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STATE OF MINNESOTA

EVALUATION REPORT

Energy Conservation Improvement Program



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State law requires electric and natural gas utilities to devote a portion of their revenues to the Conservation Improvement Program (CIP). In 2003, utilities contributed roughly \$91 million to the program and offered rebates and other financial incentives to their customers who purchased energy efficient products, such as furnaces and motors. These efforts reduce the consumption of electric and natural gas and the need for new power plants and other energy infrastructure.

CIP needs to be cost-effective and well run for the state and its utilities to efficiently meet Minnesota's energy needs. We found that CIP's benefits outweigh its costs and the program has the potential to provide cost-effective conservation in the future. However, the Department of Commerce should improve its oversight of CIP.

This report was researched and written by John Patterson (project manager), Dan Jacobson, and Joe Touschner. We also received research assistance from the American Council for an Energy-Efficient Economy and Synapse Energy Economics. We received the full cooperation of the Department of Commerce.

Sincerely,

/s/ James Nobles

James Nobles
Legislative Auditor

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Summary

The Conservation Improvement Program (CIP) is cost effective.

Major Findings

- The benefits of the Conservation Improvement Program (CIP) are greater than its costs, and the program has the potential to provide cost-effective energy conservation in the future (pp. 22 and 41 of full report).
- On balance, the methods and assumptions used by investor-owned utilities to calculate the benefits and costs of their 2003 conservation activities tended to understate CIP's cost effectiveness (pp. 25-27).
- While cost-effective energy conservation is a primary goal of CIP, some Minnesota laws, rules, and procedures reduce the cost-effectiveness of the program to achieve a desired distribution of program benefits (p. 57).
- Utilities, low-income advocates, environmental groups, and the Department of Commerce have concerns about how conservation projects for low-income households are being carried out and evaluated (p. 59).
- The Department of Commerce conducts relatively thorough reviews of investor-owned utilities' conservation plans and activities, but the review process has some deficiencies (pp. 46 and 50).

- A Department of Commerce policy that limits communication within the department about CIP plans makes the department's review process inefficient and creates confusion (p. 55).

Key Recommendations

- The Legislature should give the Department of Commerce the authority to switch CIP from a two-year to a four-year program, and the department should increase the level of scrutiny that each CIP plan receives (p. 51).
- The Department of Commerce should work with the investor-owned utilities to eliminate the problems in the methodologies and assumptions that the utilities use to estimate CIP's benefits and costs (p. 38).
- The Department of Commerce should submit to the 2006 Legislature a plan for improving the performance, evaluation, and oversight of CIP projects for low-income households (p. 61).
- The Department of Commerce should eliminate the restriction on communication within the department about CIP (p. 56).

**Minnesota
utilities annually
spend roughly
\$91 million on
CIP projects.**

Report Summary

Under the Conservation Improvement Program (CIP), state law mandates that energy utilities dedicate a portion of their revenues for projects that will reduce the consumption of electricity and natural gas. The utilities collect these additional funds by adding an adjustment or surcharge to the electric and natural gas rates that they charge their customers. The utilities use the conservation funds primarily to provide their customers with rebates and other financial incentives to purchase energy-efficient products, such as furnaces, refrigerators, air compressors, and motors. The utilities also use CIP funding for home energy audits, consumer education, and research & development. In 2003, investor-owned utilities spent approximately \$65 million carrying out CIP, while municipal and cooperative utilities spent roughly \$26 million.

While the Department of Commerce oversees the CIP activities of both investor-owned and municipal/cooperative utilities, the department only has the authority to order changes in the conservation programs of the investor-owned utilities. The department's oversight of municipal and cooperative utilities is only advisory. Our evaluation focused primarily on the CIP requirements and activities of the investor-owned utilities. As a group, these utilities dominate CIP and are the focus of the department's oversight efforts.

The Department of Commerce oversees the investor-owned utilities' conservation activities by reviewing biennial CIP plans, plan modifications, and annual status reports that the utilities file with the department. In these reviews, the department ensures that the utilities are meeting their program requirements. One of the key

factors that the department examines is the cost-effectiveness of the utilities' conservation efforts.

In 2003, the Legislature debated whether to reallocate some CIP funding from conservation to renewable energy projects. During the debate, the Department of Commerce told the Legislature that CIP's benefits were seven times greater than its costs. However, some legislators have questioned the accuracy of this figure because they had seen benefit-cost ratios closer to two-to-one or three-to-one. In addition, they had heard that CIP has probably become less effective over time as the program funds the most cost-effective projects and leaves the less effective projects for the future. Consequently, they wondered how much longer CIP will be cost-effective and whether the state should change the program. To address these issues, the Legislature Audit Commission, at the request of the Department of Commerce, directed the Office of the Legislative Auditor to carry out an independent evaluation of CIP.

CIP is Cost-Effective

Analyses carried out by Minnesota's investor-owned utilities indicate that CIP's societal benefits were two or three times greater than its costs in 2003. The seven-to-one ratio reported by the Department of Commerce during the 2003 legislative session was based on benefits and costs from a utility perspective rather than a societal one. If the department had reported benefit-cost figures from both the societal and utility perspectives, the confusion would have been avoided.

While the benefit-cost figures reported by the investor-owned utilities show that CIP is cost effective, we found several problems in the methodologies and assumptions that they used in these calculations. However, on balance,

these problems tended to understate the cost effectiveness of CIP's 2003 projects and do not undermine the overall conclusion that CIP is cost effective. For example, if the investor-owned natural gas utilities had used up-to-date gas prices to assess their 2003 projects, their benefit-cost ratios would have been about 48 percent higher. Not all the estimation problems were the fault of the utilities. In some cases, the Department of Commerce required the utilities to use an assumption that created an estimation problem. In the case of gas prices, the department required the utilities to use 2002 prices rather than current prices.

The Department of Commerce should make sure that the investor-owned utilities use appropriate and consistent methods and assumptions. In some cases, this will involve improving the assumptions and methods established by the utilities. In other cases, the department needs to improve the methods and assumptions that it establishes.

Minnesota Has More Opportunities for Cost-Effective Conservation

CIP should continue to provide Minnesota with cost-effective conservation into the future. Over the last several years, the effectiveness of CIP has not declined much, if at all, with its societal benefit-cost ratios remaining in the range of two-to-one or three-to-one. In addition, studies carried out by three of Minnesota's investor-owned utilities indicate that, in 5 to 20 years, cost-effective conservation will have the potential to reduce the state's energy needs by between 10 and 30 percent.

CIP Can Be Improved

Although CIP is cost-effective, it has requirements and procedures that reduce its effectiveness. For example,

the Department of Commerce expects investor-owned utilities to carry out conservation projects for a broad range of customers, including commercial, industrial, and residential. However, conservation projects for residential customers are generally less cost-effective than projects for commercial and industrial customers. If the utilities carried out CIP to maximize the net benefit to society as a whole, they would devote all or most of the program funding to the commercial and industrial projects. While this distributional provision reduces the overall cost-effectiveness of CIP, it ensures that all types of customers who pay into the program have adequate access to the program's benefits. If the Legislature considers eliminating this provision, it needs to weigh its advantages against its disadvantages.

Utilities, environmentalists, low-income advocates, and the Department of Commerce have concerns about how CIP's low-income projects are operating. State law requires utilities to devote a portion of their CIP funding to conservation projects that assist low-income households. However, as measured in 2003, these projects were generally not cost effective. According to some stakeholders, the agencies that carry out these low-income conservation projects could do a better job selecting projects and houses. Others contend that the current methodology for measuring cost-effectiveness is inadequate. For example, the model does not include the utilities' benefits of lower bill collection costs and payment arrears and the broader societal benefits of greater housing stability. We recommend that the department submit a plan to the 2006 Legislature for addressing these issues and improving the performance of the low-income CIP projects.

State laws, rules, and procedures reduce the cost-effectiveness of CIP.

The Department of Commerce also needs to be more efficient and thorough in reviewing the investor-owned utilities' CIP activities. According to the utilities, the current review process can be burdensome because it requires them to file hundreds of pages of documents every two years and often to respond to more than a dozen additional information requests. Even with all this information, the department's review process has deficiencies. For example, the department does not have a copy of the model/software package that the investor-owned electric utilities use to estimate the benefits and costs of CIP. Thus, the department has a limited understanding of how these estimates are derived. We recommend that the Legislature give the Department of Commerce the authority to switch CIP from a two-year to a four-year program, which would allow the utilities to file CIP plans every four years rather than every two years. We also recommend that the department use the time and resources saved by reviewing fewer plans each year to review the plans more thoroughly. Because switching from a two-year program to a four-year program will substantially change the review process, the department should make the change gradually and test the longer filing cycle with one or two utilities first.

Finally, the Department of Commerce has a policy that restricts communication between its policy staff and analysts. When a CIP plan from an investor-owned utility is being reviewed, the two sides have traditionally only communicated through public documents. The restriction is intended to keep the department's review process impartial and open. While the policy staff (which includes the Commissioner and Deputy Commissioner) makes the department's final decisions about the

investor-owned utilities' CIP plans, the analysts evaluate the utilities' plans and make recommendations to the policy staff. Consequently, some people see the analysts as another advocacy group, similar to the utilities, environmental groups, low-income advocates, and business organizations.

However, we recommend that the Department of Commerce eliminate the communication restriction because it makes the department's review process inefficient and creates confusion. The restriction makes the department go through two discovery processes with the policy staff and analysts separately learning about each utility's CIP plan. Furthermore, the restriction limits the access that the Commissioner and the Deputy Commissioner, who are the department's final decision makers, have with their analysts. Within the department, the analysts have the greatest understanding of the CIP plans and conservation issues. Finally, eliminating the restrictions should not harm the public interest. In their recommendations, the analysts "advocate" for the investor-owned utilities to meet the program's requirements and for CIP to increase the net benefits of all Minnesotans combined, not the benefits of one particular segment of society.

The Department of Commerce needs to be more efficient and thorough in reviewing the utilities' CIP plans.

Introduction

Some legislators have questioned the effectiveness of the Conservation Improvement Program (CIP).

Under the Conservation Improvement Program (CIP), state law requires energy utilities to devote a portion of their operating revenues to fund projects that reduce the consumption of electricity and natural gas.¹ The utilities use these funds to provide rebates and other financial incentives to their customers who buy energy-efficient products, such as furnaces and motors. CIP is intended to help the state and utilities meet Minnesota's energy needs cost-effectively.

During the 2003 session, the Legislature debated whether to reallocate some CIP funding from conservation to renewable energy projects. As part of this debate, the Department of Commerce, which oversees CIP, indicated that the program's benefits were seven times greater than its costs. However, some legislators questioned these figures and wanted an independent assessment of the program. Consequently, the Legislature required the Department of Commerce to contract with the Office of the Legislative Auditor or another third party to review the program.² In response, Commerce Commissioner Glenn Wilson asked the Legislative Audit Commission to direct our office to evaluate CIP. In April 2004, the Commission approved the request.

To address the concerns raised by legislators about CIP, our evaluation answers the following questions:

- **How cost effective is CIP?**
- **Is CIP experiencing diminishing returns because the most cost-effective conservation activities have already been carried out?**
- **Do state statutes, rules, and procedures facilitate or hinder the selection and execution of cost-effective conservation activities?**
- **How well does the Department of Commerce oversee CIP?**

To answer these questions, we examined the cost effectiveness of CIP in calendar year 2003, the most recent year for which actual program results were available. We obtained not only the benefit-cost figures that the utilities computed but also the underlying inputs and assumptions that went into these calculations. We used this information to report the cost-effectiveness of CIP and assess the accuracy and reasonableness of the utilities' calculations. Because assessing the accuracy and reasonableness of the more technical assumptions is outside the expertise of our staff, we hired two consulting firms to assist in our review.

¹ *Minn. Stat.* (2004), §216B.241.

² *Laws of Minnesota* (1Sp2003), ch. 11, art. 3, sec. 13.

**The
Commissioner of
Commerce
requested that
the Legislative
Auditor evaluate
CIP.**

In addition, we examined the effectiveness of CIP over the last decade and reviewed Minnesota studies that have estimated the potential for cost-effective conservation in the future. We also reviewed (1) other energy-conservation literature; (2) CIP's statutes, rules, and procedures; and (3) the utilities' CIP plans and status reports. Finally, we interviewed Department of Commerce staff, officials from all 8 of Minnesota's investor-owned utilities, and representatives from 11 other stakeholder groups.

In this report, we summarize our consultants' findings and conclusion but do not include their complete reports. Because they reviewed the most technical aspects of estimating the cost-effectiveness of CIP, their reports are detailed and technical. Furthermore, they often contain information that the utilities have labeled "proprietary" or "trade secret." As a result, they are not available for public review. However, these reports contain very useful critiques of the utilities' methodologies and assumptions. Consequently, we have given the Department of Commerce the consultants' full reports, so that the department can ensure that the problems identified by the consultants are addressed. In addition, we gave each utility an opportunity to review and comment on the consultant's findings and conclusions. In order to protect trade secret information, we gave each utility only the portions of the consultants' reports that applied to that utility.

Chapter 1 of this report provides a brief overview of CIP. In Chapter 2, we examine the cost-effectiveness of the program. Finally, Chapter 3 assesses how well the state's process for reviewing and overseeing the utilities' conservation efforts is working. Most of the report focuses on the conservation efforts of investor-owned utilities, but we provide some information about conservation carried out by municipal and cooperative utilities. We focused on the investor-owned utilities because they account for a majority of the conservation carried out in Minnesota and generally provide more detailed information about the benefits and costs of their conservation programs.

The Conservation Improvement Program

SUMMARY

Under the Conservation Improvement Program (CIP), Minnesota requires its energy utilities to set aside a portion of their operating revenues for projects that reduce the consumption of electricity and natural gas. With these funds, the utilities offer rebates to their customers who purchase energy-efficient products, such as furnaces or motors. In 2003, Minnesota's utilities devoted roughly \$91 million to CIP. These efforts benefited not only the energy customers who purchased energy-efficient products but also other members of society. Customers who participate in CIP benefit by consuming less energy and having lower energy bills. Other members of society benefit by having utilities avoid the cost of constructing new power plants, transmission lines, natural gas pipelines, and distribution systems. Without conservation, the utilities would need this additional infrastructure to meet their customers' energy needs and would pass the resulting costs onto all their customers. Finally, conservation benefits overall society by reducing the environmental damage caused by burning fossil fuels.

State law requires energy utilities to fund CIP.

The topic of energy conservation is very technical and complex and covers issues such as energy markets, generation and distribution systems, and energy efficiencies. Consequently, a basic understanding of these issues is necessary to assess the performance of the Conservation Improvement Program (CIP). This chapter addresses the following questions:

- **What is the Conservation Improvement Program, and how does it work?**
- **What types and levels of conservation are carried out?**

PROGRAM DESCRIPTION

Unlike most other state programs, the Legislature does not appropriate state tax dollars to CIP. Rather, state law mandates energy utilities to devote a portion of their revenues for projects that will reduce the consumption of electricity and natural gas. State law requires (1) electric utilities that operate nuclear-power plants to devote at least 2.0 percent of their gross operating revenue to CIP, (2) other electric utilities to devote at least 1.5 percent of their revenue, and (3) natural gas utilities to devote at least 0.5 percent.¹ The utilities recover these

¹ *Minn. Stat.* (2004), §216B.241, subd. 1a(a) and 1b(b). As specified in *Minn. Stat.* (2004), §216B.241 subd. 1b(a)(3), the CIP requirements do not apply to municipal utilities with \$5 million or less of natural gas sales to retail customers.

CIP costs by increasing the electricity and natural gas rates they charge their customers.

The utilities use the conservation funds primarily to provide their customers with financial incentives (including rebates, grants, and low-interest loans) to purchase or invest in energy-efficient products and processes. The utilities also use CIP funding for projects that have a more indirect impact on energy conservation. These indirect projects include home energy audits, consumer education, and research & development.

CIP provides rebates to customers who purchase energy efficient products.

The types of conservation projects sponsored by the utilities vary by the type of customer. For residential customers, the utilities provide rebates for such things as energy-efficient furnaces, boilers, air conditioners, refrigerators, and light bulbs. The utilities also help pay for home energy audits, which identify steps that customers may take to improve the energy efficiency of their homes. The utilities also have projects that exclusively target low-income households. These projects include home weatherization and appliance replacement.

Utilities provide a wide range of conservation services for their commercial and industrial customers. For example, utilities provide rebates and other financial incentives for such things as energy-efficient furnaces, boilers, lighting systems, air conditioners, motors, air compressors, and refrigeration systems. In addition, just like the residential customers, the utilities offer business customers energy audits for their facilities. The business customers may also receive a range of more specialized services. For example, Xcel Energy offers design assistance to businesses that want to build a new energy-efficient facility. Xcel also offers a program called “building recommissioning” that improves the operating efficiency of existing systems (such as heating, cooling, ventilation, or pumping) by adjusting the systems’ controls (such as start/stop times and sequences of operations).² Finally, many utilities offer their commercial and industrial customers customized energy-efficiency services if the customers have unique operations or systems that cannot be served by the standard conservation products offered in the utilities’ conservation programs. For example, an industrial customer could replace its laser-cutting machine with a more efficient one.

Some of the rebates offered by utilities are uniform for all customers. For example, in 2003, CenterPoint Energy Minnegasco offered a \$100 rebate to anyone who bought a 92 percent efficient furnace.³ In contrast, utilities negotiate with their customers the rebates for the customized conservation projects. For these custom projects, the utilities generally have guidelines or limits for the size of the rebates. For example, a utility may have a policy that negotiated rebates cannot reduce the customer’s payback period to less than two years.⁴ A utility might also limit the rebate to no more than half of the incremental cost between

² Xcel Energy, *Biennial Plan for 2003-2004 Minnesota Natural Gas and Electric Conservation Improvement Program* (Minneapolis, June 2002), 74 and 76.

³ Reliant Energy Minnegasco (now CenterPoint Energy), *Biennial CIP/DSM Plan, 2003-2004* (Minneapolis, June, 2002), 22.

⁴ The payback period refers to the number of years it will take the customer to recover the additional funds that were spent to buy the high-efficiency product. The customer recovers the investment costs by paying lower energy bills and receiving the rebate.

the price of the high-efficiency product and the price of the regular-efficiency product that the customer would have likely bought without the rebate.

Purpose of CIP

CIP is part of Minnesota's strategy for meeting the state's energy needs in the least costly fashion. State law requires electric utilities to prepare "integrated resource plans." These are intended to show the mix of electric generation and conservation that will achieve the least costly path for the utility to meet its customers' future electric needs.⁵ CIP is the primary mechanism by which the electric utilities achieve the conservation targets laid out in the resource plans. While state law does not require natural gas utilities to develop resource plans, the state still requires these utilities to sponsor cost-effective conservation projects under CIP.

Conservation is a critical part of Minnesota's efforts to meet its residents' energy needs. On an annual basis, newly implemented CIP projects reduce electricity consumption by approximately 0.8 percent.⁶ While this figure may seem small, these activities have a significant impact on the annual rate that electricity consumption grows. After accounting for new conservation activities, the Department of Commerce expects electricity consumption to annually increase by about 1.5 percent.⁷ In contrast, without new conservation activities, consumption would annually increase by roughly 2.3 percent.⁸

CIP saves energy, reduces pollution, and reduces the need for more power plants and other energy infrastructure.

A conservation program is cost-effective if the benefits of the program outweigh its costs. There are three primary benefits. First, conservation helps the utilities and their customers avoid the operating costs of providing more electricity and natural gas. These costs include buying fuel and operating and maintaining power plants. In the conservation field, these benefits are referred to as "*avoided energy costs*." Second, conservation helps the utilities and their customers avoid or delay the capital costs of adding new system capacity. Without conservation, utilities would have a greater need to construct new power plants, transmission lines, natural gas pipelines, and distribution systems. These benefits are referred to as "*avoided capacity (or demand) costs*." Third, conservation reduces the environmental damage caused by burning fossil fuels and the resulting smog, acid

⁵ *Minn. Stat.* (2004), §216B.2442, subd.1 - 2. Only utilities with the capability of generating 100,000 kilowatts or more of electric power and serving the needs of 10,000 retail customers in Minnesota need to file a resource plan with the Public Utilities Commission.

