carver CAP agency.

Countywide Recycling

In 1989, Dakota County adopted a Recycling Implementation Strategy, establishing countywide residential and commercial recycling. Currently, Solid Waste Ordinance 110 requires all municipalities to establish a solid waste abatement program to reduce residential waste and increase recycling efforts. Additionally, the ordinance requires all municipal solid waste haulers to provide customers with recycling service when trash collection services are offered. Through partnerships with cities and waste haulers, the program results in 200,000 tons of recycled material each year.

Renewable Energy Generation

The County jointly owns a hydroelectric facility with Goodhue County at the Lake Byllesby Dam. The facility generates 9,200 megawatt hours of electricity a year the electricity generated at the Byllesby Dam is sold to the Xcel Energy power grid. In addition, the County operates a 39 kilowatt wind turbine in the Spring Lake Regional Park adjacent to the Schaar's Bluff Gathering Center. The energy generated by the turbine is first directed to the building for electricity. If excess electricity is generated, it is sold to the power grid. The turbine is designed to generate 93% of the electrical demand at the Gathering Center.

Public Transportation

Dakota County is served by both the Minnesota Valley Transit Authority and the Metropolitan Transit Authority. Most of the bus routes are aimed at commuter services but limited cross community transit is available. The commuter routes are served by four transit hubs and several park and ride parking lots.

Promotion of Non-motorized Transportation

The County's bikeway system was established in 1978 and most communities within the County have local bike trail systems. The County has a total of 161 miles of paved bike trails along County roads. The County Parks and Open Space Department has also developed and maintains 19.3 miles of regional bike trails within Dakota County.

The County is developing a countywide greenway system that will connect places residents want to go, including parks, shopping and home with hundreds of miles of off-road trails in natural setting. This system will not only create a very efficient transportation and recreation system, but also wildlife habitat and a system to improve water quality.

The County has further supported the use of non-motorized transportation by installing bike lockers at the Western Service Center, a wellness area with changing rooms and showers at the Northern Service Center, and bike racks at most County buildings to facilitate non-motorized commuting.

County Fleet Management

In 2008, the County established a Fleet Management unit within the Operations Management Department. Fleet Management insures the efficient management of the County's vehicles through proper vehicle maintenance, reduced mileage, and evaluation of vehicle fuel use. The County is currently evaluating the potential of alternative fuels and has set aside \$50,000 in 2009 for the evaluation and initial implementation of an alternative fuel system.

Preservation / Enhancement of Natural Areas

In 2002, the voters of Dakota County approved a levy to establish a Farmland & Natural Areas Program. To date, conservation easements on 3,517 acres of farmland and 2,456 acres of natural areas have been purchased preserving these valuable assets for future generations. The Parks and Open Space Department manages 5900 acres of parkland and implements a natural area restoration program in each park. The County has established a stormwater improvement program and reserved funds annually to make improvements to the stormwater systems on County building sites. To date, five rain gardens have been established at County buildings.

Park System Plan

The 2008 Dakota County Park System Plan establishes a contemporary vision that recognizes the park system as an integral part of the community that provides for diverse societal needs: healthy living, lifelong learning, protection of vital open space and natural systems, economic growth, and relevant recreation. The Park System Plan vision is comprised of Great Places, Connected Places and Protected Places. Dakota County's priorities for the next ten years include 52 miles of regional greenways. The entire system (city and regional) could include more than 200 miles of greenways over time, supporting non-vehicle modes of transportation throughout the county.

Local Food Production

Eight communities in Dakota County have established nine local farmers markets that provide opportunities for the sale of locally grown food. In addition, the County Parks and Open Space Department provides garden plots at the Spring Lake Regional Park. These efforts, while external to County government, lower the transportation-related energy costs of shipping food long distances.

Awards

Governor's MnGREAT (Minnesota Government Reaching Environmental Achievements Together) - recognizes environmental achievements by government employees. The program focuses on the prevention of waste and pollution, the reduction of waste at its source, conservation of energy and water, recycling and composting.

Dakota County was awarded the MnGREAT Award in 2004 for its vision, leadership, and commitment to design and construct high-performance, sustainable building projects, as exemplified by the Dakota County Lebanon Hills Regional Park Visitor Center. The Visitor Center demonstrates how adequate and sustainable spaces can be constructed with a small ecological footprint, while also providing a energy-efficient and long-lasting facility with minimal impact upon future operating costs

The Northern Service Center was awarded an EPA ENERGY STAR rating with a score of 98 out of a possible 100 points for demonstrating superior energy performance. The Northern Service Center was rated in the top four percent of the most energy efficient buildings in the nation.