⁶ This estimate is not intended to be precise but reflect the relative magnitude of CIP's impact. According to data that the investor-owned utilities reported to the Department of Commerce, customers of Minnesota's investor-owned utilities annually consume a little more than 40,000 gigawatt-hours of electricity. In comparison, new CIP activities increase annual conservation levels of the investor-owned utilities' customers by about 325 gigawatt-hours over what they were already conserving.

⁷ Department of Commerce, *Energy Policy and Conservation Report (Draft)* (St. Paul, July 2004), 13.

⁸ This is an Office of the Legislative Auditor estimate based on (1) the Department of Commerce's estimate that energy consumption will annually grow by 1.5 percent after accounting for new conservation activities and (2) an expectation that newly implemented CIP projects will continue to annually reduce electricity consumption by an additional 325 gigawatt-hours. See footnotes 6 and 7.

rain, and global warming. These benefits are referred to as “*avoided environmental damage costs*.”⁹

There are two primary costs of conservation. First, there is the higher price that is paid for energy-efficient products. The customers pay for part of these costs, and CIP’s rebates pay for the rest. Second, the utilities incur costs to administer and carry out CIP projects. The utilities pass these costs onto their customers by increasing the energy rates that they charge.

The state tries to ensure that utilities use CIP to achieve broad social benefits.

There are several arguments for why the state should intervene in the energy market and encourage Minnesotans to invest in conservation. First, without intervention, energy consumers would not invest enough in conservation to maximize the net benefit to society. From a societal perspective, investments should be made in conservation as long as the societal benefits outweigh the societal costs. However, energy consumers investing in high-efficiency products have a narrower perspective. Some of the benefits of conservation (such as avoiding the construction of new power plants and avoiding environmental damage) go to all ratepayers and society as a whole, not just the individual or business making the investment decision. Energy consumers who invest in conservation typically do not take into account the benefits that accrue to other individuals when making their investments and consequently under-invest from a societal perspective. For example, a family that is looking for a new refrigerator may figure out that the lower energy bills that would come with a high-efficiency unit do not quite pay for the higher price. However, if the family also considered the broader benefits of delaying the construction of a new power plant and avoiding environmental damage, the benefits of the high-efficiency refrigerator would likely outweigh its higher cost. To overcome this barrier, Minnesota has added CIP rebates to the customer’s investment decision, which makes the high-efficiency refrigerator cost effective for the customer and leads to greater net benefits for society.

Government intervention in conservation serves a second function by providing energy consumers with information about the benefits of conservation. Without this information, prospective investors may not know for sure how much energy a high-efficiency product will actually save. Consequently, energy consumers may be reluctant to invest in high-efficiency products. However, CIP helps overcome this uncertainty and reluctance. Specifically, CIP’s sponsorship of a product provides information (or a seal of approval) to the customer that the investment should be cost effective.

Finally, the state of Minnesota may wish to intervene because investor-owned utilities may not have an incentive to promote energy conservation. These utilities are in the business of selling energy to maximize their profits, but conservation lowers their sales and potentially their profits. Consequently, without the state mandate requiring utilities to invest in and carry out conservation programs, it is unlikely that investor-owned utilities would encourage their customers to carry out much conservation. To ensure that investor-owned utilities carry out CIP to

⁹ California Public Utilities Commission and California Energy Commission, *Standard Practice Manual: Economic Analysis of Demand Side-Management Programs* (December 1987); and California Public Utilities Commission and California Energy Commission, *California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects* (October 2001).

maximize society's net benefit and not to minimize their lost profits, the state has given the Department of Commerce the responsibility for approving and overseeing the CIP activities of utilities.

In contrast to investor-owned utilities, there is theoretically less need for the department to closely oversee the conservation activities of municipal and cooperative utilities. These utilities are non-profits and not accountable to shareholders. Rather, municipal utilities are accountable to the municipalities' elected officials and residents, who are the utilities' customers. Likewise, cooperative utilities are accountable to their members, who are their customers. Municipal and cooperative utilities should provide their customers with the mix of energy and conservation that serves the best interest of the customers, rather than on the mix that maximizes profits. However, in the real world, municipal and cooperative utilities are often small operations and may not have the resources or expertise to determine the optimal mix of energy and conservation. Determining if municipal and cooperative utilities are actually providing their customers with the optimal mix was beyond the scope of this study.

Program Requirements and Procedures

In order to comply with state laws, rules, and policies, utilities must meet several CIP requirements, which are different for investor-owned utilities and for municipal and cooperative utilities. Table 1.1 summarizes these requirements. In general, the requirements for the investor-owned utilities are more extensive. Most notably, the Department of Commerce has a lengthy process for approving and overseeing the CIP activities of the investor-owned utilities, while the department's oversight of municipal and cooperative utilities is less substantial.

The Department of Commerce reviews CIP plans submitted by energy utilities.

With respect to the investor-owned utilities, the department's oversight starts with the utilities submitting their biennial CIP plans. The natural gas utilities submit their plans by June 1 of even numbered years, and the electric utilities submit their plans by June 1 of odd numbered years.¹⁰ After receiving the plans, the department goes through the review processes outlined in Table 1.2 to determine if the utilities' plans meet the requirements listed in Table 1.1. If a utility does not meet a program requirement, the Commissioner of Commerce will typically require the utility to modify its CIP plan to comply. As part of the review process, the Commissioner also sets CIP spending, participation, energy savings, and capacity savings goals for each utility. If utilities want to make substantial changes to their conservation programs after having their CIP plans approved by the Commissioner, they must submit plan modifications for approval.

As shown, in Table 1.1, the department also requires the investor-owned utilities to submit annual status reports that discuss the utilities' CIP activities and achievements from the previous year. The department reviews these reports to monitor program activity and verify that the utilities are achieving the conservation goals set by the department. If necessary, after reviewing the status reports, the department will require the utilities to make programmatic changes.

¹⁰ Xcel Energy is a combined electric and natural gas utility and submits its joint CIP plan (for both electric and natural gas conservation) in even numbered years. Interstate Power and Light is also a combined electric and natural gas utility but submits its joint CIP plan in odd numbered years.

Table 1.1: CIP Program Requirements and Expectations

Investor-owned utilities are required to:

- Submit plans to the Department of Commerce every two years that describe and outline the utilities' conservation programs,^a
- Submit status reports to the department every year that present the utilities' conservation activities and achievements from the previous year,^b
- Meet their minimum spending requirements (2.0 percent of gross operating revenues for electric utilities with nuclear power plants, 1.5 percent of revenues for other electric utilities, and 0.5 percent of revenues for natural gas utilities),^a
- Have cost-effective conservation projects,^a
- Meet the conservation goals set in their "integrated resource plans" (if an electric utility),^b
- Maintain their historical funding for projects that serve renters and low-income customers,^a
- Have projects that strongly encourage the use of energy-efficient lighting (if an electric utility),^a
- Serve a wide range of customer types (residential, commercial, and industrial),^b
- Offer rebates for a wide-range of conservation products and processes,^c
- Spend no more than 10 percent of the minimum spending requirement on research and development,^a
- Spend no more than 3 percent of the minimum spending requirement on evaluation,^a
- Spend no more than 5 percent of CIP funds on distributed generation and renewable resources,^a and
- Meet energy and capacity savings goals that are set by the Commissioner of Commerce.^b

Municipal and cooperative utilities are required to:

- Submit plans to the department every two years that describe and outline the utilities' conservation programs,^a
- Meet their minimum spending requirements (1.5 percent of revenues for electric utilities and 0.5 percent of revenues for natural gas utilities),^a
- Devote a portion of their CIP funding to projects that serve the needs of renters and low-income customers,^a
- Have projects that strongly encourage the use of energy-efficient lighting (if an electric utility),^a
- Spend no more than 10 percent of the minimum spending requirement on research and development,^a and
- Spend no more than 3 percent of the minimum spending requirement on evaluation.^a

^a*Minn. Stat.* (2004) §216B.241

^b*Minn. Rule* (2003) ch. 7690.0100 – 7690.1600

^cMinnesota Department of Commerce, unpublished document titled "Criteria the Minnesota Department of Commerce Uses for Evaluating CIP Projects For Investor-Owned Utilities (Utility)," (undated), received by the Office of the Legislative Auditor on April 6, 2004.

SOURCE: Office of the Legislative Auditor.

CIP requirements for investor-owned utilities are more extensive than the requirements for municipal and cooperative utilities.

Table 1.2: The Department of Commerce’s Review Process for CIP Plans From Investor-Owned Utilities

CIP Review Activity	Deadline
Each investor-owned utility files a biennial CIP plan	June 1 of even numbered years for natural gas utilities and June 1 of odd numbered years for electric utilities
The Department of Commerce submits a notice that a utility’s plan is complete and contains all the required information	10 calendar days after the CIP plan is filed with the department
Outside parties submit comments and alternative conservation projects	30 calendar days after the department issues the notice of completion
The utility responds to the comments and alternative projects	15 calendar days after the comments and alternatives are filed with the department
The department’s analysts submit a proposed decision to the Commissioner of Commerce concerning the proposed CIP plan	30 calendar days after the reply comments are due
Parties submit to the department written comments about the analysts’ proposed decision	15 calendar days after the proposed decision
The Commissioner of Commerce issues his or her final decision	30 calendar days after the written comments on the proposed decision are due

SOURCE: *Minn. Stat* (2004), §216B.241, subd. 2(a); and *Minn. Rules* (2003), ch. 7690.1440, subp. 2.

Investor-owned utilities receive a bonus payment for meeting CIP program goals.

Besides overseeing the CIP activities of the investor-owned utilities, the state has another mechanism to encourage these utilities to carry out conservation programs that maximize society’s overall benefit. Investor-owned utilities that meet or exceed the energy savings goals established by the Department of Commerce receive a financial bonus.¹¹ The size of the bonus reflects the amount by which a utility exceeds its energy savings goal—the bigger the difference, the bigger the bonus.¹² The utilities receive the bonus by being allowed to increase the rates they charge their customers for electricity or natural gas. Because energy utilities are monopolies, the Public Utilities Commission regulates the electric and natural gas rates they can charge their customers. In 2003, these incentive payments totaled about \$11 million for all the investor-owned utilities, which represented a relatively small share of CIP’s net benefit. The investor-owned utilities’

¹¹ Public Utilities Commission, *Order Approving Demand Side Management Financial Incentive Plans* (St. Paul, April 7, 2000).

¹² For the purpose of calculating the bonus payment, the state expects a utility to meet its “statutory-spending, energy-savings goal.” This is not the approved goal in the Department of Commerce’s final decision for the CIP plan, but the energy saving goal that the department would expect the utility to achieve if the utility just spent the statutory minimum on CIP. In some cases, the approved goal in the department’s final decision reflects a spending level that is higher than the statutory minimum.

**The
Commissioner of
Commerce's CIP
recommendations
for municipal
and cooperative
utilities are
advisory and
non-binding.**

conservation efforts in 2003 generated an estimated \$238 million in net benefits for Minnesota.¹³

As mentioned earlier, the Department of Commerce's review process for the municipal and cooperative utilities is less formal than the process for the investor-owned utilities. Every two years, these utilities submit CIP plans to the department for review. The plans include (1) descriptions of their conservation programs, (2) evaluations of spending and investment levels, and (3) analyses of the energy savings and cost-effectiveness of the conservation programs.¹⁴ The department is required to review these plans and make recommendations where appropriate.¹⁵ Unlike the conservation activities of the investor-owned utilities, state statutes and rules do not establish a deadline for the department's review of these CIP plans, and the Commissioner's recommendations are advisory and non-binding. The department also has just started having the municipal and cooperative utilities file annual status reports.

ENERGY CONSERVATION IN MINNESOTA

In the rest of this report, we will use several technical terms to discuss energy and capacity savings. While it is not critical for the reader to fully understand these terms, it is important to have a general understanding. The capacity of a power plant or an entire electric system is expressed in "kilowatts" (kW), which is a measure of the amount of electricity that can potentially be generated at a given point in time. Capacity can also be expressed in "megawatts" (MW), which are 1,000 kilowatts, or "gigawatts" (GW), which are 1 million kilowatts. Thus, when a conservation project avoids or delays the construction of a new power plant, the savings are expressed as kW or MW savings. In contrast, the amount of energy actually generated or consumed is expressed in terms of "kilowatt-hours" (kWh), "megawatt-hours" (MWh), or "gigawatt-hours" (GWh). Correspondingly, when a conservation project reduces that amount of electricity actually generated, the savings are expressed as kWh, MWh, and GWh savings. With respect to natural gas, energy and capacity savings are typically expressed in "thousands of cubic feet" or "Mcf."

When we examined Minnesota's energy markets and conservation activities, we found that:

- **Two utility companies—Xcel Energy and CenterPoint Energy Minnegasco—dominate both the provision and conservation of energy in Minnesota.**

¹³ Department of Commerce, unpublished table of each utilities' net benefits and incentive payments for the 2003 CIP program, received by the Office of the Legislative Auditor on October 26, 2004. In this context, net benefits are defined as the net present value of the avoided energy and capacity costs less the utilities' CIP spending.

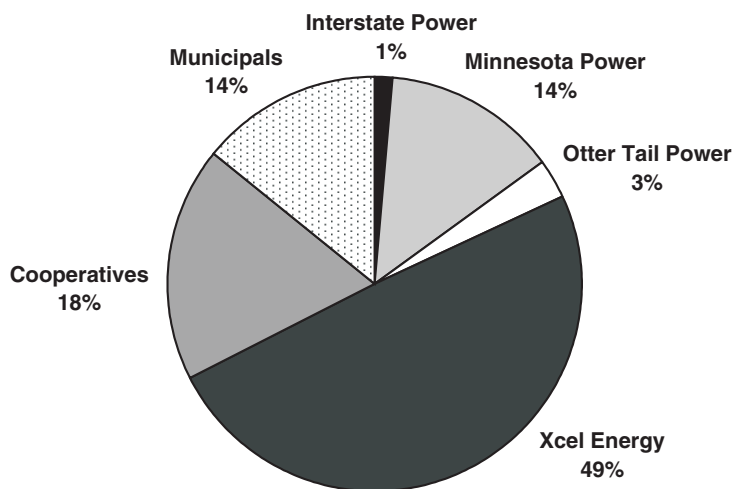
¹⁴ Small municipal electric utilities (those with less than 60 million kilowatt hours of annual electricity sales) are not required to submit this full CIP report but only required to submit a letter identifying the utility's minimum spending requirement and certifying that the utility has complied with the requirement.

¹⁵ *Minn. Stat.* (2004), §216B.241, subd. 1b(g).

For electricity, Minnesota has 4 main investor-owned utilities (Interstate Power & Light, Minnesota Power, Otter Tail Power, and Xcel Energy), 126 municipal utilities, and 46 distribution cooperative utilities.¹⁶ Figure 1.1 shows the proportion of Minnesota’s electricity consumption served by these utilities. Xcel provides about half of the electricity consumed in Minnesota. Consequently, as shown in Table 1.3, Xcel also accounts for roughly half of the statewide CIP spending. Xcel’s CIP also provides a large share of the energy and capacity savings generated by the investor-owned utilities.

Figure 1.1: Share of Minnesota Electricity Consumption Served by Each Utility, 2001

Xcel Energy dominates the electricity market in Minnesota.



SOURCE: Office of the Legislative Auditor analysis of data from the Department of Commerce, *The Minnesota Utility Data Book: A Reference Guide to Minnesota Electric and Natural Gas Utilities, 1965-2001* (St. Paul, undated),

For natural gas, Minnesota has 6 investor-owned utilities (CenterPoint Energy Minnegasco, Great Plains Natural Gas, Interstate Power and Light, Northern Minnesota Utilities, Peoples Natural Gas, and Xcel Energy) and 29 municipal utilities.¹⁷ Figure 1.2 shows that CenterPoint Energy Minnegasco provides about half of the natural gas consumed in Minnesota. Consequently, as shown in Table 1.4, CenterPoint Energy Minnegasco also accounts for about half of CIP’s statewide spending and energy savings.

We also found that:

- **Commercial and industrial customers account for most of the energy consumption and conservation in Minnesota.**

¹⁶ Department of Commerce, *The Minnesota Utility Data Book: A Reference Guide to Minnesota Electric and Natural Gas Utilities, 1965-2001* (St. Paul, undated), 3. Minnesota is served by a fifth investor-owned electric utility (Northern Wisconsin Electric Company), but the utility serves less than 100 customers.

¹⁷ Department of Commerce, *The Minnesota Utility Data Book, 1965-2001*, 106.

Table 1.3: 2003 Electric Conservation Levels

Utility	Expenditures (Millions)	Energy Savings (Millions of kWh)	Capacity Savings (kW)
Investor-Owned Utilities			
Interstate Power & Light	\$ 3	21	4,072
Minnesota Power ^a	5	48	11,152
Otter Tail Power	2	14	2,984
Xcel Energy	<u>42</u>	<u>245</u>	<u>110,607</u>
Subtotal	\$52	328	128,815
Cooperative Utilities	19	N/A	N/A
Municipal Utilities	<u>6^b</u>	N/A	N/A
Statewide Total	\$77	N/A	N/A

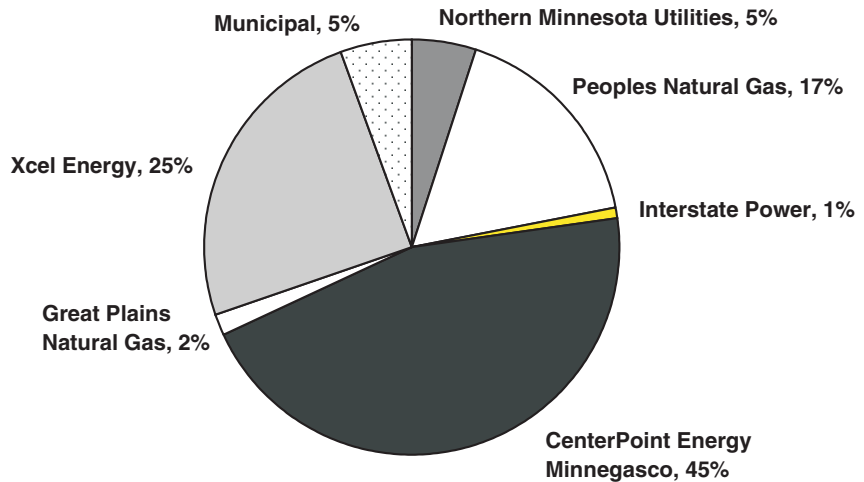
NOTE: N/A means "not available."

^aExcludes CIP projects for Minnesota Power's large industrial customers who have not opted out of CIP.

^bBased on municipal utilities that have reported results by January 11, 2005. The figure is an underestimate because not all utilities had reported results.

SOURCE: Department of Commerce database of CIP outcomes, *Electric dbase 5-04.xls*, received by the Office of the Legislative Auditor on July 1, 2004; and Department of Commerce, unpublished tables of actual CIP spending as reported by municipal and cooperative utilities, received by the Office of the Legislative Auditor on January 11, 2005.

Figure 1.2: Share of Minnesota Natural Gas Consumption Served by Each Utility, 2001



SOURCE: Office of the Legislative Auditor analysis of data from the Department of Commerce, *The Minnesota Utility Data Book: A Reference Guide to Minnesota Electric and Natural Gas Utilities, 1965-2001* (St. Paul, undated).

CenterPoint Energy Minnegasco dominates the natural gas market in Minnesota.

Table 1.4: 2003 Natural Gas Conservation Levels

<u>Utility</u>	<u>Expenditures (Millions)</u>	<u>Energy Savings (Mcf)</u>
Investor-Owned Utilities		
CenterPoint Energy Minnegasco	\$6.6	867,687
Great Plains Natural Gas	0.2	36,627
Interstate Power & Light	0.3	21,595
Northern Minnesota Utilities	0.4	24,788
Peoples Natural Gas	1.6	121,498
Xcel Energy	<u>3.9</u>	<u>708,864</u>
Subtotal	\$13.1	1,781,059
Municipal Utilities ^a	<u>1.1</u>	N/A
Statewide Total	\$14.2	N/A

NOTE: N/A means "not available."

^aExpected 2003 spending levels (not actuals).

SOURCE: Department of Commerce database of CIP outcomes, *Gas dbase 6-04.xls*, received by the Office of the Legislative Auditor on July 1, 2004; and Department of Commerce, unpublished tables of expected CIP spending as reported by municipal utilities, received by the Office of the Legislative Auditor in August 2004.

While most electric and natural gas customers are residential households, commercial and industrial businesses consume more energy in Minnesota.

While most electric and natural gas customers in Minnesota are residential households, commercial and industrial businesses consume most of the electricity and natural gas. Tables 1.5 and 1.6 provide a breakdown of each utility's clientele and sales in 2001. For all the utilities listed, residential customers accounted for a sizable majority of customers. In contrast, commercial and industrial customers consumed the majority of energy provided. Commercial and industrial customers dominate Minnesota Power's service area in particular. These customers accounted for 89 percent of the electricity consumed. In fact, seven very large customers (five taconite facilities and two paper mills) accounted for over 50

Table 1.5: Electric Utility Operations in Minnesota, 2001

<u>Utility</u>	<u>Total</u>	<u>Customers</u>		<u>Total MWh</u>	<u>Electricity Provided</u>	
		<u>Percentage of Utility Total</u>			<u>Percentage of Utility Total</u>	
		<u>Residential</u>	<u>Commercial & Industrial</u>		<u>Residential</u>	<u>Commercial & Industrial</u>
Interstate Power & Light	40,480	79%	21%	763,355	34%	66%
Minnesota Power	122,401	82	18	8,311,392	11	89
Otter Tail Power	58,449	80	20	1,896,431	26	74
Xcel Energy	1,139,485	89	11	29,871,615	27	73
Cooperative Utilities	647,200	69	31	11,069,000	40	60
Municipal Utilities	326,459	85	15	8,599,000	28	72

NOTE: The "commercial & industrial" category includes farms and all other non-residential customers.

SOURCE: Office of the Legislative Auditor Analysis of data from the Department of Commerce, *The Minnesota Utility Data Book: A Reference Guide to Minnesota Electric and Natural Gas Utilities, 1965-2001* (St. Paul, Undated).

Table 1.6: Natural Gas Utility Operations in Minnesota, 2001

Utility	Customers			Natural Gas Provided		
	Total	Percentage of Utility Total		Total Mcf	Percentage of Utility Total	
		Residential	Commercial & Industrial		Residential	Commercial & Industrial
CenterPoint Minnegasco	711,265	91%	9%	142,052,496	46%	54%
Great Plains Natural Gas	20,531	86	14	5,440,410	29	71
Interstate Power & Light	10,367	88	12	2,142,090	42	58
Northern Minnesota Utilities	36,218	85	15	15,564,729	20	80
Peoples Natural Gas	146,036	90	10	53,302,975	24	76
Xcel Energy	383,109	92	8	77,779,299	46	54
Municipal Utilities	72,682	92	8	16,553,872	43	57

NOTE: Figures include natural gas that some customers purchase from natural gas suppliers/wholesalers but is delivered/transported through the utilities' distribution systems. The "commercial & industrial" category includes all non-residential customers.

SOURCE: Office of the Legislative Auditor analysis of data from the Department of Commerce, *The Minnesota Utility Data Book: A Reference Guide to Minnesota Electric and Natural Gas Utilities, 1965-2001* (St. Paul, undated).

Commercial and industrial energy conservation projects produce more energy savings per dollar of CIP spending than residential projects.

percent of Minnesota Power's electricity sales in 2002.¹⁸ These seven facilities (along with three large facilities in Xcel's electric service territory) have taken advantage of a statutory provision that allows facilities that have a peak electrical demand of at least 20 megawatts to opt out of CIP and avoid paying the program's rate adjustment in their electric and natural gas bills.¹⁹

As Tables 1.7 and 1.8 show, the investor-owned utilities have split CIP funding between commercial/industrial and residential customers. On a statewide basis, commercial/industrial customers received more funding than the residential customers for electric conservation, while residential customers received a little more funding than the commercial/industrial customers for natural gas conservation.

However, for both electricity and natural gas, conservation projects for commercial and industrial customers accounted for 75 to 91 percent of the energy and capacity savings statewide. The commercial and industrial projects produced more energy savings per dollar of CIP spending than the residential projects.²⁰

The percentage of Minnesota Power's CIP funding (shown in Table 1.7) going to commercial and industrial customers is relatively small for two reasons. First, as discussed earlier, seven of its largest customers have opted out of CIP. These facilities do not pay into CIP and are ineligible to receive any program funding.

¹⁸ Department of Commerce, *Analysis and Recommendations of the Advocacy Staff of The Energy Division of the Minnesota Department of Commerce, Regarding Minnesota Power, Inc.'s Conservation Improvement Program 2004-2005* (St. Paul, September 2003), 6. The electricity sales are based on Minnesota Power's gross operating revenue coming from the seven facilities that have opted out of CIP.

¹⁹ *Minn. Stat.* (2004), §216B.241, subd. 1a(b).

²⁰ Table 1.8 does not include capacity savings for natural gas because the Department of Commerce requires all the investor-owned natural gas utilities to assume that capacity savings are 1 percent of the energy savings. Consequently, the proportion of capacity savings coming from each customer segment is exactly the same as the proportion of energy savings.

Table 1.7: Proportion of Electric CIP Spending and Savings by Customer Class for Each Investor-Owned Utility, 2003

Utility and Customer Class	Spending	Energy Savings	Capacity Savings
Interstate Power & Light			
Commercial & Industrial	77%	98%	89%
Residential	<u>23</u>	<u>2</u>	<u>11</u>
Subtotal	100%	100%	100%
Minnesota Power ^a			
Commercial & Industrial	39%	55%	56%
Residential	<u>61</u>	<u>45</u>	<u>44</u>
Subtotal	100%	100%	100%
Otter Tail Power			
Commercial & Industrial	66%	92%	88%
Residential	<u>34</u>	<u>8</u>	<u>12</u>
Subtotal	100%	100%	100%
Xcel Energy			
Commercial & Industrial	68%	97%	76%
Residential	<u>32</u>	<u>3</u>	<u>24</u>
Subtotal	100%	100%	100%
Statewide Total			
Commercial & Industrial	66%	91%	75%
Residential	<u>34</u>	<u>9</u>	<u>25</u>
Subtotal	100%	100%	100%

NOTES: The spending percentages exclude spending for general CIP activities (such as research & development and overhead) that are not assigned to a customer class. The "residential" customer class includes CIP projects targeted exclusively for low-income customers.

^aExcludes CIP projects for Minnesota Power's large industrial customers who have not opted out of CIP.

SOURCE: Office of the Legislative Auditor analysis of Department of Commerce's database of CIP outcomes, *Electric dbase 5-04.xls*, received by the Office of the Legislative Auditor on July 1, 2004.

Second, we have excluded Minnesota Power's remaining large industrial customers from Table 1.7 because there is a disconnect between the level of funding that these customers receive and the resulting energy savings. Minnesota Power allocates CIP funding to these customers and allows them to reserve it until they have a conservation project ready to be implemented, which may be several years after the customer was allocated the funding.²¹ (Minnesota Power is the only utility that allows its customers to do this, and it only grants this flexibility to its largest industrial customers.) Therefore, the conservation projects for these customers are often concentrated in a few years, and the resulting energy savings do not coincide with the year in which the funding was provided.

Finally, we found that:

- **The level of CIP funding has fluctuated substantially over the last decade.**

²¹ Minnesota Power, *2004-2005 Conservation Improvement Program*, (Duluth, May 2003), 35.

Table 1.8: Proportion of Natural Gas CIP Spending and Savings by Customer Class for Each Investor-Owned Utility, 2003

<u>Utility and Customer Class</u>	<u>Spending</u>	<u>Energy Savings</u>
CenterPoint Energy Minnegasco		
Commercial & Industrial	57%	82%
Residential	<u>43</u>	<u>18</u>
Subtotal	100%	100%
Great Plains Natural Gas		
Commercial & Industrial	10%	83%
Residential	<u>90</u>	<u>17</u>
Subtotal	100%	100%
Interstate Power & Light		
Commercial & Industrial	20%	36%
Residential	<u>80</u>	<u>64</u>
Subtotal	100%	100%
Northern Minnesota Utilities		
Commercial & Industrial	35%	64%
Residential	<u>65</u>	<u>36</u>
Subtotal	100%	100%
Peoples Natural Gas		
Commercial & Industrial	24%	53%
Residential	<u>76</u>	<u>47</u>
Subtotal	100%	100%
Xcel Energy		
Commercial & Industrial	47%	80%
Residential	<u>53</u>	<u>20</u>
Subtotal	100%	100%
Statewide Total		
Commercial & Industrial	47%	79%
Residential	<u>53</u>	<u>21</u>
Subtotal	100%	100%

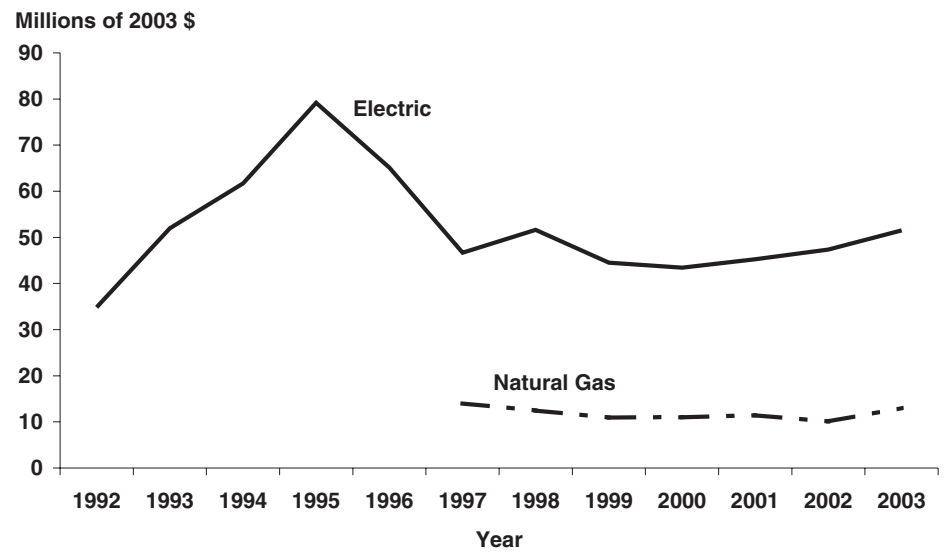
NOTES: The spending percentages exclude spending for general CIP activities (such as research & development and overhead) that are not assigned to a customer class. The "residential" customer class includes CIP projects targeted exclusively for low-income customers.

SOURCE: Office of the Legislative Auditor analysis of Department of Commerce's database of CIP outcomes, *Gas dbase 6-04.xls*, received by the Office of the Legislative Auditor on July 1, 2004.

In recent years, CIP spending on natural gas projects has been stable.

As Figure 1.3 shows, electric conservation spending for investor-owned utilities rose dramatically in the early 1990s but then dropped off in the mid-1990s. In recent years, spending has stayed in the \$45 million range but rose to over \$50 million in 2003 for the first time since 1998. According to the Department of Commerce's chief electric analysts, a temporary boom in Xcel's lighting retrofit program largely caused the dramatic rise and fall in CIP spending in the 1990s, which the analysts referred to as the "lighting bubble." We only obtained spending data for natural gas conservation for 1997 through 2003. During this period, spending by the investor-owned utilities stayed between \$10 million and \$14 million.

Figure 1.3: Conservation Spending, Investor-Owned Utilities, 1992-2003



SOURCE: Office of the Legislative Auditor analysis of data from Department of Commerce databases of CIP outcomes, *Electric dbase 5-04.xls* and *Gas Dbase 6-04.xls*, received by the Office of the Legislative Auditor on July 1, 2004.

Cost Effectiveness

SUMMARY

Based on the benefit-cost information reported by Minnesota's investor-owned utilities, the Conservation Improvement Program (CIP) has been cost effective. In 2003, CIP's societal benefits were two or three times greater than its societal costs. While we did find problems with the accuracy of these estimates, the problems do not undermine the overall conclusion that CIP has been cost effective. In fact, the utility estimates tended to understate the cost effectiveness of the program, especially for natural gas projects. The Department of Commerce needs to work with the utilities to ensure that they are using appropriate and consistent methodologies and assumptions to measure the effectiveness of CIP.

CIP does not appear to be becoming less effective over time. The cost effectiveness of CIP has remained relatively constant over the last several years. In addition, utilities that have tried to estimate the potential for cost-effective conservation in Minnesota have found that the state should not run out of conservation opportunities in the near future.

Because it is mandated by law, the state has an obligation to oversee utility conservation efforts.

As we discussed in Chapter 1, Minnesota's utilities devoted roughly \$91 million to CIP in 2003. While state tax dollars do not pay for the program, the state still has an obligation to ensure that the utilities spend the money effectively. First, CIP is a creation of the state. State law mandates that utilities devote a portion of their revenues for conservation. The utilities recover these conservation funds from their customers by charging more for electricity and natural gas. Second, with respect to the investor-owned utilities, which are monopolies in their service territories, the state has a regulatory responsibility to ensure that the utilities serve their customers effectively. In this chapter, we address the following questions:

- **How do utilities and the Department of Commerce measure the cost-effectiveness of CIP?**
- **How cost effective is CIP?**
- **Are the assumptions and methods that utilities use to calculate the benefits and costs of their CIP activities reasonable and appropriate?**
- **Is CIP experiencing diminishing returns because the most cost-effective conservation activities have already been carried out?**

To answer these questions, we examined the cost effectiveness of CIP in calendar year 2003, the most recent year for which actual program results were available. We obtained not only the benefit-cost figures that the investor-owned utilities

computed but also the underlying inputs and assumptions that went into these calculations. We used this information to report the cost-effectiveness of CIP on a statewide basis and assess the accuracy and reasonableness of the utilities' calculations. We only examined the benefit-cost figures of the investor-owned utilities because the municipal and cooperative utilities are not required to compute and report benefit-cost figures.

Because assessing the accuracy and reasonableness of the more technical assumptions is outside the expertise of our staff, we hired two consulting firms—the American Council for an Energy-Efficient Economy (ACEEE) of Washington, D.C. and Synapse Energy Economics of Cambridge, Massachusetts—to assist in our review. Synapse examined the assumptions and methodologies that the electric utilities used to estimate the dollar value associated with the benefits of not having to construct new power plants, transmission lines, and distribution systems. ACEEE examined the electric utilities' estimates of kilowatt-hour and kilowatt savings created by CIP. ACEEE also examined the natural gas utilities' estimates of energy savings.

In the first part of this chapter, we discuss the various benefit-cost measures used by the utilities and the Department of Commerce. In the second part, we discuss the benefit-cost figures that the investor-owned utilities reported to the Department of Commerce in their 2003 status reports. We then briefly discuss some of the problems that we found in the assumptions and methods that the investor-owned utilities used to calculate their benefit-cost figures. Finally, in the last part, we examine whether there is strong evidence that CIP has become less effective over time and whether the state can expect CIP to provide cost-effective conservation in the future.

MEASURES OF COST-EFFECTIVENESS

The utilities and Department of Commerce examine cost effectiveness from four perspectives—societal, utility, program participant, and ratepayer.

Like many states and utilities around the country, the Department of Commerce and Minnesota's utilities measure the cost-effectiveness of conservation programs from four different perspectives—societal, utility, program participant, and ratepayer.¹ Table 2.1 provides a brief definition of each test. Table 2.2 shows the specific benefit-cost factors that are included in each test. The results of the tests are often expressed as a ratio of the benefits to the costs.

Benefit-cost ratios are typically based on benefits that will be received and costs that will be incurred over a 10 to 20 year period. For example, a program participant typically incurs the cost of buying an energy-efficient product in the first year of the project, and the utility incurs the cost of administering this conservation effort in the first year as well. However, once the energy-efficient

¹ The California Public Utilities Commission and the California Energy Commission developed a manual for carrying out these tests, which are used widely around the country. California Public Utilities Commission and California Energy Commission, *Standard Practices Manual: Economic Analysis of Demand-Side Management Programs* (December 1987); and California Public Utilities Commission and California Energy Commission, *California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects* (October 2001). The manual also discusses a fifth test (the Total Resources test), which is similar to the societal test. Minnesota focuses on the societal test rather than the total resources test.

Table 2.1: Definitions of Cost-Effectiveness Tests

- The **societal test** examines the net impact that a conservation program or project has on society overall. The test combines the impact on the utility, program participants, and non-participating ratepayers. It also includes environmental benefits.
- The **utility test** (also referred to as the “revenue requirements” test) compares the funds that a utility would need to carry out two alternative strategies to meet its customers' energy needs. Under the first approach, the utility sponsors and funds CIP. Under the alternative strategy, the utility provides the same amount of energy as would be conserved through CIP.
- The **participant test** examines the impact of CIP on program participants by comparing their cost of investing in an energy-efficient product with the benefit of having lower energy bills.
- The **ratepayer test** (also referred to as the “cost comparison” test) examines the impact that a CIP project will have on the electric and natural gas rates paid by customers who do not participate in the conservation project.

SOURCE: Office of the Legislative Auditor, based on information in the California Public Utilities Commission and California Energy Commission, *Standard Practice Manual: Economic Analysis of Demand Side-Management Programs* (December 1987).

product is in place, society will receive the benefits of conservation for as long as the product is operating. Typically, energy-efficient appliances have an expected life of about 15 years. Consequently, when computing the benefit-cost ratios, the utilities examine the stream of benefits and costs that will occur over the entire project life.

The Department of Commerce relies heavily on the societal perspective to assess conservation projects.

When reviewing and assessing each utility’s overall conservation program and individual projects, the Department of Commerce relies heavily on the societal test. With the exception of projects targeted exclusively for low-income households and projects that have an indirect impact on energy savings (such as energy audits and research & development), the department generally requires projects to have societal benefits that outweigh its societal costs. The department’s emphasis on the societal test is appropriate because the department has the goal of serving the overall public interest—not the interest of one particular segment of society, such as utilities, program participants, or other ratepayers.

The “utility test” is somewhat of a misnomer. It does not show the impact of conservation on the utilities for two reasons. First, the test just compares the funds that utilities will need to carry out conservation with the funds that they will need to produce or provide an equivalent amount of energy. It does not include the loss of revenues that utilities will experience by selling less energy because of conservation. Second, the model on which the cost-effectiveness tests are based assumes that utilities will pass the costs and benefits of conservation (including lost revenues) onto their customers/ratepayers by raising or lowering the electric and natural gas rates that they charge. Thus, the ratepayer test (which includes the utilities’ lost revenues) actually measures the impact of CIP on the utilities before they pass these benefits and costs onto their ratepayers. From this perspective, and as shown in Table 2.2, the societal test is really a combination of the participant and ratepayer tests with environmental factors also included. The

Table 2.2: Benefit-Cost Factors for the Four Cost-Effectiveness Tests

Benefit-Cost Factors	Cost-Effectiveness Tests			
	Societal	Participant	Ratepayer ^a	Utility
Avoided energy costs (from buying less fuel and reducing the amount of operation and maintenance of power plants, transmission lines, and distribution systems)	Benefit		Benefit	Benefit
Avoided capacity costs (from building/installing fewer power plants, pipelines, transmission lines, and distribution systems)	Benefit		Benefit	Benefit
Avoided environmental damage (including smog, acid rain, and global warming)	Benefit			
Lower energy bills / lost utility revenue (from lower energy consumption and sales)	Transfer between parties ^b	Benefit	Cost	
Rebates and other financial incentives for purchasing high efficiency products	Transfer between parties ^c	Benefit	Cost	Cost
Utilities' cost of administering the conservation programs (excluding the cost of paying rebates and other financial incentives)	Cost		Cost	Cost
Participants' incremental cost of purchasing the high-efficiency product (price difference between the high-efficiency product and product that would have been purchased without CIP)	Cost	Cost		

^aThese costs and benefits are incurred by the utilities, but the model on which this test is based assumes that the utilities pass these costs and benefits onto their customers/ratepayers by decreasing or increasing the electric and natural gas rates that they charge.