Appendix C: Relevant Dakota County Board Resolutions

Board Resolution No. 07-297 - Acceptance Of Grant And Authorization To Execute Grant Agreement And Electrical Cogeneration Contract With Dakota Electric Association For The Schaar's Bluff Gathering Center Wind Turbine

Board Resolution No. 06-567 - Approval Of Schaar's Bluff Gathering Center Design Development And Amendment Of 2006 Parks Capital Improvement Program Budget

Board Resolution No. 05-460 - Authorization To Execute Contract With Prairie Technologies Inc., DBA Direct Digital Controls, For Energy Management System Replacement At Western Service Center

Board Resolution No. 05-228 - Appointment Of County Board Member To Metro Counties Energy Task Force

Board Resolution No. 03-437 - Award of Bid and Authorization to Execute Contract with Traffic Control Corporation to Purchase Light Emitting Diode (LED) Traffic Signal Indications

Board Resolution No. 03-286 - Authorization to Execute Contracts with Direct Digital Controls, Inc. and Energy Services Group for Energy Management System Installation and Replacement

Board Resolution No. 01-10 - Approval of Design, Construction, and Sustainability Standards for County Buildings (this document covers bullets 1,2, 6,7,8,9,10,11 – all of these projects were constructed with these standards)

Board Resolution No. 99-534 - Authorization to Execute Contract with Allweather Roof for Farmington Library Roof Replacement

Board Resolution No. 97-675 - Award of Professional Electrical Engineering Services Contract to Toltz, King, Duvall, Anderson & Associates for the Government Complex Lighting Retrofit Project

Board Resolution No. 97-124 - Authorization to Submit Application to Northern States Power (NSP) for Local Government Energy Conservation Program

Board Resolution No. 95-450 - Authorizes that the Dakota County Board of Commissioners directs County staff to prepare amendments to Ordinance No. 110, Solid Waste Management, for consideration by the County Board in 1995, to incorporate requirements for the disposal of non-hazardous industrial waste; and the Dakota County Board of Commissioners directs staff to continue the development of amendments to Ordinance No. 110, Solid Waste Management, pertaining to incineration and landspreading of solid waste and to review the need for amendments related to designation and energy recovery facilities and report back to the Physical Development Committee of the Whole early in 1996.

Board Resolution No. 93-656 - Authorizes that the Dakota County Board of Commissioners directs staff to attempt to negotiate an agreement with NRG and other possible large refuse derived fuel users for the processing of Dakota County's mixed municipal solid waste, and to contact other regional counties as to possibly working together; and that staff is directed to prepare a Request for Proposals for waste

processing, including an MRF, organic composting, and a mass burn waste to energy facility in the event that negotiations on refuse derived fuel fail; and that the Dakota County Board of Commissioners authorizes the Physical Development Division Director to enter into an agreement with a consultant to assist in the negotiations and preparations of the Request for Proposals at a cost not to exceed \$100,000, subject to the County Attorney's approval as to form and execution.

Board Resolution No. 93-664 - Authorizes That staff is directed to prepare a Request for Proposals for waste processing including an MRF, organic composting, and a mass burn waste to energy facility in the event that negotiations on refuse derived fuel fail; and that staff is directed to prepare a Request for Proposals for waste processing including an MRF, organic composting, and a mass burn waste to energy facility in the event that negotiations on refuse derived fuel fail.

Board Resolution No. 93-582 - Authorizes that the Dakota County Board of Commissioners selects the following two processing options (as presented on June 29, 1993) for further study of the waste remaining after reduction and recycling:

System 4--RDF (Modified) (Including a comingled Materials Recovery Facility and a segregated organic composting program with refuse derived fuel production and the possible use of available existing capacity)

System 5--Mass Burn (Modified) (Including a comingled Materials Recovery Facility and segregated organic composting with waste to energy mass burn technology). And the Dakota County Board of Commissioners directs staff to conduct an analysis of the markets available for segregated organic compost, and refuse derived fuel.

Board Resolution No. 93-218 - Authorizes that the Dakota County Board of Commissioners approves acceptance of a grant from the Minnesota Department of Natural Resources - Minnesota ReLeaf Program for a windbreak planting in Spring Lake Park Reserve.