^bCIP lowers the energy bills of program participants, which is a benefit to the participants, but also lowers utilities' revenues by an equivalent amount, which is a cost to the utilities (and eventually ratepayers). Because this is just a transfer from one part of society to another, it is not included in the societal benefit-cost calculation.

^cThe utilities pay rebates to program participants for purchasing high-efficiency products. These rebates are a cost to the utilities (and eventually ratepayers) but a benefit to the program participants. Because this is just a transfer from one part of society to another, it is not included in the societal benefit-cost calculation.

SOURCE: Office of the Legislative Auditor, based on information in California Public Utilities Commission and California Energy Commission, *Standard Practices Manual: Economic Analysis of Demand-Side Management Programs* (December 1987).

utility test is a separate test that compares the funding requirements of conservation versus production.

UTILITY ESTIMATES

When we examined the cost-effectiveness of CIP, we found that:

- **According to the benefit-cost analyses carried out by Minnesota's eight investor-owned utilities, CIP was cost effective in 2003.**

Tables 2.3 and 2.4 show the benefit-cost ratios for each of Minnesota’s investor-owned utilities. Overall, CIP benefits society as a whole because the societal benefit-cost ratios are greater than 1.0. However, CIP makes some utilities’ customers/ratepayers who do not purchase energy-efficient products and receive rebates worse off. The ratepayers’ benefit-cost ratios for the electric projects are sometimes below 1.0, reflecting that these customers will have to pay higher electric rates because of CIP. Furthermore, as we will discuss in greater detail in the next section, the ratepayer ratios for the natural gas utilities are too high because of methodological errors in calculating them. After making the necessary corrections, we recalculated the ratios to be less than 1.0 for all the gas utilities. While ratepayers who do not participate in CIP will have to pay higher energy bills because of CIP, ratepayers who participate in CIP and society as a whole will benefit because the participant and societal tests are greater than 1.0.

In 2003, CIP's societal benefits were two or three times greater than its societal costs.

Table 2.3: Utility Reported Benefit-Cost Ratios for Electric Conservation, 2003

Utility	Societal Test	Utility Test	Participant Test	Ratepayer Test
Interstate Power & Light	2.6	4.5	1.8	0.8
Minnesota Power	2.3	6.1	3.5	0.8
Otter Tail Power	3.1	6.5	3.8	0.9
Xcel Energy	3.0	5.4	4.7	1.1
Investor-Owned Utilities Total	2.9	5.4	4.0	1.0

SOURCE: Investor-owned utilities' benefit-cost data from 2003 status reports.

Table 2.4: Utility Reported Benefit-Cost Ratios for Natural Gas Conservation, 2003

Utility	Societal Test	Utility Test	Participant Test	Ratepayer Test
CenterPoint Energy Minnegasco	1.8	5.1	2.8	2.0
Great Plains Natural Gas	4.2	6.6	7.6	1.6
Interstate Power & Light	2.0			
Northern Minnesota Utilities	1.5	2.3	2.9	1.3
Peoples Natural Gas	1.8	2.9	2.5	2.8
Xcel Energy	3.8	6.8	6.9	1.6
Investor-Owned Utilities Total	2.3	5.3	3.7	1.8

SOURCE: Investor-owned utilities' benefit-cost data from 2003 status reports.

Based on the results in Tables 2.3 and 2.4, we cannot determine which utility is doing a better job of carrying out conservation programs. First, as we will discuss later, there are inconsistencies and variations in the assumptions and methodologies that utilities use to compute their benefit-cost ratios. Thus, the ratios are not directly comparable but provide a general indication of the cost-effectiveness of CIP. Second, the service areas and market situations of each utility are different, which affects the utilities’ ability to provide cost-effective

conservation. For example, one utility may have a higher proportion of commercial and industrial customers, which generally have better conservation opportunities than residential customers. Another utility may have a rural service area. These areas may have a limited number of vendors and contractors who provide energy-efficient products or conservation services. In addition, a dispersed population makes it difficult for utilities to provide conservation services.

While having four separate cost-effectiveness tests allows the Department of Commerce and the utilities to examine the effects of conservation projects from different perspectives, it can also create some confusion. For example, when the 2003 Legislature was considering proposals to use a portion of CIP funds for renewable energy projects, the Department of Commerce stated that electric utilities avoid seven dollars in energy and capacity costs for every dollar utilities spend on CIP. Some legislators have questioned whether this seven-to-one benefit-cost ratio is accurate when they have seen benefit-cost ratios closer to two-to-one or three-to-one.

Having four different cost-effectiveness tests can create confusion.

One reason for this apparent inconsistency is that the department based its seven-to-one ratio on the utility test while most people, including the department, typically focus on the societal test when evaluating CIP programs. As Tables 2.3 and 2.4 show, the societal test usually has a lower benefit-cost ratio than the utility test. The department used the utility test in this case because it was comparing alternative ways of meeting state energy needs (energy conservation versus renewable energy projects). The utility test is often used by state agencies in energy planning to identify the alternative with the lowest cost to the utility. Nevertheless, we think that when discussing CIP as a way to meet energy needs, the department should present both tests. The societal test is useful because it takes a broader perspective than the utility test and is commonly used to present CIP results. In the future, presenting both tests and explaining the difference could help avoid confusion.

Another reason for the discrepancy is that the seven-to-one ratio was based on dated information. Specifically, it was based on the utility test for Xcel Energy's 2001 electric CIP. At the time of the legislative hearings, this was Xcel's most recent utility benefit-cost ratio that had been approved by the department. However, Xcel's 2003 status report showed that its utility benefit cost ratio declined from 7.5 to 5.4. In large part, Xcel's benefit-cost ratio declined because it revised how it determined its avoided capacity costs.

ASSESSMENT OF UTILITY METHODS

Accurately measuring the benefits and costs of CIP is important for two reasons. First, benefit-cost measures tell decision makers how well the program is performing and whether or not performance is improving. Second, utilities and the Department of Commerce use these measures to monitor the performance of individual projects so that they can make better decisions about which projects to cut back, continue, or expand.

To access the reasonableness of the utility's benefit-cost calculations, we reviewed and assessed 12 factors that go into the calculations. We identified the 12 factors by reviewing literature that discusses the cost-effectiveness tests, interviewing utilities and other stakeholders, and analyzing and assessing the benefit-cost calculations from Minnesota's utilities. To be part of our review, a factor had to be (1) a primary driver of the benefit-cost results, (2) hard to measure or particularly uncertain, or (3) a known problem. The 12 factors are listed in Table 2.5. We asked the consultants that we hired to examine the first five factors, and we examined the last seven.

Overall, we found that:

- **The methods and assumptions used by the utilities to calculate the benefits and costs of CIP projects have several problems, but the problems do not undermine the overall conclusion that CIP is cost effective.**

Table 2.5: Factors in Benefit-Cost Calculations That Were Reviewed

- **Energy savings calculations** are the estimates of the kilowatt-hours or Mcf of energy saved through CIP.
- **Capacity savings calculations** (electric only) are the estimates of the kilowatts of capacity saved through CIP.
- **Avoided energy costs** (electric only) are the estimated monetary value of the energy savings achieved by CIP. The estimates reflect the costs that utilities avoid by (1) purchasing less fuel and (2) reducing the operation and maintenance of their power plants, transmission lines, and distribution systems. The estimates are expressed in avoided costs per kilowatt-hour saved.
- **Avoided capacity costs** (electric only) are the estimated monetary value of the capacity savings achieved by CIP. The estimates reflect the costs that the utilities avoid by delaying the construction of power plants, transmission lines, and distribution systems. The estimates are expressed in avoided costs per kilowatt saved.
- **Free-rider / free-driver effects** are indirect market factors that affect the amount of energy savings that should be attributed to CIP. Free-riders are individuals or businesses that purchase energy-efficient products and receive rebates but would have purchased the products on their own without CIP or the rebates. Free-drivers are individuals or businesses that purchase an energy-efficient product because of CIP but do not apply for a rebate. For example, a CIP advertising promotion may lead an individual to buy an energy-efficient furnace, but for some reason the individual does not apply for a rebate.
- **Avoided environmental damage costs** are the estimated monetary value of the environmental damages that CIP avoided. The savings are expressed in avoided costs per kilowatt-hour or Mcf saved.
- **Natural gas prices** are the cost of natural gas to the utilities. These prices are the primary monetary value of the energy and capacity savings created by CIP gas projects.
- **Discount rates** are the rate at which future benefits and costs are discounted to reflect their value today. Because conservation benefits may last for 10 to 20 years, the value of these benefits need to be discounted to reflect the fact that a dollar received in the future is less valuable than a dollar received today.
- **Project lives** are the number of years that energy-efficient products operate and conserve energy.
- **Structural errors in the Department of Commerce's benefit-cost model for natural gas** reflect discrepancies in how the department's model computes benefits and costs with how a nationally recognized model computes them.
- **Misclassification of a program benefit** reflects a structure problem in one of the utilities' benefit cost calculations.
- **Utility incentive payments** are the rewards that utilities receive for meeting or exceeding their energy savings goals. While ratepayers finance these payments by paying higher energy rates, these costs are not included in the ratepayer test.

The types of problems we found include (1) out-of-date information, (2) inconsistencies between utilities in how they measure costs and benefits, (3) structural problems with the benefit-cost model used by gas utilities, and (4) problems that distort the relative performance of projects within utilities.

The impact of these problems varies among utilities and among individual projects. Overall, the problems we identified appear to understate the effectiveness of the 2003 conservation projects more often than they overstate the effectiveness, particularly for gas utilities. Table 2.6 summarizes the type of problems we identified and indicates whether they understate or overstate the program's effectiveness under each of the four benefit-cost tests. For some of these problems, we made corrections and estimated the impact on the benefit-cost

Table 2.6: Types of Problems in the 2003 Benefit-Cost Calculations

Problem	Effect of the Problem on the 2003 Benefit-Cost Ratios			
	Societal Test	Utility Test	Participant Test	Ratepayer Test
Out-of-date assumptions				
Natural gas prices	Understates	Understates	Understates	Mixed
Discount rates (gas and electric)	Understates	Not examined	Not examined	Not examined
Inconsistencies				
Societal discount rates for electric utilities (Xcel and Otter Tail)	Understates	No effect	No effect	No effect
Avoided costs of energy and power plants (electric)	Mixed	Mixed	No effect	Mixed
Avoided costs of transmission and distribution (electric)	Mixed	Mixed	No effect	Mixed
Avoided costs of environmental damage (electric)	Mixed	No effect	No effect	No effect
Structural problems				
Errors in the benefit-cost model for natural gas	Understates	No effect	Understates	Overstates
Treatment of incentive payments for utilities (gas and electric)	No effect	No effect	No effect	Overstates
Distortion problems				
Categorization of costs and benefits (Xcel electric)	Overstates	No effect	Overstates	No effect
Project lives (gas)	Mixed	Mixed	Mixed	Mixed

SOURCE: Office of the Legislative Auditor.

On balance, problems in the utilities' benefit-cost calculations tended to understate CIP's effectiveness.

ratios, which we discuss in the following sections. For other problems, we could not estimate the size of the problem precisely enough to make a correction. While we were not able to correct all of the problems we identified, these uncorrected problems should not undermine the overall conclusion that CIP is cost effective for several reasons. First, correcting for the problems we could accurately quantify increased the benefit-cost ratios for the societal test—the primary test used to assess the program’s overall effectiveness. Second, some of the uncorrected problems make the ratios too high, while others make the ratios too low. Finally, the reported ratios were well above 1.0. It would take large errors that systematically overstate the benefit-cost ratios to undermine our conclusion.

The only benefit-cost ratio that appears to systematically overstate the program’s effectiveness is the ratepayer ratio for gas utilities. After correcting the problems that we could quantify, we recalculated the ratio for gas utilities to be less than 1.0, rather than the 1.8 reported by utilities. As we mentioned earlier, the Department of Commerce does not require a ratepayer ratio for a conservation project to be greater than 1.0 in order to be approved.

Out-of-Date Information

Natural gas prices are a key input for benefit-cost calculations because the value of the gas that is conserved is the main benefit of gas conservation projects. However, we found that:

- **The use of out-of-date natural gas prices resulted in a significant understatement of the 2003 benefit-cost ratios for the natural gas utilities.**

If the utilities had used up-to-date natural gas prices, the 2003 societal benefit-cost ratios would have been about 48 percent higher for natural gas projects.

The 2003 benefit-cost ratios are inaccurate because they are based on 2002 prices rather than on more current price information.² Specifically, they are based on the average price of natural gas from January through March 2002, after which prices rapidly climbed. For example, the average commodity cost for natural gas rose from about \$2.50 per Mcf during early 2002 to over \$5.00 in 2003 and 2004.³ According to the most recent forecast used by the Department of Commerce, commodity costs will range from \$4.77 to \$6.39 per Mcf between 2005 and 2019. When the benefit-cost ratios for the 2003 program were reported in 2004, they were still based on the 2002 prices even though they were known to be out of date. Had the results been based on more recent price forecasts, the societal benefit-cost ratios would have increased by an average of about 48 percent.⁴

Using appropriate discount rates is also important when calculating the benefits and costs of CIP. As we discussed earlier in this chapter, the benefits of

² The out-of-date price information includes commodity prices, demand prices, and the escalation factors for these prices. In our analysis, we updated all three of these price inputs.

³ Department of Commerce, unpublished spreadsheet, received by the Office of the Legislative Auditor on December 10, 2004.

⁴ As we discuss later in this chapter, the Department of Commerce has proposed several corrections to the model used by gas utilities to estimate benefits and costs of CIP projects. To estimate the impact of using up-to-date information and correcting for distortion problems, we used a benefit-cost model that incorporated most of the department’s proposed corrections rather than the model currently used by the utilities.

conservation generally occur over a 10 to 20 year period as the energy-efficient products conserve energy over their operating lives. The value of these future benefits must be discounted to reflect that a dollar received in the future is less valuable than a dollar received today.

However, we found that:

- **The use of out-of-date discount rates also resulted in an understatement of the 2003 benefit-cost ratios.**

To determine the discounted value of future societal benefits under the 2003 conservation program, the Department of Commerce required gas utilities to reduce future benefits by 5.88 percent per year. This discount rate is based on the interest rate of 20-year United States Treasury securities and was designed to be slightly higher than expected inflation. When the department updated its assumptions in 2004, it set the discount rate at 4.72 percent because interest rates had declined since the department last revised the discount rate in 2002. However, even though the final benefit-cost ratios for the 2003 conservation projects were prepared in 2004, the ratios were based on the discount rate set in 2002. If the department had used the updated discount rate for gas utilities, the societal benefit-cost ratios would have increased by about 7 percent.⁵

The Department of Commerce's CIP procedures cause the utilities to use out-of-date assumptions.

The department's CIP procedures cause the use of out-of-date assumptions. In preparing their biennial CIP plans, the utilities develop expected benefit-cost ratios for the upcoming two years using economic assumptions (e.g. gas prices and interest rates) and engineering assumptions (e.g. energy-efficiency levels and product operating lives). However, the department requires the utilities to continue using these assumptions when reporting their actual results for the two years covered by the plan. For example, the gas utilities developed their 2003-04 CIP plans in early 2002. Consequently, the utilities used these 2002 assumptions in their 2003 status report and will continue to use them to prepare their 2004 status reports.

To determine if the utilities are meeting program expectations, the Department of Commerce needs the utilities to use assumptions that do not change during the two years covered by each CIP plan. As we discussed in Chapter 1, when reviewing and approving each CIP plan, the department sets spending, participation, energy savings, and capacity savings goals for the utilities. When the utilities report their actual results in their status reports, the department checks to see if the utilities are meeting their goals. This process is particularly important for the energy savings goals because it determines the incentive/bonus payment each utility receives. The more the utilities exceed their energy savings goals, the larger the bonus payments. If utilities are allowed to change their engineering assumptions that determine energy savings, the utilities could manipulate the assumptions to get bigger bonus payments. For example, they could use assumptions that lead to low energy-savings estimates when the goals are set and optimistic assumptions when the results are reported.

The Department of Commerce also requires the utilities to use economic assumptions that do not change during the life of a CIP plan because these

⁵ *Ibid.*

assumptions are also part of the department's formula for determining the size of the bonus payment. Depending on how much a utility exceeds its energy savings goal, it receives a bonus payment that is a percentage of the net benefits that its conservation program generates. As we have discussed, economic assumptions (such as natural gas prices and discounts rates) help determine the benefits and costs of conservation programs.

Inconsistencies

We found several inconsistencies among utilities in the methods they use to estimate the benefits and costs of conservation projects. For example, we found that:

- **In 2003, electric utilities did not use the same discount rate to calculate the value of benefits received in future years under the societal test.**

Since this test represents the value of energy conservation to society, the discount rate should be the same for all conservation programs regardless of which utility runs the program. In the 2003 benefit-cost estimates, Xcel Energy and Otter Tail Power used discount rates of 7.87 and 8.0 respectively, considerably higher than the rates of 4.0 and 5.0 percent used by Interstate Power and Minnesota Power. These rates also differ from the rate of 5.88 percent used by gas utilities. To illustrate how these differences affect benefit-cost ratios, we estimated what Xcel Energy's benefit-cost ratio would have been had it used a rate similar to other utilities. If Xcel Energy used a societal discount rate that equaled 4.5 percent (the average of the rates used by Minnesota Power and Interstate Power), its societal benefit-cost ratio for its electric CIP program would have increased by about 29 percent.

Synapse Energy Economics (one of our consultants) found that:

- **Electric utilities do not use the same methods and assumptions as each other to estimate the energy, power plant, transmission line, and distribution system costs that were avoided through conservation, which led to widely varying estimates.⁶**

Some utilities used questionable methods to estimate how much CIP reduced costs associated with constructing new transmission and distribution systems for electricity.

There are large differences in the utilities' methods and assumptions for estimating transmission and distribution avoided costs. We found that utility estimates of transmission and distribution avoided costs per kilowatt of capacity conserved varied by a ratio of more than four to one in 2003. While some utilities pointed out that their unique circumstances lead to differences with other utilities, our consultant found that some of the difference is due to questionable methods used by some utilities. For example, our consultant criticized methods that used historical or expected transmission costs during a short time period to estimate avoided transmission costs over a 10 to 20 year period. The problem is that the costs during a short time period of 1 to 5 years may not be representative of costs over longer time periods because utility investment in transmission line facilities can vary greatly from year to year. If an unusually large transmission project falls

⁶ Synapse Energy Economics, *Review of Avoided Costs Used in Minnesota Electric Utility Conservation Improvement Programs: Including All Four Investor-Owned Utilities* (Cambridge, MA: November 2004).

within the base time period, the method may cause the utility to substantially overstate the transmission avoided costs. On the other hand, if an unusually small number of projects are expected within the base period, the utility may underestimate the avoided costs. Furthermore, according to our consultant, some utilities do not accurately identify the type of transmission and distribution costs that are avoided by energy conservation.

Our consultant also found problems with energy and power plant avoided costs. He thought that utilities generally made reasonable estimates of avoided energy costs in the near future but likely understated long-term avoided costs. Specifically, some utilities did not account for changes in the energy markets that are likely to occur in future years. For example, the utilities' long-term estimates did not always account for the fact that energy costs tend to increase at rates higher than inflation. When he examined avoided power plant costs, he found some problems that overstated costs but other problems that understated costs. As a result, he could not determine whether the estimates were too high or too low. Overall, the consultant did not find any evidence of major systematic flaws in the estimates.

Because utilities consider information about their energy, power plant, transmission, and distribution costs to be trade secret, we cannot discuss the consultant's findings in detail in this report. However, we have given the consultant's full report to the Department of Commerce so that the department can assess the consultant's specific concerns.

Finally, we found that:

- **The electric utilities used different methods to estimate the value of health and environmental damages that energy conservation avoids, which has led to widely varying estimates.**

To assess the reasonableness of these estimates, we determined the extent to which the methods used by Minnesota's utilities are consistent with the approach recommended by the Minnesota Public Utilities Commission, which regulates utilities.

In 1997, the Public Utilities Commission established a range of environmental costs for different pollutants and required the utilities to use these values when planning the state's energy future. The Commission set high and low damage values for five different pollutants for four different geographic areas.⁷ Table 2.7 presents these ranges. To determine the environmental benefit of conservation, the damage estimates must be converted from "dollars per ton emitted" into "dollars per megawatt-hour of electricity generated" or "dollars per Mcf burned." The conversion for electricity varies depending on the mix of plants used by the utility because the amount of pollution emitted per megawatt hour of electricity generated varies from plant to plant.

We found that the utilities' estimates of avoided environmental damage per unit of energy conserved were the same for each of the gas utilities but varied widely among the electric utilities. The Department of Commerce requires Minnesota

The Public Utilities Commission, which regulates utilities, has established estimates of the environmental damage caused by energy consumption.

⁷ The Commission originally set damage values for six pollutants, but now uses only five.

Table 2.7: Public Utilities Commission's Estimated Environmental Damage per Ton of Pollutant Emitted, 2003

Pollutant	Urban Areas		Metro Fringe		Rural Areas		Portions of Other States Within 200 Miles of Minnesota	
	Low Estimate	High Estimate	Low Estimate	High Estimate	Low Estimate	High Estimate	Low Estimate	High Estimate
Particulate matter	5,119	7,369	2,280	3,311	645	981	645	981
Carbon monoxide	1.22	2.60	0.87	1.54	0.24	0.47	0.24	0.47
Nitrogen oxides	426	1,122	161	305	21	117	21	117
Carbon dioxide	0.34	3.56	0.34	3.56	0.34	3.56	0.0	0.0
Lead	3,592	4,446	1,895	2,289	461	514	461	514

NOTE: The Public Utilities Commission annually updates these estimates based on the Gross Domestic Product Implicit Price Deflator.

SOURCE: Minnesota Public Utilities Commission, "Environmental Externality Values Updated through 2003," <http://www.puc.state.mn.us/doc/environext.pdf>, accessed July 26, 2004.

gas utilities to use the high end of the Commission's recommended range when estimating the environmental damage that conservation avoids. In the 2003 status reports, all gas utilities used the environmental damage estimate of \$0.29 per Mcf. However, the department expects, but does not require, electric utilities to use the Commission's values when calculating the benefits of their conservation projects. Consequently, electric utilities' estimates of avoided environmental damage ranged from \$0 to \$5.50 per megawatt-hour of energy conserved. While differences in the types and locations of the utilities' power plants explain some of the variation, differences in methods explain a lot of the variation.⁸

While all the natural gas utilities used the Public Utilities Commission's environmental damage estimates, only two electric utilities did.

Two of the four investor-owned electric utilities based their estimates on the values established by the Commission. Xcel Energy based its estimate of approximately \$2.00 per megawatt-hour on the high end of the Commission's range for the metro fringe area.⁹ But Otter Tail Power's estimate of roughly \$0.25 per megawatt-hour was lower primarily because it was based on the low end of the Commission's range for rural areas and other states. Interstate Power's environmental estimate was higher (about \$5.50 per megawatt-hour) than the other utilities' estimates because it used the same method that it used for its conservation program in Iowa. This method assumes that environmental damages avoided by a conservation program equals about 10 percent of the energy, power plant, transmission, and distribution costs avoided by the conservation program. Minnesota Power did not report environmental damages avoided by its 2003 program because it assumed that they were already reflected in the cost of electricity. For its 2004-05 biennial plan, Minnesota Power adopted the same method used by Interstate Power.

To determine the impact that this variation in environmental damage estimates had on the utilities' benefit-cost ratios, we recalculated the ratios based on different

⁸ We rounded the electric utilities' estimates of avoided environmental damage to the nearest \$0.25 to reflect their uncertainty. The utilities did not report these figures, but we backed them out based on the avoided cost data that they did provide.

⁹ Xcel revised its environmental damage estimate to \$3.89 per megawatt-hour for its 2004-05 CIP plan. Xcel revised its estimate after reassessing the mix of power plants used to derive the estimate.

estimates. We found that using Interstate Power's approach would increase the societal benefit-cost ratio by roughly 10 percent compared with the approach used by Minnesota Power.

When we examined the scientific literature on environmental damage caused by energy production, we found that damage estimates vary greatly from study to study. For example, a national peer-reviewed study that summarized estimates from other studies found that estimated damage per ton of emission varied by a ratio of 43 to 1 for nitrogen oxide and 14 to 1 for carbon dioxide.¹⁰ The differences are due to a variety of factors, including different assumptions about how pollutants affect human health and the environment, the geography and population density of the area studied, the type of damages included, and the extent to which the studies counted future damages caused by pollutants emitted today.

The Public Utilities Commission's estimates of environmental damage fall in the lower half of the range found in the scientific literature.

The range of values recommended by the Minnesota Public Utilities Commission typically falls within the lower half of the range in estimates we found from examining the scientific literature. In fact, the high end of the Commission's range for the metro fringe is less than half of the median estimated value from the national study for carbon dioxide, nitrogen oxide, and carbon monoxide. While the Commission's environmental damage estimates for urban areas are closer to the median estimates in the national study, the two electric utilities that used the Commission's estimates (Xcel and Otter Tail Power) did not base their avoided cost calculations on the Commission's estimates for power plants in urban areas. Table 2.8 shows the damage estimates from the national study. While some environmentalists argue that the Commission's environmental damage estimates are too low, the Commission went through a lengthy hearing process and weighted a lot of evidence to derive their estimates.

Table 2.8: Range in Estimated Environmental Damage per Ton of Pollutant Emitted, Based on a National Study

	Low Estimate	Median Estimate	High Estimate	Number of Studies
Particulate matter	1,166	3,435	19,875	12
Carbon monoxide	1	638	1,288	2
Nitrogen oxides	270	1,300	11,655	9
Carbon dioxide	2	17	28	4

NOTE: The national study estimated the environmental damage values in 1992 dollars. We updated these estimates to 2003 dollars based on the Gross Domestic Product Implicit Price Deflator.

SOURCE: H. Scott Mathews and Lester B. Lave, "Applications of Environmental Valuation for Determining Externality Costs," *Environmental Science and Technology*, 34, no. 8 (2000): 1390-95.

¹⁰ H. Scott Mathews and Lester B. Lave, "Applications of Environmental Valuation for Determining Externality Costs," *Environmental Science and Technology*, 34, no. 8 (2000): 1390-95. We carried out a literature review that revealed a handful of studies that summarize environmental damage estimates. We chose this one because it (1) was published recently in a peer-reviewed journal, (2) presents values in a dollars per ton format that is consistent with the Public Utilities Commission's format, and (3) is based mostly on studies performed in the United States.

Structural Problems

All the investor-owned natural gas utilities in Minnesota use a benefit-cost model that they collaboratively developed with the Department of Commerce. However, the Interstate Power and Light Company recently found structural problems in this model. For example, it found that the logic and design of this model was inconsistent with a widely recognized national model. Consequently, the Department of Commerce has proposed changes to the Minnesota model that will correct these problems. We found that:

- **Minnesota's benefit-cost model for natural gas projects generally understated the utilities' 2003 reported benefit cost-ratios because of structural problems in the model.**

Minnesota's model for assessing the cost effectiveness of natural gas projects is not consistent with a nationally recognized model.

If the proposed model had been applied to the 2003 conservation programs, we estimate that the societal benefit-cost ratios would have increased by about 10 percent for the two largest gas utilities (CenterPoint Energy Minnegasco and Xcel) and by 26 to 49 percent for the smaller gas utilities. In addition, the ratio for the participant test would have increased by an average of about 5 percent.

Unlike the other tests, making the ratepayer test consistent with the national model would significantly reduce the benefit-cost ratios. The problem with the current model is that it incorrectly omits a large portion of the utilities' costs from the ratepayer test.¹¹ Under the proposed model, we estimate that the overall ratepayer benefit-cost ratios would range from 0.6 to 0.7 among the gas utilities, instead of 1.3 to 2.8.

Another problem with the ratepayer test is that it does not recognize the costs borne by the ratepayers for the incentive/bonus payments that the utilities receive for achieving or surpassing their energy conservation goals. As a result of the performance of their 2003 projects, utilities received \$11 million in incentive payments. If these payments, which are financed by ratepayers, were included in the ratepayer test, the benefit-cost ratios would have declined by an average of 3 percent for electric utilities and 2 percent for gas utilities.

Distortion Problems

Finally, we found that:

- **While some problems in the utilities' benefit-cost methods and assumptions had modest effects on overall benefit-cost ratios, they had a larger effect on the relative performance of individual projects.**

For example, in 2003, Xcel electric treated the operation and maintenance expenses of its customers who participated in CIP differently than other utilities

¹¹ The national model and Minnesota's current model have the same definition of ratepayer benefits but have different definitions of the ratepayer costs. CIP's costs under the national model include program costs and the utilities' lost revenue from reduced sales. In contrast, CIP's costs under Minnesota's current model include program costs and the utilities' lost profits (rather than lost revenues).

did. In some cases, energy efficient products not only reduce energy consumption but also reduce customers' operation and maintenance expenses. Xcel treated this reduction in expenses as an offset to the customers' costs, while the other utilities treated it as a benefit to the customer. At first glance, this difference may seem purely semantic, but it had an impact on the benefit-cost ratios by putting these avoided costs in the denominator of the ratio rather than the numerator. Xcel's treatment of these avoided costs increased its societal benefit-cost ratio by about 17 percent over what it would have been under the method used by other utilities. But the impact of this method varied greatly from project to project. For example, Xcel's roofing program had a benefit-cost ratio of 3.9, but it would have been 1.7 if it had treated the avoided operation and maintenance expenses the same way as other utilities. According to Xcel, it has recently recalculated the benefit-cost ratios for its 2005-06 CIP plan by categorizing these avoided operation and maintenance expenses the same way as the other utilities.

The Department of Commerce requires natural gas utilities to unrealistically assume that all conservation projects will last no longer than 15 years.

As another example, the Department of Commerce's benefit-cost model unrealistically assumes that gas conservation projects conserve energy for 15 years. The department requires gas utilities to assume that each conservation project would save energy for no longer than 15 years. In practice, most utilities used 15 years as the project life for all projects in their benefit-cost calculations. In contrast to the other utilities, CenterPoint Energy Minnegasco assumed that many commercial and industrial projects would last less than 15 years. However, a utility and our consultant pointed out that gas conservation projects have different project lifetimes and that the current benefit-cost calculations do not reflect those differences. For example, weatherization projects involving attic and wall insulation should have expected lifetimes exceeding 15 years. If the average life of a project were 25 years, its actual benefit-cost ratio would be about 50 percent higher than the ratio reported under the department's 15-year cap. Similarly, the 15-year assumption causes the current benefit-cost model to overstate benefits for projects that conserve energy for less than 15 years.

Other Issues

We asked ACEEE (the other consulting firm that we hired) to review the investor-owned utilities' estimates of (1) "free-rider / free-driver" effects, (2) energy savings, and (3) capacity savings. ACEEE found that:

- **The utilities' free-rider / free-driver, energy savings, and capacity savings estimates were generally reasonable.**

In this chapter, we just summarize the consultant's findings, but we have given the Department of Commerce the consultant's full reports so that the department can address the specific concerns identified by ACEEE.¹²

¹² Memorandum from Marty Kushler (ACEEE) to John Patterson (OLA), *Summary Memorandum, Task a (Free-Rider / Free-Driver Assessment)*, October 29, 2004; Memorandum from Harvey Sachs (ACEEE) to John Patterson (OLA), *Summary Memorandum Task c (Energy Savings Assumptions, investor-owned gas, electric, and combination utilities)*, November 11, 2004; and Memorandum from Harvey Sachs (ACEEE) to John Patterson (OLA), *Summary Memorandum Task d (Demand Savings Estimate, investor-owned electric utilities)*, November 11, 2004.

Free Riders and Free Drivers

“Free-rider and free-driver” effects refer to market factors that some utilities include in their benefit-cost calculations. “Free riders” are individuals who participate in a conservation program by taking a rebate but would have purchased the energy-efficient product (such as a furnace) on their own without the rebate. Thus, the energy savings from these individuals would have occurred without the conservation program and should not be attributed to the program. Some utilities reduce their energy savings estimates to account for this phenomenon.

Soon after the concept of “free-ridership” was recognized in the conservation field, researchers realized that there was a contrasting phenomenon called “free-drivership.” This phenomenon represents individuals who are influenced by the conservation program to buy an energy efficient product but do not bother to get a rebate. For example, an individual may see a CIP financed promotion for an energy-efficient product and buy the product, but not apply for the rebate. The conservation field has also started to recognize other indirect benefits of conservation programs. For example, as conservation programs and demand for energy-efficient products grow, suppliers and retailers stock more of these products and devote more shelf space to them. With higher awareness and visibility, energy customers are more likely to buy these products even without the rebate. In the conservation field, this phenomenon is called “market transformation.” To account for “free-drivership” and “market transformation,” some utilities increase the energy savings attributed to their conservation programs beyond the energy savings that come from the products sold with a rebate.

Estimating the size of free-ridership and free-drivership/market-transformation effects is costly and very difficult. Consequently, Minnesota utilities generally assume that the competing effects cancel each other out.¹³

According to ACEEE, it is reasonable for Minnesota utilities to assume that free-ridership and free-drivership/market-transformation cancel each other out. Widely respected organizations have stated that this assumption is reasonable. For example, the International Energy Agency stated,

These indirect effects work in opposite directions and both are difficult to quantify. Until better information is available, it may be practical to assume...that these two effects cancel each other out.¹⁴

¹³ By design, the Department of Commerce’s model for calculating the benefit-cost ratios of natural gas conservation projects assume that the free-rider and free-driver effects cancel each other out. With respect to electric conservation, Minnesota Power, Otter Tail Power, and Xcel Energy reduce the energy savings estimates for a few of their energy-efficient products because of free-ridership. Interstate Power and Light assumes that free-ridership and free-drivership cancel each other out for all the energy-efficient products that they sponsor. In 2003, Minnesota Power tried to claim free-driver/market transformation estimates that were greater than their free-rider estimates for its Energy Star program, but the Department of Commerce did not accept these estimates.

¹⁴ International Energy Agency, *Initial View on Methodologies for Emissions Baselines* (June 2000). 7.

CIP has indirect market effects that are hard to quantify.

Furthermore, ACEEE reviewed a range of studies that have tried to estimate the free-rider and free-driver/market-transformation effects. While the studies that just examined free-ridership showed some significant reductions in energy savings, studies that included the combination of free-ridership, free-drivership, and broader market transformation effects generally showed the factors canceling each other out.

Energy Savings

We also asked ACEEE to assess the reasonableness of the energy savings estimates that all eight investor-owned utilities used to report their 2003 program results. For each utility, ACEEE chose a small sample of energy-efficient products and assessed the underlying assumptions that were used to estimate energy savings. ACEEE examined such things as (1) the number of years that each utility assumed its energy-efficient products would operate and provide conservation savings and (2) the efficiency level of the product that each utility assumed its customers would purchase if CIP did not exist. The efficiency level of this baseline or standard product largely dictates the energy savings that CIP creates. If customers typically choose a higher-efficiency product on their own, CIP will provide small savings. Alternatively, if customers would otherwise choose a relatively inefficient product, CIP will provide large savings.

The utilities' energy savings estimates were generally reasonable.

While ACEEE found some questionable assumptions, it found the utilities' assumptions to be generally reasonable. The consultant's review identified some issues across several of the utilities. For example, most gas utilities assume that customers would purchase a 78 percent efficient furnace without CIP, which is the minimum efficiency allowed in the market by Minnesota's energy code and federal appliance standards. However, according to the Gas Appliance Manufacturers Association, 78 and 79 percent efficient furnaces account for only 1 percent of manufactures' shipments. In contrast, the association found that 80 percent efficient furnaces account for 70 percent of the shipments.¹⁵ Consequently, an 80 percent efficient furnace is a better baseline efficiency level to determine energy savings. The utilities' baseline efficiency level of 78 percent overstated the energy savings by about 2.6 percent.¹⁶ However, according to ACEEE, another aspect of the utilities' furnace estimates was conservative. While Minnesota utilities generally assumed a 15-year operating life for furnaces, the U.S. Department of Energy uses 20 years as an average lifetime, with 10 years as a low estimate and 30 years as a high estimate.¹⁷

In contrast to furnaces, Minnesota gas utilities assumed a longer than expected operating life for hot water heaters than the U.S. Department of Energy assumes. The natural gas utilities usually assumed an operating life of 15 years in their 2003 energy-savings estimates, while the U.S. Department of Energy assumes 9 years. Yet, ACEEE still felt that Minnesota's 15-year assumption could be

¹⁵ Letter from Mark Kendall, (Director, Technical Services, Gas Appliance Manufacturers Association) to Cyrun Nasseri (U.S. Department of Energy), April 10, 2002.

¹⁶ Depending on the utility, the furnaces receiving rebates have a 90, 92, and/or 94 percent efficiency level.

¹⁷ U.S. Department of Energy, *Technical Document: Energy Efficiency Program for Consumer Products, Energy Conservation Standards for Residential Furnaces and Boilers*, Table 8.3.2; http://www/eere.energy.gov/buildings.appliance_standards/residential/furnaces_boilers_1113_r.htm.

considered reasonable. First, ACEEE argues that the U.S. Department of Energy has historically assumed that hot water heaters last 13 years and did not adequately explain why it recently switched to a 9-year assumption. Second, the operating life of hot water heaters varies with water chemistry. With the right water chemistry in Minnesota, a 15-year assumption may be reasonable.

Capacity Savings

In addition, the utilities' capacity savings estimates were generally reasonable.

The last task that we asked ACEEE to carry out was to assess the estimates of capacity savings that the four investor-owned electric utilities' used to report their 2003 CIP results. ACEEE found that the utilities estimates were generally sophisticated and done appropriately. All four electric utilities rely on a model called DSManager to derive the capacity savings created by their conservation programs. According to ACEEE, DSManager is a "powerful" and "sophisticated" tool. The program allows utilities to enter data about (1) the operation of their power systems and (2) the consumption patterns of their customers, which are broken out by the various electricity-consuming products that the customers operate. Based on these data, the model determines the extent to which conservation reduces the need for new electric system capacity.

ACEEE also examined a sample of the capacity savings estimates developed by each electric utility and generally found them to be appropriate. Depending on the utility and conservation project, ACEEE's method for assessing the appropriateness of the assumptions varied. For example, for commercial lighting projects, ACEEE calculated the ratio of capacity-savings to energy-savings, which should be relatively constant between utilities and across the country. While this measure is not a formal engineering review, it provides an indirect indication of the reasonableness of the assumption. In the cases that ACEEE reviewed, the Minnesota utilities' ratios were relatively consistent with those found in California.¹⁸

However, ACEEE has one primary criticism of the Department of Commerce's review of the utilities' capacity savings. Because the department does not own or have access to the DSManager model or have a staff person trained in its use, it does not have sufficient resources and expertise to fully review the utilities' CIP submissions. To improve its review process, the department needs access to this model. However, the department may have difficulty purchasing a license to use it because the company that owns the model is no longer actively supporting it. Consequently, ACEEE recommends that the department gain access to DSManager through one of the Minnesota utilities and have a department staff member trained in its use. Alternatively, the department could require the utilities to select a new model/software package, which would be equally accessible to the utilities and department. We discuss this recommendation further in Chapter 3.

¹⁸ Pacific Gas & Electric, *Evaluation of Pacific Gas & Electric Company's 1997 Commercial Energy Efficiency Incentives Program: Lighting Technologies* (San Francisco, 1999), Exhibit 4-12.

CORRECTIVE ACTION

If the methodological problems outlined in the previous sections are not corrected, the utilities and Department of Commerce may draw incorrect conclusions about the performance of conservation projects.

RECOMMENDATION

The utilities and Department of Commerce should correct the methodological problems in the utilities' benefit-cost estimates.