Board Resolution No. 91-1027 - Authorizes that the Dakota County Board of Commissioners strongly encourages the United States Department of Energy to locate a permanent national spent fuel repository expeditiously; and that the Dakota County Board authorizes its Chair to sign letters directed to the Federal Nuclear Regulatory Commission, Minnesota Public Utilities Commission, and United States Department of Energy communicating the positions stated herein.

Board Resolution No. 92-762 - Authorizes that the Dakota County Board of Commissioners awards the bid for the Judicial Center Re-roof Project to Sela Roofing and Remodeling, Inc., 3233 Hennepin Ave. South, Minneapolis, MN 55408, as the lowest competitive bidder meeting specifications in the Alternate Base Bid amount of \$182,385 and unit price for insulation replacement of \$2.75 per square foot; and that expenditure is approved from the Judicial Center Remodeling CIP project remaining funds in the amount of \$14,385 as additional funding for the re-roofing project.

Board Resolution No. 91-623 - Authorizes that the Deputy County Administrator be authorized to execute an agreement with Data Center Systems for one 20-ton Liebert cooling unit, in an amount not to exceed \$21,730, subject to approval by the County Attorney's Office as to form and execution.

Appendix D: Summary of Evaluation Criteria Assumptions and Measures

Natural Gas

Common ways to measure natural gas includes therms and cubic feet. There are 0.12 pounds of CO2 per cubic foot of gas, or **12 pounds of CO2 per therm**. [Source](#).

Propane

There are **139.11 pounds of CO2 per million BTUs** (MBtu). [Source](#). There are 91,330 BTUs per gallon of liquid propane, therefore each gallon of propane contains **12.7 pounds of CO2**.

Electricity

The carbon content of electricity varies depending on the mix of production sources available in a particular location. Dakota County uses power from both Xcel Energy and Dakota Electric, each of which has different carbon content. Xcel Energy has a carbon intensity of 1.650 lbs CO2/kW (reported in 2003), while Dakota Electric has 2.321 lbs of CO2/kw (reported in 2005). Xcel supplies approximately 75% of Dakota County government's electrical power based on 2008 figures. Using a weighted average, the carbon intensity of the electricity used by Dakota County government is **1.81775 pounds of CO2 per kW**.

Transportation Fuel

The following are emissions factors for transportation fuel. [Source](#).

Fuel Type	Pounds CO2/Gallon
Gasoline	19.54
Diesel	22.37
E-100	0
E-85	2.93
E-10	17.59
B2	21.92
B20	17.89
B100	0

Municipal Solid Waste (MSW), Landfilling and Incineration

Incineration

The Energy Information Administration states that there are 919 pounds of CO₂ per short ton of MSW when incinerated, using average percentages of MSW composition. This means that there is **0.4595 tons of CO₂ per short ton of MSW** when incinerated. [Source](#).

Landfill

The Climate and Air Pollution Planning Assistant (CAPPA) provides assumptions for landfilling MSW. The CAPPA tool was provided by ICLEI. The CAPPA estimates that each pound of landfilled waste is responsible for **0.00175 metric tons** of greenhouse gas.

Appendix E: Strategy Research Template

Please use this template to prepare a brief (5 minute) presentation for each of your strategies. This form should also be submitted electronically to OPA staff.

Your Name: _____

Strategy Category: _____

Strategy Name: _____

Strategy Description (brief paragraph/bullets of **WHAT** the strategy is and means and the County's role):

Action Steps (Based on your research, **WHERE** would you recommend this be implemented, such as countywide or a demonstration project with one entity? **HOW** would you write the first action step?):

Value and Impact (**WHY** is this strategy important and needed to meet stated goals? **WHAT** is the primary benefit to implementing this strategy? If possible, quantify **HOW MUCH** you think this strategy could ultimately impact energy use? **What** would be the anticipated life-cycle cost of this strategy?)

Measures: Operational Impact and Costs.

Operational Impact:

Cost/Investment:

Low-cost—less than \$10,000

Medium-cost—\$10-250,000

High-cost—more than \$250,000

Timeline and Feasibility (**WHEN** can this strategy reasonably be implemented? **WHAT** level of effort is required to implement it? **WHAT** are the primary barriers or potential pitfalls that might have to be overcome (e.g., Policy, Political Environment, Culture, Budget, Staffing))

Measures: Timeframe and Initial Investment (person hours).