Both the utilities and the department need to take action. The utilities should correct the problems under their control, but the department should verify and ensure that the utilities have taken sufficient corrective action. For example, the department should verify that the utilities are basing their estimates of avoided environmental damages on the methodology established by the Public Utilities Commission. The department should also ensure that the electric utilities' estimates of avoided energy and capacity costs are comparable with each other. Differences in the estimates should reflect differences in costs between the utilities rather than differences in methodology.

Incorrect conclusions about CIP's performance may be drawn if methodological problems in assessing cost-effectiveness are not corrected.

The department also needs to change some of the methods and assumptions that it requires the utilities to use. As discussed earlier, the department is already examining potential changes to the benefit-cost model for natural gas projects. These changes will hopefully address the structural problems identified by Interstate Power and Light. The department should also allow the utilities to use up-to-date economic assumptions (such as natural gas prices and discount rates) when the updated information will have a significant impact on the benefit-cost calculations. While it would be unproductive for the department to reexamine and reassess all the utilities' benefit-cost calculations every time an economic indicator changes, some changes are large enough to warrant a reexamination. However, the department has concerns about the impact that updated economic assumptions will have on the operation of the department's incentive/bonus payment system. As we discussed earlier, utilities that meet or exceed their energy savings goals receive bonus payments, and the size of these payments are partially determined by the net benefits that the utilities' conservation programs generate. While we did not have the time to research all the ramifications that updated information will have on the process for determining the bonus payments, we strongly encourage the department to develop a mechanism for ensuring that benefit-cost ratios that are published in the utilities' status reports are accurate.

COST-EFFECTIVENESS IN THE PAST AND FUTURE

Some critics of CIP suggest that the program is becoming less effective over time and may become ineffective in the near future. There are a couple reasons why CIP could potentially experience diminishing returns over time. In theory, as

As CIP completes the most cost-effective projects, the program may be left with less effective projects over time.

utilities focus their conservation efforts on those products and processes with the highest benefit-cost ratios, the state and utilities will be left with conservation strategies that are less and less effective over time. Consequently, the state and utilities could see a decline in the cost-effectiveness of their conservation efforts.

Furthermore, in some product areas, customers have no choice but to buy high-efficiency products. This occurs if the state sets building and energy code standards high enough to only allow high-efficiency products or if the federal government sets efficiency standards for appliances sufficiently high. For example, in January 2006, the federal government will raise the efficiency standards for air-conditioners.¹⁹ Some utilities claim that the change will make their conservation projects for air-conditioners ineffective.

When we examined the issue of diminishing returns, we found that:

- **In recent years, CIP does not appear to have experienced a significant decline in its performance.**

Despite the prospect of diminishing returns, the societal benefit-cost ratio of CIP has not declined significantly in recent years, as shown in Figures 2.1 and 2.2. Figure 2.1 applies to electric conservation activities, and Figure 2.2 applies to natural gas activities. While there was a substantial drop in the benefit-cost ratio for electric utilities between 1997 and 1998, the ratio has been quite stable for the last six years.²⁰ For natural gas conservation, the five investor-owned utilities (which excludes Xcel) have had a stable societal benefit-cost ratio. We excluded Xcel from this analysis because we did not obtain good consistent data that covered several years.²¹ We also examined the energy savings per dollar of CIP spending that the utilities achieved between 1992 and 2003. CIP's performance has not declined much, if at all, in the last decade.

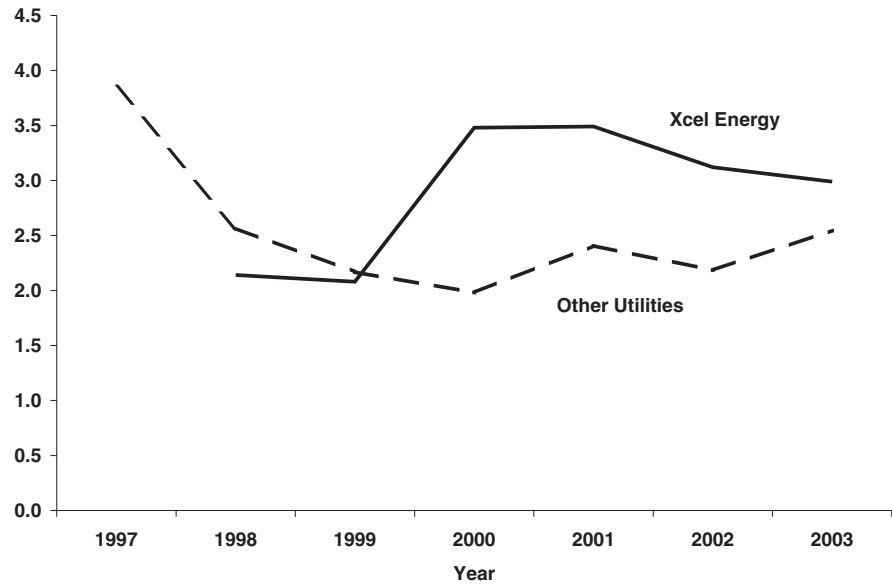
To address the issue of cost-effective conservation in the future, we contracted with ACEEE to assess the amount of future energy savings that could be achieved in Minnesota. To do this, ACEEE reviewed Minnesota studies that have addressed this issue and compared them with studies from other states and regions. The Minnesota studies were prepared by Interstate Power and Light (which uses Iowa information as a proxy for its Minnesota service territory), Otter Tail Power, and Xcel Energy. While these studies represent only three of Minnesota's eight investor-owned utilities, they provide a rough indication of the potential for future energy savings in the state. ACEEE also carried out a comprehensive national literature search and obtained information about future

¹⁹ 10 C.F.R. Part 430 (January 22, 2001).

²⁰ For electric conservation programs, we report Xcel's benefit-cost ratios separately from the other utilities because Xcel reports its information in a different format than the other utilities. Consequently, we could not easily aggregate it with benefit-cost information from the three other investor-owned electric utilities. Specifically, Xcel reports its benefits and costs in terms of dollars per customer kilowatt, rather than in simple dollar terms. With limited resources, we decided not to gather historical information on Xcel's customer kilowatts in order to convert Xcel's benefits and costs to simple dollar terms.

²¹ While Xcel provides about one-quarter of the natural gas that is consumed in Minnesota, Xcel would have had to experience a very sizable change in its conservation performance to significantly affect the trend line shown in Figure 2.2.

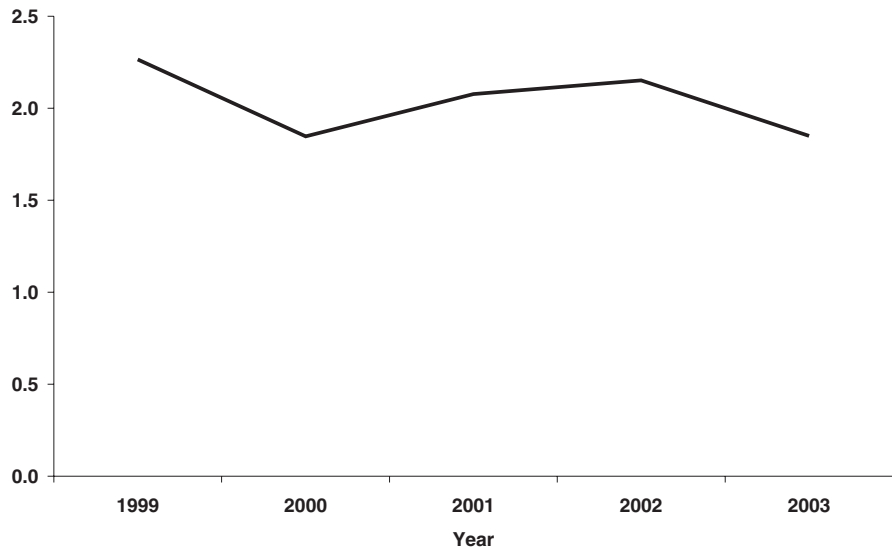
Figure 2.1: Societal Benefit-Cost Ratios, Investor-Owned Electric Utilities



SOURCE: Office of Legislative Auditor analysis of utility CIP data.

In recent years, CIP's benefit cost ratios have been relatively stable.

Figure 2.2: Societal Benefit-Cost Ratios, Investor-Owned Natural Gas Utilities



NOTE: Excludes Xcel Energy due to inconsistencies in reported data.

SOURCE: Office of the Legislative Auditor analysis of utility CIP data.

energy savings from 17 studies that had been conducted in the U.S. in the past four years.²²

According to ACEEE's review of these studies,

- **CIP has the potential to provide cost-effective conservation in the future.**

Between 10 and 30 percent of Minnesota's future energy needs could be met through cost-effective conservation.

The Minnesota studies indicate that between 10 and 20 percent of future electric load in Minnesota could be met through cost-effective conservation.²³ The figure varied by utility and distance into the future being projected, which was five to twenty years. ACEEE's review also found that other states and regions could save between 10 and 30 percent of their future load through efficiency measures, which is relatively consistent with the Minnesota estimates. According to ACEEE, between 15 and 30 percent of the future load for natural gas utilities in Minnesota could be met through cost-effective conservation. The savings potential for other states and regions varied between 10 and 35 percent.

These findings need to be put into some context. First, the estimates apply to cost-effective conservation measures, some of which may not be achievable because of practical limitations. For example, while installing compact fluorescent lights are a cost-effective conservation strategy, some people do not buy them because they do not like the quality of the light provided. Several of the studies from other regions of the country that ACEEE reviewed estimated both cost-effective and achievable savings. In these studies, the estimates of achievable savings were 23 to 52 percent lower than the estimates of cost-effective savings. In general, the Minnesota studies did not report achievable energy-savings estimates. Second, we asked ACEEE to examine a full range of perspectives concerning opinions about the potential for future energy savings, including entities that believe conservation is no longer cost-effective. According to ACEEE, they could not find any published studies that showed no potential for cost-effective or achievable energy savings in the future.

During our interviews with the investor-owned utilities, they expressed opinions that are consistent with our assessment of past conservation performance and ACEEE's assessment of future energy savings. The utilities told us that while they have had some difficulty finding cost-effective conservation projects (particularly in certain market segments), they believe that Minnesota has not reached the point where diminishing returns has made CIP ineffective. Several factors have helped utilities continue to provide cost-effective conservation. First, technological changes are leading to the development of higher efficiency products and processes, such as light bulbs. Second, as utilities saturate the

²² With respect to electricity, the states and regions covered in these studies were California, Connecticut, Iowa, Massachusetts, New York, Oregon, Vermont, Puget Sound, Southwestern United States, and the United States as a whole. With respect to natural gas, the studies covered California, Iowa, Oregon, Utah, Puget Sound, and the United States as a whole.

²³ Neither the Xcel Energy study nor Otter Tail Power study actually reported their results in terms of percentage of future load that could be met by energy efficiency. Rather, they just reported the total GWh savings potential for the years in question. To derive a percentage figure for comparison purposes, ACEEE calculated projected future load for each utility by taking actual 2003 sales data and escalating future sales at a rate of 1.5 percent per year. The reported percentages for Xcel and Otter Tail are proxy values derived by ACEEE using each utilities' actual 2003 electric sales, a 1.5 percent annual escalation rate, and each utilities' projected future energy savings potential (GWh).

market with a high-efficiency product, they can switch to products and markets that still have a lot of potential for cost-effective conservation. For example, Xcel claims that it has achieved 70 to 80 percent market saturation for high-efficiency lighting for its large commercial customers. Consequently, Xcel is shifting its focus to providing customized conservation projects to improve the efficiency of industrial processing.

Program Operation

SUMMARY

The Department of Commerce's process for reviewing the utilities' Conservation Improvement Programs should be improved. The Legislature should give the department the authority to review utility plans for the Conservation Improvement Program (CIP) every four years, rather than every two years. With fewer plans being filed each year, the department would have more time and resources to review each plan and to address the deficiencies in the current review process that we identified. In addition, we recommend that the department eliminate its policy that restricts communication between the department's policy staff and analysts about CIP plans. This restriction makes the review process inefficient and creates confusion.

For the most part, Minnesota's statutes, rules, and procedures for CIP facilitate the selection and execution of cost-effective conservation projects. However, the program includes some provisions that reduce its cost-effectiveness. For example, state law requires utilities to devote a share of their CIP funding to projects that assist low-income households. But, in many cases, the utilities have reported that these projects are not cost-effective. We recommend that the Department of Commerce work with the utilities and other stakeholders to develop and implement a plan to improve the performance, evaluation, and oversight of low-income conservation projects.

Although we found in Chapter 2 that the Conservation Improvement Program (CIP) is a cost-effective program, we also wanted to assess whether the program could be made more effective and administered more efficiently. Consequently, in this chapter, we address the following research questions:

- **How well does the Department of Commerce oversee CIP?**
- **Do state statutes, rules, and procedures facilitate or hinder the selection and execution of cost-effective conservation activities?**

To answer these questions, we reviewed (1) CIP's statutes, rules, and procedures; (2) the investor-owned utilities' CIP plans and status reports; and (3) relevant national literature. We also interviewed Department of Commerce staff, officials from all 8 investor-owned utilities, and representatives from 11 other stakeholder groups. Table 3.1 lists the organizations that we interviewed and divides them by

Table 3.1: Organizations Interviewed by OLA**Investor-Owned Utilities**

- Aquila (which owns both Northern Minnesota Utilities and Peoples Natural Gas)
- CenterPoint Energy Minnegasco
- Great Plains Natural Gas
- Interstate Power and Light
- Minnesota Power
- Otter Tail Power
- Xcel Energy

Statewide Associations for Municipal and Cooperative Utilities

- Minnesota Municipal Utility Association
- Minnesota Rural Electric Association (which represents electric cooperative utilities)

Conservation / Environmental Advocates

- Center for Energy and Environment
- Izaak Walton League
- Minnesotans for an Energy Efficient Economy
- St. Paul Neighborhood Energy Consortium

Low-Income Advocates

- Community Action Programs (including Minnesota Community Action Association, Community Action of Minneapolis, and Ramsey Action Program)
- Energy Cents Coalition
- Legal Services Advocacy Project

Business Advocates

- Minnesota Chamber of Commerce
- William Glahn (from Dahlen, Berg, and Co.)

SOURCE: Office of the Legislative Auditor

National organizations have recognized Minnesota for having an effective, well-run conservation program.

the type of organization. With respect to Northern Minnesota Utilities and Peoples Natural Gas, we only interviewed Aquila, which owns both utilities.¹

In our review, we found that:

- **Minnesota has a good system and process for carrying out energy conservation, but the state's conservation program needs to be improved.**

As we discussed in Chapter 2, CIP is a cost effective program. Furthermore, national organizations have recognized Minnesota for having an effective, well-run program. According to a scorecard developed by the American Council for an Energy-Efficient Economy (ACEEE), Minnesota had the 5th best conservation program in the country in 2000.² When ACEEE updated the scorecard in 2002, it did not provide an overall ranking but ranked states on three

¹ We selected the non-utility organizations by identifying Minnesota organizations that have submitted comments or alternative projects for more than one utility's CIP plan in the last six years. We also interviewed four other organizations (Minnesota Municipal Utility Association, Minnesota Rural Electric Association, Community Action Programs, and Minnesota Chamber of Commerce) because they were identified as representing a key interest in the CIP program.

² Dan York, Ph.D., and Marty Kushler, Ph.D., *State Scorecard on Utility and Public Benefits Energy Efficiency Programs: An Update* (Washington, DC: American Council for an Energy-Efficient Economy, December 2002), 5.

separate measures. On this scorecard, Minnesota ranked 12th in conservation spending per capita, 11th in conservation spending as a percentage of utility revenues, and 3rd in electricity savings as a percentage of electricity sales.³ Finally, a study sponsored by the Regulatory Assistance Project found that:

[Conservation] efforts have dwindled in [some] states through the failure of regulators to pay attention. Minnesota is the exception. The strong role of MNDOC oversight in Minnesota is similar to the strengthened role assigned to DOER in Massachusetts. Giving greater direct responsibility for oversight to an adequately staffed state energy office appears to have improved program functioning in both states though both were working on an already solid foundation.⁴

However, state oversight of the program could be streamlined.

However, as we will discuss in this chapter, Minnesota's statutes, rules, and procedures need to be revised to make CIP even better. The Department of Commerce's process for reviewing the conservation activities of the investor-owned utilities can be unnecessarily burdensome. In addition, the state is not maximizing the cost-effectiveness of the program.

The first section of this chapter addresses the Department of Commerce's oversight and review of CIP, and the second section examines program requirements that reduce the cost-effectiveness of CIP. In the third section, we discuss CIP's low-income program. While the first three sections of the chapter address aspects of CIP for investor-owned utilities, the fourth and final section discusses the Department of Commerce's oversight of municipal and cooperative utilities.

OVERSIGHT OF INVESTOR-OWNED UTILITIES

As we discussed in Chapter 1, the state has structured CIP to be a utility administered program; however, the investor-owned utilities have an incentive to minimize conservation because it reduces their sales and profits. Consequently, there is a need for the Department of Commerce to closely monitor the utilities' activities to ensure they are carrying out CIP in the public's best interest. While the state needs to monitor utility activities, it does not want the review process to be overly burdensome. Preparing and reviewing paperwork runs the risk of becoming the focus of the program, rather than carrying out effective conservation projects. In this section, we examine the level of oversight that the department provides and whether the process could be improved or streamlined.

³ *Ibid.*, 19-20.

⁴ Cheryl Harrington and Catherine Murray, *Who Should Deliver Ratepayer Funded Energy Efficiency: A Survey and Discussion Paper* (Gardiner, ME and Montpelier, VT: Regulatory Assistance Project, May 2003), 19.

The Review Process

To assess the review process, we examined the amount of documentation the department reviewed in the summers of 2002 and 2003 and how thoroughly the department reviewed it. We found that:

- **Investor-owned utilities provide a large amount of documentation so that the Department of Commerce can verify that the utilities are meeting program requirements and expectations.**

As we discussed in Chapter 1, the review process starts with the investor-owned utilities submitting biennial CIP plans, which range in length from about 100 to over 500 pages. These plans provide descriptions of the utilities' conservation projects, information about how the utilities expect to meet each CIP requirement, and program data (including expected spending, participation, energy savings, and capacity savings levels). The plans also provide information on four benefit-cost calculations (societal, utility, participant, and ratepayer) for each conservation project and on the engineering and economic assumptions used in these calculations. In addition, this is often not enough information for the department's analysts to fully assess the conservation programs. For the plans that the department reviewed in the summers of 2001 and 2002, the department asked each utility to formally respond to between 1 and 22 additional information requests. Every utility except one had to respond to at least eight additional information requests. Furthermore, this count of information requests does not include all the informal telephone and email exchanges between the utilities and the department's analysts.

Furthermore, each investor-owned utility must submit an annual status report to the department, which provides information about the utility's activities and achievements during the previous year. These reports generally range in length from 100 to 200 pages.

With respect to how thoroughly the department reviews all this documentation, we found that that:

- **The Department of Commerce reviews the investor-owned utilities' CIP plans and status reports relatively thoroughly.**

For each biennial plan submitted by the investor-owned utilities, the department carries out a three-part review. First, the department's economic analysts verify that the plans comply with the program requirements listed in Table 1.1 and that the utilities plan to maintain their historical level of performance. Specifically, they check that the utilities' proposed energy savings per dollar of CIP spending are consistent with their historical levels. This assessment helps ensure that the Commissioner sets the utilities' conservation goals sufficiently high to warrant a bonus payment for the utilities. As discussed earlier, utilities receive a bonus payment for meeting or exceeding the conservation goals set by the Commissioner. In the second part of the department's review, the engineering staff examine each utility's engineering assumptions used to estimate the effectiveness of the program. For example, they check whether the energy savings claimed by the utilities are reasonable. After the economic analysts and

Although CIP plans are lengthy, the Department of Commerce often requires additional data from utilities.

engineers have completed their reviews of each plan, they develop recommendations and a proposed decision for the Commissioner. In the third and final part of the review, the department's policy staff (including the Commissioner or Deputy Commissioner) examine (1) the utilities' plans to ensure that they are consistent with the administration's policy goals, (2) the recommendations from the department's analysts and engineers, and (3) comments from the public. When this last review is completed the Commissioner (or Deputy Commissioner) working with the other policy staff issues a final decision concerning each plan, which includes spending, participation, energy savings, and capacity savings goals.

While the Commissioner of Commerce has the authority to approve and order changes in the CIP plans of the investor-owned utilities, the current Commissioner has delegated this authority to the Deputy Commissioner. In this chapter, we will refer to the authorities and responsibilities of the Commissioner, but in many cases, it is the Deputy Commissioner who is carrying them out in the current administration.

The department also reviews the investor-owned utilities' annual status reports. Specifically, the department determines whether each utility (1) met its CIP spending requirements, (2) carried out projects that were cost effective, and (3) met its goals for participation and energy conservation. In addition, the department reviews the engineering assumptions for the utilities' custom projects. As we discussed in Chapter 1, the custom projects involve rebates for commercial and industrial customers who have unique equipment or operations that do not fall within the utilities' standard conservation projects. The department reviews the custom projects after they have been carried out (rather than before hand when they review the CIP plans) because, at the time the CIP plans are prepared, the utilities and department do not know what types of equipment will receive rebates. Finally, the department reviews any results in the status reports that appear abnormal or inconsistent.

These reviews cost the department roughly \$300,000 per year and require the equivalent of about three full-time employees. The department spent \$369,000 administering CIP in 2002, while it spent \$206,000 in 2003.⁵ The department charges these costs back to the investor-owned utilities who pay for them with their CIP funds. While \$300,000 is a considerable amount of money, it represents less than 1 percent of CIP's overall program costs. As Table 3.2 shows, over half of the department's staff time for CIP came from the economic and engineering staff. The policy staff and attorneys accounted for the rest.

The department's review of CIP plans leads to several types of changes. First, the department will change inappropriate assumptions or calculations used for assessing a project's effectiveness. For example, in Northern Minnesota Utilities' 2003-04 CIP plan, the department reduced the energy savings for a 92 percent efficient furnace from 16.66 to 14.12 Mcf (thousand cubic fee) of natural gas

The department annually spends roughly \$300,000 to review the CIP activities of the investor-owned utilities.

⁵ Office of the Legislative Auditor analysis of unpublished data from the Department of Commerce, received by the Office of the Legislative Auditor on September 22, 2004. According to the department, the figures for 2002 are artificially high because the department did not finish reviewing all the plans from 2001 until 2002. Thus, the 2002 staff costs include time for finishing the 2001 review.

The department devotes the equivalent of three full time employees to the investor-owned utilities' CIP activities.

Table 3.2: Department of Commerce's FTEs for CIP, by Type of Staff

<u>Type of Staff</u>	<u>2002</u>	<u>2003</u>
Economic Analysts	2.0	1.4
Technical Staff/Engineers	0.2	0.1
Policy Staff	1.5	1.0
Attorneys	<u>0.1</u>	<u>0.0</u>
Total	3.8	2.5

SOURCE: Office of the Legislative Auditor analysis of unpublished data from the Department of Commerce, received by the Office of the Legislative Auditor on September 22, 2004.

because the utility made a simple calculation error.⁶ The department also rejects proposed conservation projects if they do not meet CIP's requirements or are inappropriate. For example, in its 2003-04 plan, Xcel proposed using CIP funds to study the effect that charging different electric rates at different times of the day will have on how much electricity is consumed and when it is consumed.⁷ The department rejected the study for two reasons. First, the proposed evaluation would have put Xcel's evaluation budget over the 3 percent cap that is discussed in Chapter 1. Second, the department's analysts reasoned that Xcel would likely carry out this study even if CIP did not finance it.⁸

When reviewing the investor-owned utilities' CIP plans, the department also assesses alternative conservation projects proposed by outside stakeholders, such as environmental advocates. For example, in 2002, the Green Institute and the Phillips Community Energy Cooperative proposed a two-year project to market energy conservation projects in the Phillips neighborhood of Minneapolis. The Commissioner approved the two organizations' request for \$260,000 of funding from Xcel's CIP.⁹ Finally, if a utility's CIP plan does not show that the utility intends to maintain its historical level of energy-savings per dollar of CIP spending, the department's analysts generally recommend that the Commissioner of Commerce increase the utility's overall energy savings goal. For example, the

⁶ Aquila Networks (formerly Northern Minnesota Utilities), *2003-2004 Biennial Conservation Improvement Program* (Kansas City, MO, June 2002), table after page 33; and Department of Commerce, *Decision in the Matter of the Implementation of the 2003-04 Conservation Improvement Program for Aquila Networks-NMU* (St. Paul, October 11, 2002), 10.

⁷ Xcel Energy, *Biennial Plan for 2003 and 2004 Minnesota Natural Gas and Electric Conservation Improvement Program* (Minneapolis, June 2002), 418.

⁸ Department of Commerce, *Analysis, Recommendations, and Proposed Decision of the Advocacy Staff of the Energy Division of the Minnesota Department of Commerce Regarding Northern States Power Company D/B/A Xcel Energy's Conservation Improvement Program, 2003-2004* (St. Paul, October 2002), 17-18 and 78-80; and Department of Commerce, *Decision in the Matter of the Implementation of the 2003-2004 Conservation Improvement Program for Xcel Energy* (St. Paul, November 25, 2002), 13.

⁹ Department of Commerce, *Analysis, Recommendations, and Proposed Decision Regarding Xcel Energy's Conservation Improvement Program 2003-2004*, 62 and 84; and Department of Commerce, *Decision in the Matter of the Implementation of the 2003-2004 Conservation Improvement Program for Xcel*, 12.

department raised Interstate Power and Light's 2004 energy savings goal from 18,484 to 19,989 megawatt-hours for this reason.¹⁰

As we have already discussed, outside stakeholder groups assist the department in scrutinizing the plans. In the 2002-2003 period, several outside stakeholder groups commented on the utilities' plans or proposed alternative conservation projects. Table 3.3 summarizes the number of organizations that submitted comments or alternative projects.

Table 3.3: Number of Organizations Submitting Comments or Alternatives Concerning Each Utility's CIP Plan, 2003-04 or 2004-05

Outside stakeholder groups assist the department in scrutinizing CIP plans.

<u>Utility</u>	<u>Number of Organizations</u>
CenterPoint Energy Minnegasco	4
Great Plains Natural Gas	0
Interstate Power & Light	2
Minnesota Power	4
Northern Minnesota Utilities	0
Otter Tail Power	2
Peoples Natural Gas	0
Xcel Energy	7

SOURCE: Office of the Legislative Auditor compilation of information from the Department of Commerce's proposed and final decisions regarding the investor-owned utilities' 2003-04 or 2004-05 CIP plans.

All this scrutiny typically does not lead to a lot of changes in the utilities' CIP plans. Table 3.4 shows the percentage changes in each utility's proposed conservation goals that (1) the department's analysts recommended and (2) the Commissioner of Commerce actually ordered. The Commissioner increased or decreased the goals by up to 16 percent from the level originally proposed by the utilities. While a 16 percent change in CIP goals is substantial, a 0 to 5 percent change is more typical. The department's analysts generally recommended a bigger change to the proposed goals than the Commissioner ended up ordering.

In addition, the department did not make significant changes to the utilities' conservation programs after reviewing their 2003 status reports. However, the department did encourage the utilities to strengthen poor-performing projects. For example, the department ordered two utilities that fell far below their goals for their low-income projects to submit progress reports and/or work with department staff to improve the project's performance. The department also reduced the energy savings claimed by utilities for some of their custom projects. After reviewing 40 out of 314 custom electric projects and 69 out of 212 custom gas projects, the department reduced the energy or capacity savings for 10 of these projects.

¹⁰ Department of Commerce, *Analysis, Recommendations, and Proposed Decision of the Advocacy Staff of the Energy Division of the Minnesota Department of Commerce Regarding Interstate Power and Light Company's Conservation Improvement Program, 2004-2005* (St. Paul, October 2003), 18-19; and Department of Commerce, *Decision in the Matter of the Implementation of Interstate Power and Light's 2004-2005 Biennial Conservation Improvement Program* (St. Paul, December 11, 2003), 8.

Table 3.4: The Department of Commerce's Percentage Changes to Utilities' Proposed Conservation Goals, 2003-04 or 2004-05 CIP Plans

Utility	Analysts' Recommended Change in:			Commissioner's Ordered Change in:		
	Spending Goal	Energy Savings Goal	Capacity Savings Goal	Spending Goal	Energy Savings Goal	Capacity Savings Goal
CenterPoint Energy Minnegasco	2.66%	0.23%	N/A	0.00%	0.00%	N/A
Great Plains Natural Gas	0.00	-3.41	N/A	0.00	-3.28	N/A
Interstate Power (electric)	0.00	7.09	16.23%	0.00	7.09	16.23%
Interstate Power (natural gas)	0.00	0.00	N/A	0.00	0.00	N/A
Minnesota Power	15.13	10.81	30.82	-1.35	0.00	0.00
Northern Minnesota Utilities	0.35	-2.67	N/A	0.35	-2.67	N/A
Otter Tail Power	-4.37	0.00	0.00	-4.21	0.00	0.00
Peoples Natural Gas	5.60	4.81	N/A	5.60	4.81	N/A
Xcel (electric)	4.03	5.28	3.29	1.91	4.92	1.89
Xcel (natural gas)	4.30	3.32	N/A	4.30	3.32	N/A

SOURCE: Office the Legislative Auditor review of conservation goals in the Department of Commerce's proposed and final decisions concerning the gas utilities' 2003-2004 CIP plans and the electric utilities' 2004-2005 CIP plans.

The department's changes to the utilities' conservation programs after reviewing their CIP plans and status reports may only be modest because the utilities believe that they need to submit good conservation programs and supporting documentation to get through the department's scrutiny. A utility official who administers CIP told us that the department's analysts know the utilities' conservation activities as well as anyone after the analysts have reviewed the plans. An official with another utility told us that the department provides a high level of scrutiny for the custom projects that this utility sponsors. According to this official, the utility is much more careful in documenting its assumptions and calculations knowing that a sample of these projects will be audited by the department's engineers. However, this admiration is not universal. Some utility officials think that the department's analysts are too involved and micromanage CIP by examining the assumptions and details so closely. Another utility official felt that the level of the department's scrutiny varies with each analyst and that the utilities' engineers are more qualified than the department's engineers. Thus, it is hard for the department to really dispute the utility's assumptions.

While we found that the department monitors the investor-owned utility's CIP activities relatively closely, we also found that:

- **In some areas, the Department of Commerce does not provide enough scrutiny.**

The department's review process has several weaknesses. First, the department's review of engineering assumptions is less formal for the electric utilities than it is for the natural gas utilities. On the natural gas side, the department collects a more consistent set of engineering assumptions from each utility, which allows the department to compare and contrast each utility's assumptions to ensure they are reasonable and consistent. On the electric side, the department allows utilities to determine the form of the assumptions and level of detail that they submit to the department for review. Consequently, the department's assessment of the

The department's review of engineering assumptions is less formal for the electric utilities than it is for the natural gas utilities.

electric assumptions is much more ad hoc and less systematic. Furthermore, the engineers spent about 20 percent less time in 2002 and 2003 reviewing the CIP activities of the electric utilities than the natural gas utilities. These discrepancies are noteworthy since the electric conservation program is about four times bigger than the natural gas program in terms of investor-owned utility expenditures.

Part of the difference in the department's review of the natural gas and electric CIP plans may be caused by the fact that the department collaborated with the utilities to develop the natural gas model (called "BENCOST") used to measure program effectiveness. In contrast, all four electric utilities have purchased a proprietary model (called DSManager) to measure program effectiveness. The department does not have access to this model or have a staff person trained in its use. Consequently, the department is unable to directly examine how the DSManager model uses the utilities' assumptions to measure effectiveness.

The department does not review the marketing efforts of the utilities.

Another potential area of weakness is that the department does not review the utilities' marketing efforts. While advertising and promotions account for only 6.5 percent of the utilities' CIP budgets, marketing is an important part of CIP. If people do not know about CIP and the rebates that it offers, they will not participate in the program. If people do not know about energy-efficient products and processes, they will never choose them. In its oversight role, the department should take steps to ensure that the utilities have successful marketing strategies. For example, during our interviews with the utilities, we learned that they rely heavily on "bill stuffers" to promote CIP because it is an inexpensive strategy. If the utility is mailing a bill to a customer, it is relatively easy and inexpensive to include promotional material with the mailing. However, some outside stakeholders question the effectiveness of this approach because they think that the vast majority of customers just throw the promotional material away without reading it.

Finally, and probably most importantly, Chapter 2 discusses several problems in the utilities' benefit-cost calculations that the department should be catching or addressing. These problems include out-of-date assumptions, inconsistent assumptions and methods, structural problems in the benefit-cost formulas, and assumptions that distort the relative effectiveness of individual conservation projects. As we discussed, some of these problems can have significant impacts on the estimated effectiveness of CIP projects.

The department needs to address these deficiencies in its review process. In Chapter 2, we already recommended that the department and utilities should correct the problems in the benefit-cost estimates. But CIP needs a more systematic change. Specifically, the department needs more time and resources to review the utilities' conservation programs more closely without making the review process overly burdensome.

RECOMMENDATION

The Legislature should give the Department of Commerce the authority to switch CIP from a two-year to a four-year program, and the department should increase the level of scrutiny that each plan receives.

Having the utilities file CIP plans less frequently should give the department more time to review each plan.

With a four-year program, the utilities would have the option of filing their CIP plans with the department every four years, rather than every two years. This longer filing cycle would have two primary benefits. First, it would reduce the volume of material that the utilities would have to file each year, which would free time and resources for the utilities to make sure that they are designing and running the best possible conservation programs. Second, the department would have the time and resources to examine the CIP plans in greater detail and address the oversight problems that we have raised. If all eight investor-owned utilities filed four-year plans, the department would only have to review two plans per year, rather than its current average of four plans per year.¹¹ Under this new system, the utilities should still be required to file annual status reports.

With more time and resources to review each plan, the department could collect a more detailed and consistent set of engineering assumptions from the electric utilities (as it does for the natural gas utilities). The department could also examine the possibility of purchasing or gaining access to DSManager. Alternatively, the department could examine the possibility of requiring the utilities to use another model that would be more accessible to the department.

In addition, the department could examine other utility assumptions and methodologies in greater detail—for example, how the utilities estimate their avoided costs of energy, capacity, and environmental damage. As we discussed in Chapter 2, one of our consultants found some substantial inconsistencies in how the utilities estimate their avoided costs of capacity. Consequently, differences in the benefit-cost ratios reported by the utilities reflect not only differences in program performance but also differences in the methodologies and assumptions used by the utilities.

Finally, the department would potentially have the time and resources to (1) look more closely at the marketing efforts of each utility, (2) send department analysts to national conferences and training sessions that address emerging trends in conservation, and (3) be more proactive in directing utilities to emerging cost-effective strategies. Currently, the department takes a passive approach to guiding utilities' conservation strategies. As we discussed earlier in this chapter, the department has relied on outside stakeholder groups and the utilities themselves to identify new approaches to conservation. In the Commissioner's decisions concerning the gas utilities' 2003-2004 plans and the electric utilities' 2004-2005 plans, the department did not require the utilities to carry out any alternative conservation project unless it was proposed by an outside stakeholder group.

However, moving from a two-year to four-year program creates several risks for the state and CIP. First, the utilities may not implement new and improved conservation strategies as quickly with a longer time between plans. Second, the engineering and economic assumptions used to develop the plans may be inappropriate by the fourth year. Likewise, the utilities' conservation goals set by the Commissioner of Commerce may be unrealistic or inappropriate by the fourth

¹¹ In even numbered years, the department currently reviews five plans (Great Plains Natural Gas, CenterPoint Energy Minnegasco, Northern Minnesota Utilities, Peoples Natural Gas, and Xcel), while in odd numbered years, the department reviews three plans (Interstate Power and Light, Minnesota Power, and Otter Tail Power).

With a four-year filing cycle, the department will need to ensure that the utilities keep their CIP activities up to date.

year. Third, the CIP plans may become inconsistent with the electric utilities' integrated resource plans. Electric utilities prepare these plans to identify the least-costly path for meeting the electricity needs of their customers. The plans involve a combination of generation and conservation. While the plans cover a fifteen-year period, the utilities are supposed to revise them every two years. Having CIP on a four-year cycle and the resource plans on a two-year cycle may create inconsistencies.

The Department of Commerce can take steps to mitigate and manage these risks. The department should encourage the investor-owned utilities to submit plan modifications in the four years between the full plan filings. This would help ensure that the plans are up to date. (Under the current two-year filing cycle, utilities already file plan modifications between plans.) These modifications could be quite small—for example, changing one underlying assumption for one conservation project. Alternatively, they could be more sweeping—for example, replacing a less effective project with an emerging and more effective project. In addition, the department should have the authority to require the utilities to file plan modifications. For example, if the federal government increased the minimum efficiency standard for furnaces in the middle of the four-year cycle, the department should require the utilities to re-evaluate the effectiveness of their furnace projects and make any necessary program modifications.¹² As another example, natural gas prices may change dramatically, which would affect the benefit-cost ratios of all the gas projects. In this situation, the department should require the utilities to re-calculate their benefit-cost ratios with the up-to-date gas prices but not change the other assumptions in the calculations. Finally, the department should allow outside stakeholders to submit their own proposed plan modifications just like they can currently submit alternative projects. The department would review these modifications and decide if they should require the utilities to carry them out.

The four-year planning cycle with intervening modifications should reduce the amount of paper and information that the utilities need to submit to the department. The modifications would focus on just those areas of the program or calculations that need to be revised without having to address the areas that have not changed. This should save time and resources for both the department and utilities. If the overall circumstances surrounding a utilities' CIP program changes dramatically, the utilities would still have the option of submitting a plan every two years.

To keep each investor-owned utility's conservation goals up-to-date (for the purpose of determining each utility's bonus payment), the department should revise the goals at least once in the middle of the four-year cycle. For example, a utility would submit its 2007-2010 CIP plan to the department in 2006. At which time, the department would review the plan and set conservation goals for 2007 through 2010. However, in 2008, the department could then examine the utility's CIP plan modifications and program performance up to that point and set revised conservation goals for 2009 and 2010.

¹² By increasing the minimum efficiency standard for furnaces, the federal government would prohibit the sale of less efficient furnaces. Consequently, with only higher-efficiency furnaces in the market, a CIP rebate may not be necessary to encourage the sale of the most-efficient furnaces.

Because the switch from a two-year to a four-year program would substantially change the way the department administers CIP and the benefits and risks of this change will be unknown until it is carried out, the state should not automatically switch to the four-year cycle. The Department of Commerce should allow one or two investor-owned utilities to file a four-year plan and see how well the new review process works. If the new process improves the operation and performance of CIP, the department should then convert the other utilities to the four-year cycle. However, the department should always give the utilities the option of filing a plan every two years. Some utilities may find that the shorter cycle serves their purposes better. Finally, while the department is testing the four-year filing cycle, it should formally solicit comments from the utilities and other stakeholders.

The Review Structure

The Department of Commerce's structure for reviewing the CIP plans of the investor-owned utilities dates back to when the Public Utilities Commission (PUC) oversaw CIP. Prior to July 1989, the PUC had the authority to approve utilities' CIP plans and order changes. Because the PUC makes its decisions in a quasi-judicial fashion, the Commission prohibits "*ex parte*" communication between the PUC Commissioners and the people who advocate for positions that they think the PUC should take. (*Ex parte* communication refers to cases where one of the advocates communicates with a PUC Commissioner without the other advocates being present or given notice of the communication.) Prior to 1989, one of the "advocates" presenting information to the PUC was the Department of Public Service whose analysts advocated for running CIP to maximize society's overall benefit. Consequently, these analysts were prohibited from communicating with the PUC other than through public documents or hearings.

On July 1, 1989, the Legislature transferred authority over CIP from the PUC to the Department of Public Service, where the advocacy analysts were already working.¹³ To maintain the same decision-making structure used at the PUC, the Department of Public Service prohibited the Commissioner and his or her policy staff, who made the final decisions about the CIP plans, from communicating with their own analysts while the department reviewed the CIP plans. Department staff referred to this barrier between the policy staff and analysts as the "Chinese Wall." The purpose of the wall was to keep the policy staff at an arms-length distance from the analysts who were making recommendations to them. On July 1, 2001, the Legislature merged the Department of Public Service into the Department of Commerce.¹⁴ As part of the merger, the Department of Public Service brought CIP and its separation of policy staff and analysts to the Department of Commerce.