Short-term—less than 2 years

Low effort—less than 100 hours

Mid-term—2 -5 years

Medium effort—100 to 300 hours

Long-term—5 years or more

High effort—more than 300 hours

Other (Share any other specific information about this strategy that is important for implementation):

Appendix F: Ranking of Strategies by Evaluation Criteria

Strategies by Metric Tons of GHG Avoided

Row Labels	Sum of Metric Tons of GHG
Private, state, federal funds for renewables	-
Puruse Joint Fuel Purchasing Opportunities	-
Energy Leadership Position	-
Add an "Energy and GHG Impacts" section to County Request for Board Actions (RBAs)	-
Sales Tax Exemption	-
Efficient use of ag water	-
Use grey/blackwater for non-potable uses	-
Grant Assistance for Cities	-
Interpretive Info	-
LEED certification for County buildings	-
Partner with Higher Ed on Renewables	-
Low-emission land management in Parks	-
Characterize and monitor existing County-owned habitats via ecological surveys	-
Promote EV Legislation	-
Promote Green Jobs	-
Document GHG emissions	-
Waste Heat	-
HHW Pickup	-
Participate in the state's low interest loan fund to low-income home owners for residential upgrades that conserve energy.	-
Expand capacity for hydroelectricity at Byllesby dam	-
Propose legislation to exempt energy conservation expenses from state sales tax.	-
Food production on park land	-
Promote low-impact land development thru loans	-
Energy Legislative Platform	-
On and off-site carbon capture and storage, cap & trade	-
Promote Alt. Commute Progs (no cost)	8
Natural Gas Generators	9
Reduce intra-County travel through IT improvements	10
Incentives to Reduce Miles Traveled for Work Purposes	10
10% Fuel Efficiency Increase by Class	11
HourCar for Public Use	12
Solar Heating/Hot Water for Park Buildings	17
Fleet policies that promote energy conservation	18
County owned vehicles for work purposes	22
Promote Empl Transit Use	25
2010 - Empl recycle 60% of MSW from County work	32
Convert Fleet Elec/Alt Fuel Vehicles	35
Non-motorized commuting (capital improvements)	37
Energy mini-audits	47
Employee Telecommuting	52
Site and Design Park Facilities for energy efficiency	63
Modify waste management practices - County	65
Food composting	66
Virtual Office	72
Maximize Participation in Utility rebate programs	83
Install a ground source heat pump (aka geothermal) at a County building site.	85

Install an active solar system at a County building site.	124
Biomass production	160
Energy Improvement Fund	164
Green Building Program for Cities	196
EPP	221
Neighborhood Energy Sweep	222
MN Energy Challenge	345
EECBG Programs	400
Signalized Intersection Efficiency	447
Employee Training for energy conservation	675
Work with CDA	1,098
County Building Standards	1,110
Plant Trees in County ROW	1,134
Energy Finance District	1,307
Wind Turbine	1,950
Improve Public Awareness of residential conservation	2,026
Implement Park System Plan	2,177
Renewable Energy Purchasing thru utilities	3,492
Smart Energy Workshop	3,819
Bikeway, sidewalk, fiber optic - reduce VMT	3,993
Build and Expand Transit Network (Cedar BRT)	6,818
Used building material recycling	9,482
Process all solid waste	30,935
Increase MSW Recycling by 10%	178,830
Grand Total	251,905

Strategies by Dollars Spent (or Saved) per Metric Ton of GHG Avoided

Strategy	County \$ spent / Ton of GHG avoided
Incentives to Reduce Miles Traveled for Work Purposes	(1,319)
Energy mini-audits	(380)
Reduce intra-County travel through IT improvements	(335)
Natural Gas Generators	(323)
Fleet policies that promote energy conservation	(236)
Convert Fleet Elec/Alt Fuel Vehicles	(224)
10% Fuel Efficiency Increase by Class	(223)
County owned vehicles for work purposes	(195)
Site and Design Park Facilities for energy efficiency	(135)
EECBG Programs	(125)
County Building Standards	(114)
EPP	(101)
Maximize Participation in Utility rebate programs	(98)
Work with CDA	(58)
Employee Training for energy conservation	(49)
Biomass production	(25)
Employee Telecommuting	(1)
Private, state, federal funds for renewables	-
Use grey/blackwater for non-potable uses	-
Low-emission land management in Parks	-
Efficient use of ag water	-
MN Energy Challenge	-

LEED certification for County buildings	-
Energy Leadership Position	-
Interpretive Info	-
Grant Assistance for Cities	-
Partner with Higher Ed on Renewables	-
Promote EV Legislation	-
Promote Green Jobs	-
HHW Pickup	-
Waste Heat	-
HourCar for Public Use	-
Participate in the state's low interest loan fund to low-income home owners for residential upgrades that conserve energy.	-
Energy Legislative Platform	-
Propose legislation to exempt energy conservation expenses from state sales tax.	-
Document GHG emissions	-
Promote low-impact land development thru loans	-
Puruse Joint Fuel Purchasing Opportunities	-
On and off-site carbon capture and storage, cap & trade	-
Modify waste management practices - County	-
Expand capacity for hydroelectricity at Byllesby dam	-
Food production on park land	-
Sales Tax Exemption	-
Characterize and monitor existing County-owned habitats via ecological surveys	-
Promote Alt. Commute Progs (no cost)	-
Add an "Energy and GHG Impacts" section to County Request for Board Actions (RBAs)	-
Smart Energy Workshop	1
Process all solid waste	1
Used building material recycling	2
Wind Turbine	3
Increase MSW Recycling by 10%	6
Renewable Energy Purchasing thru utilities	11
Signalized Intersection Efficiency	14
Food composting	18
Build and Expand Transit Network (Cedar BRT)	26
Solar Heating/Hot Water for Park Buildings	30
Bikeway, sidewalk, fiber optic - reduce VMT	44
Improve Public Awareness of residential conservation	49
Install an active solar system at a County building site.	53
Implement Park System Plan	138
Green Building Program for Cities	193
Energy Improvement Fund	195
Neighborhood Energy Sweep	248
Install a ground source heat pump (aka geothermal) at a County building site.	259
2010 - Empl recycle 60% of MSW from County work	313
Non-motorized commuting (capital improvements)	352
Energy Finance District	383
Promote Empl Transit Use	530
Plant Trees in County ROW	860
Virtual Office	1,427
Grand Total	1,214

Strategies by Fiscal Impact to County

Strategy	Fiscal Impact to County
Increase MSW Recycling by 10%	(1,000,000)
Plant Trees in County ROW	(975,000)
Energy Finance District	(500,000)
Implement Park System Plan	(300,000)
Bikeway, sidewalk, fiber optic - reduce VMT	(175,000)
Build and Expand Transit Network (Cedar BRT)	(174,578)
Energy Leadership Position	(104,000)
Virtual Office	(103,000)
Improve Public Awareness of residential conservation	(100,000)
Grant Assistance for Cities	(100,000)
Neighborhood Energy Sweep	(55,100)
Green Building Program for Cities	(37,721)
Renewable Energy Purchasing thru utilities	(37,167)
Energy Improvement Fund	(32,000)
Promote Green Jobs	(30,000)
Partner with Higher Ed on Renewables	(25,000)
Process all solid waste	(24,000)
Install a ground source heat pump (aka geothermal) at a County building site.	(22,000)
Used building material recycling	(18,860)
Promote Empty Transit Use	(13,322)
Non-motorized commuting (capital improvements)	(13,000)
Private, state, federal funds for renewables	(10,000)
Document GHG emissions	(10,000)
2010 - Empl recycle 60% of MSW from County work	(10,000)
Install an active solar system at a County building site.	(6,510)
Signalized Intersection Efficiency	(6,195)
Wind Turbine	(6,088)
Smart Energy Workshop	(2,100)
Sales Tax Exemption	(2,000)
Energy Legislative Platform	(2,000)
Interpretive Info	(1,225)
Food composting	(1,173)
LEED certification for County buildings	(1,100)
Solar Heating/Hot Water for Park Buildings	(501)
Modify waste management practices - County	-
Efficient use of ag water	-
HourCar for Public Use	-
HHW Pickup	-
Add an "Energy and GHG Impacts" section to County Request for Board Actions (RBAs)	-
Low-emission land management in Parks	-
Waste Heat	-
Characterize and monitor existing County-owned habitats via ecological surveys	-
Participate in the state's low interest loan fund to low-income home owners for residential upgrades that conserve energy.	-
Promote Alt. Commute Progs (no cost)	-
Propose legislation to exempt energy conservation expenses from state sales tax.	-
Promote EV Legislation	-

MN Energy Challenge	-
Food production on park land	-
Promote low-impact land development thru loans	-
Use grey/blackwater for non-potable uses	-
On and off-site carbon capture and storage, cap & trade	-
Employee Telecommuting	27
10% Fuel Efficiency Increase by Class	2,423
Natural Gas Generators	2,752
Reduce intra-County travel through IT improvements	3,459
Biomass production	4,000
County owned vehicles for work purposes	4,236
Fleet policies that promote energy conservation	4,275
Expand capacity for hydroelectricity at Byllesby dam	5,400
Convert Fleet Elec/Alt Fuel Vehicles	7,919
Maximize Participation in Utility rebate programs	8,182
Site and Design Park Facilities for energy efficiency	8,428
Incentives to Reduce Miles Traveled for Work Purposes	13,792
Energy mini-audits	17,700
EPP	22,325
Employee Training for energy conservation	33,387
EECBG Programs	49,839
Work with CDA	63,497
County Building Standards	126,000
Pursue Joint Fuel Purchasing Opportunities	525,280
Grand Total	(2,995,719)

Strategies by Leadership Score

Row Labels	Leadership Score
EECBG Programs	
Add an "Energy and GHG Impacts" section to County Request for Board Actions (RBAs)	6
Puruse Joint Fuel Purchasing Opportunities	6
HHW Pickup	6
Waste Heat	6
Promote EV Legislation	7
Incentives to Reduce Miles Traveled for Work Purposes	7
Natural Gas Generators	7
Characterize and monitor existing County-owned habitats via ecological surveys	7
Signalized Intersection Efficiency	7
Sales Tax Exemption	8
Wind Turbine	8
Energy mini-audits	8
Food composting	8
MN Energy Challenge	8
EPP	8
Non-motorized commuting (capital improvements)	8
Interpretive Info	8
Promote Alt. Commute Progs (no cost)	8
Improve Public Awareness of residential conservation	8
Document GHG emissions	8
Energy Finance District	8

Reduce intra-County travel through IT improvements	8
Employee Training for energy conservation	8
Grant Assistance for Cities	8
Participate in the state's low interest loan fund to low-income home owners for residential upgrades that conserve energy.	8
LEED certification for County buildings	8
Propose legislation to exempt energy conservation expenses from state sales tax.	8
Plant Trees in County ROW	8
Renewable Energy Purchasing thru utilities	8
Employee Telecommuting	8
On and off-site carbon capture and storage, cap & trade	8
Virtual Office	8
Food production on park land	8
Promote Empty Transit Use	8
County owned vehicles for work purposes	8
Fleet policies that promote energy conservation	8
2010 - Empl recycle 60% of MSW from County work	8
Energy Legislative Platform	8
Expand capacity for hydroelectricity at Byllesby dam	8
Process all solid waste	9
Promote Green Jobs	9
Partner with Higher Ed on Renewables	9
County Building Standards	9
Smart Energy Workshop	9
Neighborhood Energy Sweep	9
Used building material recycling	9
Implement Park System Plan	9
Low-emission land management in Parks	9
Increase MSW Recycling by 10%	9
Maximize Participation in Utility rebate programs	9
Biomass production	9
Green Building Program for Cities	9
Private, state, federal funds for renewables	9
Energy Improvement Fund	9
Install an active solar system at a County building site.	9
Modify waste management practices - County	9
Install a ground source heat pump (aka geothermal) at a County building site.	9
Work with CDA	9
10% Fuel Efficiency Increase by Class	9
Use grey/blackwater for non-potable uses	9
Energy Leadership Position	9
Site and Design Park Facilities for energy efficiency	10
Bikeway, sidewalk, fiber optic - reduce VMT	10
HourCar for Public Use	10
Promote low-impact land development thru loans	10
Convert Fleet Elec/Alt Fuel Vehicles	10
Solar Heating/Hot Water for Park Buildings	10
Efficient use of ag water	11
Build and Expand Transit Network (Cedar BRT)	12

Appendix G: Glossary of Terms

Biomass: Total dry weight of all living organisms that can be supported at each trophic level in a food chain. Also, materials that are biological in origin, including organic material (both living and dead) from above and below ground, for example, trees, crops, grasses, tree litter, roots, and animals and animal waste. Source: Nebraska Energy Office

Carbon dioxide: A colorless, odorless, non-poisonous gas that is a normal part of the ambient air. Carbon dioxide is a product of fossil fuel combustion. Although carbon dioxide does not directly impair human health, it is a greenhouse gas that traps terrestrial (i.e., infrared) radiation and contributes to the potential for global warming. Source: United Nations Framework Convention on Climate Change

Carbon equivalent: A metric measure used to compare the emissions of the different greenhouse gases based upon their global warming potential (GWP). Greenhouse gas emissions in the United States are most commonly expressed as "million metric tons of carbon equivalents" (MMTCE). Global warming potentials are used to convert greenhouse gases to carbon dioxide equivalents. Source: United Nations Framework Convention on Climate Change

Carbon footprint: a measure of the impact our activities have on the environment.. It relates to the amount of greenhouse gases produced in our day-to-day lives through burning fossil fuels for electricity, heating and transportation etc.

As this refers to measurement of all greenhouse gases produced and has units of tonnes (or kg) of carbon dioxide equivalent, Dakota County will reference greenhouse gas inventory in reference to the measure of the impact of activities in measurement of carbon dioxide (equivalents).

Carbon sequestration: The uptake and storage of carbon. Trees and plants, for example, absorb carbon dioxide, release the oxygen and store the carbon. Fossil fuels were at one time biomass and continue to store the carbon until burned. Source: United Nations Framework Convention on Climate Change

Cogeneration: Production of two useful forms of energy such as high-temperature heat and electricity from the same process. Source: United Nations Framework Convention on Climate Change

Combustion: Chemical oxidation accompanied by the generation of light and heat. Source: United Nations Framework Convention on Climate Change

Composting: Partial breakdown of organic plant and animal matter by aerobic bacteria to produce a material that can be used as a soil conditioner or fertilizer Source: United Nations Framework Convention on Climate Change

Cooling Degree Days: The number of degrees per day that the average daily temperature is above 65 degrees Fahrenheit. The daily average temperature is the mean of the maximum and minimum temperatures for a 24 hour period. Source: United Nations Framework Convention on Climate Change

Biodegradable: Material that can be broken down into simpler substances (elements and compounds) by bacteria or other decomposers. Paper and most organic wastes such as animal manure are biodegradable. Source: United Nations Framework Convention on Climate Change

British thermal unit (Btu): The quantity of heat required to raise the temperature of one pound of water one degree of Fahrenheit at or near 39.2 degrees Fahrenheit.

Emissions coefficient/factor: A unique value for scaling emissions to activity data in terms of a standard rate of emissions per unit of activity (e.g., grams of carbon dioxide emitted per barrel of fossil fuel consumed). Source: United Nations Framework Convention on Climate Change

Emissions: Releases of gases to the atmosphere (e.g., the release of carbon dioxide during fuel combustion). Source: United Nations Framework Convention on Climate Change

Electrical Energy: The generation or use of electric power over a period of time expressed in kilowatthours (kWh), megawatthour (MWh), or gigawatthours (GWh). There are several types of electrical energy. Source: Nebraska Energy Office

Energy conservation: Reduction or elimination of unnecessary energy use and waste. Source: United Nations Framework Convention on Climate Change

Energy: The capacity for doing work as measured by the capability of doing work (potential energy) or the conversion of this capability to motion (kinetic energy). Energy has several forms, some of which are easily convertible and can be changed to another form for useful work. Most of the world's convertible energy comes from fossil fuels that are burned to produce heat that is then used as a transfer medium to mechanical or other means in order to accomplish tasks.

Energy-efficiency: The ratio of the useful output of services from an article of industrial equipment to the energy use by such an article; for example, vehicle miles traveled per gallon of fuel (mpg). Source: United Nations Framework Convention on Climate Change

ENERGY STAR®: a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices. The energy performance of commercial and industrial facilities is scored on a 1-100 scale and those facilities that achieve a score of 75 or higher are eligible for the ENERGY STAR, indicating that they are among the top 25% of facilities in the country for energy performance.

Fossil fuel: A general term for buried combustible geologic deposits of organic materials, formed from decayed plants and animals that have been converted to crude oil, coal, natural gas, or heavy oils by exposure to heat and pressure in the earth's crust over hundreds of millions of years. Source: United Nations Framework Convention on Climate Change

Fossil fuel combustion: Burning of coal, oil (including gasoline), or natural gas. The burning needed to generate energy release carbon dioxide by-products that can include unburned hydrocarbons, methane, and carbon monoxide. Carbon monoxide, methane, and many of the unburned hydrocarbons slowly oxidize into carbon dioxide in the atmosphere. Common sources of

fossil fuel combustion include cars and electric utilities. Source: United Nations Framework Convention on Climate Change

Generation (Electricity): The process of producing electrical energy from other forms of energy; also the amount of electric energy produced, usually expressed in kilowatthours (kWh) or megawatthours (MWh). Gross generation is the electrical output at the terminals of the generator, usually expressed in megawatts (MW). Net generation is gross generation minus the service power requirements of the generating station itself. Source: Nebraska Energy Office

Global warming: The progressive gradual rise of the earth's surface temperature thought to be caused by the greenhouse effect and responsible for changes in global climate patterns. Source: United Nations Framework Convention on Climate Change

Greenhouse gas (GHG): Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrochlorofluorocarbons (HCFCs), ozone (O₃), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). Source: United Nations Framework Convention on Climate Change

Hydropower: Electrical energy produced by falling or flowing water.

Kyoto Protocol: Negotiated by more than 160 nations in December 1997, aims to reduce net emissions of certain greenhouse gases (primarily carbon dioxide (CO₂)). Each of the participating developed countries must decide how to meet its respective reduction goal during a five-year period (2008-2012). Specific ground rules remain to be worked out at future negotiating sessions. Source: United States Energy Information Administration

Landfill: Land waste disposal site in which waste is generally spread in thin layers, compacted, and covered with a fresh layer of soil each day.

LED: Light Emitting Diode

LEED® - Leadership in Energy and Environmental Design: a third-party certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality.

Load: An end-use device or customer that receives power from an electrical system.

Metering: The process and methods of utilizing devices to measure the amount and direction of electrical energy flow; particularly for end-use. Source: Nebraska Energy Office

Municipal solid waste (MSW): Residential solid waste and some non-hazardous commercial, institutional, and industrial wastes. This material is generally sent to municipal landfills for disposal

Natural gas: Underground deposits of gases consisting of 50 to 90 percent methane (CH₄) and small amounts of heavier gaseous hydrocarbon compounds such as propane (C₃H₄) and butane (C₄H₁₀).

Nonbiodegradable: Substance that cannot be broken down in the environment by natural processes.

Non-renewable energy: Used to describe energy sources that exist in a limited amount on Earth. Thus all available material could eventually be completely used up. Coal, oil and gas (see fossil fuels) are considered as non-renewable energy sources because the rate of their formation is so slow on human timescales that they we are using them without them being replaced. Uranium (used in nuclear power) is also non-renewable, although its reserves are very large compared to its rate of use. Source: Australian Academy of Science

Off-Peak Energy: Electrical energy supplied during a period of relatively low system demand as specified in a contract.

Peak Energy: Electrical energy supplied during a period of high system demand as specified in a contract.

Photovoltaic and solar thermal energy: Energy radiated by the sun as electromagnetic waves (electromagnetic radiation) that is converted into electricity by means of solar (i.e., photovoltaic) cells or useable heat by concentrating (i.e., focusing) collectors.

Point source: A single identifiable source that discharges pollutants into the environment. Examples are smokestack, sewer, ditch, or pipe.

Recycling: Collecting and reprocessing a resource so it can be used again.

Renewable energy: Energy obtained from sources that are essentially inexhaustible, unlike, for example, the fossil fuels, of which there is a finite supply. Renewable sources of energy include wood, waste, geothermal, wind, photovoltaic, and solar thermal energy. Source: United Nations Framework Convention on Climate Change

Solar energy: Direct radiant energy from the sun. It also includes indirect forms of energy such as wind, falling or flowing water (hydropower), ocean thermal gradients, and biomass, which are produced when direct solar energy interact with the earth. Source: United Nations Framework Convention on Climate Change

Source: Any process or activity that releases a greenhouse gas, an aerosol, or a precursor of a greenhouse gas into the atmosphere. Source: United Nations Framework Convention on Climate Change

Sustainability: stability in fiscal, social and physical systems, achieved through meeting the needs of the present without compromising the ability of future generations to meet their own needs. Source: Environment and Natural Resources Strategic plan

Vehicle miles traveled (VMT): One vehicle traveling the distance of one mile. Thus, total vehicle miles or kilometers is the total mileage traveled by all vehicles.