As we discussed earlier, the Department of Commerce has a three-part process for reviewing the CIP plans of the investor-owned utilities. In parts one and two, the department's economic analysts and engineers (the advocacy staff) review the plans and develop a recommended decision. After the analysts have developed their recommendations, the policy staff (including the Commissioner or Deputy

While the department reviews CIP plans, the department restricts communication between its policy staff and analysts.

¹³ *Laws of Minnesota* (1989), ch. 338, sec. 3.

¹⁴ *Laws of Minnesota* (1Sp2001), ch. 4, art. 6, sec. 44.

Commissioner) review the plans and the analysts' recommendations before issuing a final decision about the plan. During this entire process, the analysts and policy staff have traditionally not been allowed to communicate with each other about the plans other than through formal information requests, which are public documents.¹⁵ For example, if the Deputy Commissioner wants a clarification on a recommendation from the analysts, he or she cannot walk into the analyst's office to get the information. He has had to submit a formal information request. In the last year, the department has relaxed these rules. The department has designated a third set of staff (department managers) to convey information between the policy staff and analysts.

In assessing this process, we found that:

- **The Department of Commerce's restriction on communication between its analysts and policy staff makes the review process for CIP confusing and inefficient.**

A majority of both utility officials and other stakeholders expressed frustration with the department's decision-making structure.

During our interviews, several utility officials and other stakeholders expressed frustration with the department's decision-making structure. The current review structure limits the information and expertise available to the Commissioner (or Deputy Commissioner) of Commerce when he or she makes a final decision about a CIP activity. The process also takes a long time to carry out and has unnecessary duplication.

According to an environmental advocate, the problem with the current structure is that the Commissioner (or Deputy Commissioner) is isolated from the analysts who really understand conservation issues and the utilities' plans. This opinion is shared by some of the utilities. One utility official stated that the level of sophistication drops off when a CIP plan goes from the analysts to the policy staff. According to this official, the utilities generally have a good understanding how and why the analysts make their recommendations, but then the policy staff come in and change the recommendations without much reasoning. Another utility official stated, "It's hard to figure out what you're going to end up with (when the Commissioner makes his or her final decision)." Although some stakeholders and utilities have questioned the expertise of the policy staff, other utilities felt that the policy staff play an important role in the review process. These officials stated that the policy staff have a more balanced approach than the analysts have and are more willing to look at the utilities' perspective than the analysts are.

The communication restriction and separation of the analysts from the policy staff also adds unnecessary duplication. As some utility officials and other stakeholders told us, this arrangement has essentially created two agencies within the department, which makes the staff go through the discovery process of evaluating the CIP plans twice. First, the analysts assess and evaluate the plans, and then the policy staff go through their own discovery process. This adds excess work. As shown in Table 3.2, the policy staff devote more than one full-time employee equivalent to evaluate the CIP plans of the investor-owned utilities. While policy staff play an important role and need to be involved in CIP,

¹⁵ The analysts and policy staff can communicate informally about due dates, extensions, and other procedural issues.

they would not need to go through a separate discovery process if the communication restriction did not exist.

RECOMMENDATION

The Department of Commerce should eliminate the restriction on communication between its analysts and policy staff.

Legislative action is not required to eliminate the communication restriction within the Department of Commerce.

During our interviews, many of the utility officials and other stakeholders expressed support for allowing more communication about CIP plans within the department and streamlining the decision-making process. Furthermore, during an interview, the Deputy Commissioner of Commerce, who has been delegated authority over CIP by the Commissioner, expressed support for eliminating the communication restriction. He noted that staff from the department and the Office of the Attorney General could not find any statute preventing the Department of Commerce from eliminating the communication restriction on its own. Legislative action is not required.

Finally, while some utilities and stakeholders have expressed concern about eliminating the communication restriction and allowing the analysts to have direct access to the Commissioner, there is not a strong need to keep the restriction to protect the public interest. The analysts assess the utilities' CIP activities to ensure that the utilities comply with program requirements and use CIP to serve society as a whole. They assist the Commissioner in making sure the program is administered appropriately. Furthermore, if utilities or certain stakeholders do not like a decision made by the Commissioner, they can appeal it to the Public Utilities Commission.¹⁶

However, there are other risks in eliminating the communication restriction. When we asked the department's chief CIP analysts whom the restrictions protect, they said it protects them from political pressures and allows them to provide objective and impartial assessments of each utilities' plan. The analysts are insulated from the policy/political staff of the department while developing their recommendations. Furthermore, during our interviews, some utilities and stakeholders stated that they liked the department having a two-step approval process with the department's analysts first developing recommendations for public comment, and the Commissioner then making a final decision about each CIP plan. This gives the utilities and other stakeholders an opportunity to comment on the recommendations and proposed decisions before they become official.

The department could eliminate the communication restriction and keep a two-step process. With the analysts and policy staff working together, the department could still issue a proposed decision for public comment before the Commissioner issued the final decision. Alternatively, to ensure that the analysts are developing objective impartial analyses, the department could keep some communication restrictions while analysts review the CIP plans. For example, the department could have a policy that the Commissioner and other policy staff cannot communicate with the analysts while the analysts develop their

¹⁶ *Minn. Stat.* (2004) §216B.241, subd. 2(g).

recommendations. However, after the analysts issue their recommendations, all communication restrictions would be lifted so that the analysts could work directly with the Commissioner in making the final decision. The key is to (1) have the department go through only one discovery process and (2) provide the Commissioner with direct access to the expertise and knowledge of the analysts when making his or her final decisions.

PROGRAM REQUIREMENTS THAT REDUCE COST EFFECTIVENESS

When we reviewed the criteria that the Department of Commerce uses to assess and approve investor-owned utilities' CIP plans and activities, we found that:

- **While cost-effectiveness is a primary goal of CIP, Minnesota has statutes, rules, and procedures that reduce the cost-effectiveness of the program to achieve a desired distribution of program benefits.**

The department has several procedures for ensuring that CIP projects and programs are cost-effective. First, the department will generally only approve CIP projects that pass the societal test, with the only exception being projects that specifically target low-income households or have an indirect impact on energy savings (such as energy audits and research & development). Second, in developing their recommendations to the Commissioner of Commerce concerning each utility's CIP plan, the department's analysts determine if the utilities intend to maintain their historical level of energy savings per dollar of CIP spending. If the utilities do not plan to achieve this benchmark, the analysts generally recommend that the Commissioner increase the energy savings goals being proposed by these utilities. Third, electric utilities are supposed to meet the conservation goals outlined in their 15-year integrated resource plans.

However, state statutes, rules, and procedures also address the distribution of CIP's costs and benefits. These requirements and expectations reduce the cost-effectiveness of CIP by directing CIP funding toward less effective conservation activities. For example, state law requires each investor-owned utility to allocate CIP funding to its low-income customers in the same proportion as the utility allocated CIP funding to these customers during the previous three years.¹⁷ However, as shown in Table 3.5, conservation projects that utilities carry out exclusively for low-income customers (such as home weatherization) are generally not cost effective (as measured by the utilities in 2003.) The Department of Commerce also expects each utility to serve a broad range of customers by allocating its CIP funding to both residential and commercial/industrial customers.¹⁸ Yet, as shown in Table 3.5, conservation projects for residential customers are generally less cost-effective than projects for commercial/industrial customers. While these two provisions reduce the cost-effectiveness of CIP by restricting how much funding the utilities may

State law and the department's procedures direct CIP funds to less cost-effective projects.

¹⁷ *Minn. Stat.* (2004), §216B.241, subd. 2(f).

¹⁸ Department of Commerce, unpublished document titled "Criteria the Minnesota Department of Commerce Uses for Evaluating CIP Projects For Investor-Owned Utilities (Utility)," (undated), received by the Office of the Legislative Auditor on April 6, 2004.

Table 3.5: Societal Benefit-Cost Ratios by Customer Class, 2003

<u>Customer Class</u>	<u>Electric Projects</u>	<u>Natural Gas Projects</u>
Commercial/Industrial	3.2	2.8
Residential	2.5	1.5
Low-Income	0.6	0.7

NOTE: These figures are based on the benefit-cost ratios as reported by the investor-owned utilities.

SOURCE: The investor-owned utilities' benefit-cost data from their 2003 status reports.

allocate to commercial and industrial projects, they do ensure that residential and low-income customers have access to these funds when the utilities distribute them through conservation projects.

Furthermore, as we discussed in Chapter 1, the Department of Commerce allows Minnesota Power to allocate CIP funds to each of its remaining large industrial customers (those that are not large enough to opt out) in the exact amount that these customers paid into CIP through their billing adjustment.¹⁹ Unlike other utility customers, these large companies are entitled to the funds they contribute to CIP and use the funds for their own conservation projects. Ideally, from a cost-effectiveness perspective, Minnesota Power should pool all its CIP funds and allocate them to the most cost-effective projects regardless of who contributed the funding. However, some of these large industrial companies do not have a large supply of cost-effective conservation opportunities. For example, pipeline companies do not have a lot of opportunities for conservation because they are a relatively simple operation, with a series of pumping stations along the pipeline. Once energy-efficient motors are installed to run these pumps, a pipeline company has no other substantial opportunity for conservation. Yet, Minnesota Power has entitled two pipeline companies in its service territory to CIP funding even if they do not have many conservation opportunities. In fact, in 2003, Minnesota Power proposed that the department allow these companies to sell their CIP funding at 50 cents on the dollar to companies that have better conservation opportunities, but the department rejected this proposal.²⁰

Statewide, ten large industrial facilities have opted out of CIP, which has lowered the program's funding pool by 6 percent.

Besides laws and policies that direct CIP funding to less-effective conservation projects, CIP also has a provision that reduces program funding. As mentioned in Chapter 1, state law allows very large utility customers (facilities with 20 or more megawatts of peak electricity demand) to opt out of CIP and not pay the adjustment in their energy bills if they can demonstrate that they have made reasonable efforts to identify and carry out conservation. If the companies had stayed in CIP, the Department of Commerce could have ensured that these funds

¹⁹ Minnesota Power, *2004-2005 Conservation Improvement Program*, (Duluth, May 2003), 35.

²⁰ Minnesota Power, *2004-2005 Conservation Improvement Program*, 37; Department of Commerce, *Analysis and Recommendations of the Advocacy Staff of the Energy Division of the Minnesota Department of Commerce Regarding Minnesota Power, Inc.'s Conservation Improvement Program 2004-2005* (St. Paul, September 2003), 23; and Department of Commerce, *Decision In the Matter of the Implementation of the 2004-2005 Conservation Improvement Program for Minnesota Power* (St. Paul, December 1, 2003), 6.

were spent cost-effectively from a societal perspective, rather than at the companies' discretion. Currently ten facilities have opted out, which has reduced CIP's funding pool by 6 percent. However, the loss of funding is heavily concentrated in Minnesota Power's CIP program, which has lost 52 percent of its funding pool.²¹

The Legislature has the option of eliminating all these provisions, which would potentially increase the cost effectiveness of CIP. However, the Legislature needs to weigh the positive aspects of adopting such a policy against the negatives. Specifically, if such a policy were adopted, some customers (such as large industrial facilities and households, particularly low-income) would have limited access to CIP funding even though these customers helped pay for the program.

LOW-INCOME PROGRAMS

CIP's low-income projects are a hotly debated topic in Minnesota's energy community. The debate is broader than the concern that these projects reduce the cost-effectiveness of CIP. During our interviews, we found that:

- **Stakeholders have raised many concerns about the design of CIP's low-income program and how utilities are implementing it.**

We heard about a wide range of concerns. For example, both utility officials and low-income advocates told us that the requirement that utilities allocate CIP funds to projects for low-income customers in the same proportion that they did during the previous three years is actually a disincentive to fund low-income programs. If a utility increases its funding for low-income projects, the increase is incorporated into the utility's three-year spending base for determining future low-income spending requirements. Thus, the utilities will need to maintain this higher level of spending indefinitely, which makes them reluctant to increase spending in the first place. Furthermore, because each utility's low-income funding requirement is based on past spending levels and not on a measure of need, there is wide variation in the required level of spending. As shown in Table 3.6, CIP requires electric utilities to devote between 0.3 and 13.3 percent of their funding to low-income projects and natural gas utilities to devote between 10.5 and 33.7 percent of their funding.

During our interviews, stakeholders also raised concerns about CIP's low-income home weatherization program "piggybacking" off the U.S. Department of Energy's (DOE's) weatherization program, which is a similar program and administered by Community Action Program (CAP) agencies. Through the DOE weatherization program, CAP agencies already have a system for marketing weatherization services, determining income eligibility, and determining which weatherization measures to carry out. Consequently, the utilities have contracted with the CAP agencies to carry out their CIP weatherization programs. While this arrangement provides logistical and administrative benefits, it also raises

²¹ Office of the Legislative Auditor analysis of data from the Department of Commerce's assessment of gas utilities' 2003-04 CIP plans and the electric utilities' 2004-05 CIP plans. The data came from the table in the department's analysis of each plan that showed the utility's gross operating revenue coming from the opt-out facilities.

**CIP's
low-income
projects are
controversial.**

Table 3.6: 2003-04 or 2004-05 Low-Income Funding Requirements, By Utility

Utility	Proportion of CIP Funds Required to be Allocated to Low-Income Projects
Electric Utilities	
Interstate Power and Light	0.3%
Minnesota Power	13.3
Otter Tail Power	11.9
Xcel Energy	1.5
Natural Gas Utilities	
Great Plains Natural Gas	33.7%
Interstate Power and Light	10.5
CenterPoint Energy Minnegasco	24.2
Northern Minnesota Utilities	14.6
Peoples Natural Gas	16.7
Xcel Energy	16.6

SOURCE: Office of the Legislative Auditor compilation of information from the Department of Commerce's recommendations and proposed decision for the 2003-04 and 2004-05 utility CIP plans.

Under CIP, there is a tension between serving low-income households and funding cost-effective energy conservation projects.

concerns. First, the utilities are dependent on the CAP agencies to meet the low-income spending goals that the Commissioner of Commerce sets for each utility. Second, there is supposedly not much oversight of the CAP agencies by the utilities. Third, the CAP agencies could do a better job of selecting houses and projects to carry out. Fourth, CAP agencies often combine DOE and CIP funds to weatherize a home, and it can be difficult to separate the impacts of the two programs from each other and accurately measure the effectiveness of CIP. A stakeholder pointed out that, when computing benefits and costs for CIP, CenterPoint Energy Minnegasco (and probably other utilities) includes the full energy savings achieved by these jointly funded weatherization projects but only includes the CIP costs. By including the benefits of the DOE program but not the DOE costs in the benefit-cost calculations for these jointly funded projects, the utility is overstating the cost-effectiveness of weatherization activities.²²

Another concern about the low-income program is the tension between supporting low-income households and carrying out cost-effective conservation projects. CIP is based on an energy-planning model that is predicated on cost-effectiveness. However, as discussed, CIP's low-income projects are not always cost effective. In addition, the low-income projects could be considered more of a social service program than a strategy to minimize the cost of meeting the state's energy needs. An interview that we had with a CAP agency highlighted this tension. An official from this CAP agency indicated that the agency's goal is to help low-income households and not worry about system-wide energy and capacity savings that come with conservation. Another low-income advocate stated that the current low-income program is like sticking a "square peg in a round hole" because it does not fit well with the rest of the CIP program.

²² Department of Commerce, *Analysis, Recommendations, and Proposed Decision of the Advocacy Staff of the Energy Division of the Minnesota Department of Commerce, Regarding Reliant Energy Minnegasco's Conservation Improvement Program, 2003-04* (St. Paul, August 2002), 30-31.

Some low-income advocates counter that low-income projects appear not to be cost-effective because the current tests do not capture all the benefits of lowering the energy bills of low-income customers. For example, these tests do not include the benefits to the utilities of reducing bill collection costs, payment arrears, and service disconnections. The tests also do not include the societal benefit of reducing homelessness and other negative consequences of unstable housing.²³ In theory, if people have trouble paying their utility bills, they are more likely to become homeless and face other problems. Low-income advocates argue that these benefits should be included in the cost-effectiveness tests just like environmental benefits are included.

Finally, some stakeholders contend that it is harder to find good opportunities for low-income conservation on the electric side of CIP than on the natural gas side. These stakeholders wish that the CIP funding that electric utilities have set aside for low-income electric projects could be used for natural gas conservation. In their opinion, if the goal is to find the best projects to help low-income households, it should not matter what type of utility provided the funding.

RECOMMENDATION

The Department of Commerce should submit to the 2006 Legislature a plan for improving the performance, evaluation, and oversight of low-income CIP projects.

A task force of department staff, utility officials, and other stakeholders should develop a plan to improve the cost-effectiveness of low-income projects.

To develop this plan, the department should create a task force of department staff, utility officials, and other interested stakeholders. In fact, the department's analysts recommended this type of task force in 2003, but the Commissioner of Commerce did not adopt the recommendation. In their recommendation, the analysts stated, "To help improve the delivery of energy conservation services to low-income customers, Advocacy staff will convene a meeting of investor-owned utilities and Department Staff in the fall of 2003. The purpose of the meeting would be to develop a cost-effective low-income energy conservation protocol."²⁴

MUNICIPAL AND COOPERATIVE UTILITIES

As we discussed in Chapter 1, the Department of Commerce has only an advisory role with respect to the conservation programs of municipal and cooperative utilities. The department can make suggestions but cannot order these utilities to

²³ John Howart and Jerrold Oppenheim, *Analysis of Low-Income Benefits in Determining Cost-Effectiveness of Energy Efficiency Programs* (National Consumer Law Center, April 1999). Staff from both the Energy Cents Coalition and the Legal Services Advocacy Project indicated that this study provides good examples of the additional benefits of reducing low-income families' energy costs.

²⁴ Department of Commerce, *Analysis and Recommendations Regarding Minnesota Power, Inc.'s Conservation Improvement Program 2004-2005*, 8. *The other electric utilities that submitted CIP plans in 2003 had a similar recommendation.*

change their programs. Because the department has a diminished role, we found that:

- **The Department of Commerce carries out only a cursory review of the conservation activities of municipal and cooperative utilities.**

Some municipal and cooperative utilities have submitted energy savings estimates that are suspect.

As we discussed in Chapter 1, the municipal and cooperative utilities only need to report basic programmatic information to the department—including a brief program description, spending levels, a budget breakdown, and energy savings estimates. Furthermore, a department policy person (not an analyst) carries out the department’s review of these plans. While this person checks that the utilities’ reported spending levels comply with the levels required in state law, the person does not verify the accuracy of the reported spending or energy savings levels. Consequently, some of these numbers are suspect, especially with respect to energy savings. While the success of municipal and cooperative utilities’ conservation efforts will vary, they should not vary by orders of magnitude. Yet, for the municipal and cooperative electric utilities, the 2003 energy savings per dollar of CIP spending ranged from 0.06 to 26.19 kilowatt-hours per dollar of CIP spending.²⁵ For comparison, the range for investor-owned utilities is 5.81 to 10.24 kilowatt-hours per dollar of CIP spending.²⁶

Although the department has only an advisory role with respect to the conservation programs of the municipal and cooperative utilities, the department has the option of commenting on the quality of these programs after reviewing their CIP plans. Yet, with respect to the plans that these utilities submitted in 2002, the department’s reviewer did not issue any formal comments to any of the utilities.

RECOMMENDATIONS

The Department of Commerce should move the responsibility of reviewing CIP plans for municipal and cooperative utilities from its policy staff to its analysts.

This recommendation should improve the department’s operations for a couple reasons. First, the analysts often have a better understanding of many conservation issues than the policy staff. Specifically, they have a thorough understanding of the CIP projects that the investor-owned utilities carry out, which are a good basis for evaluating the conservation programs of municipal and cooperative utilities. Second, the department’s lead electric analyst indicated that reviewing the CIP activities of the municipal and cooperative utilities should not place a large burden on the department’s analysts. They could fit the reviews into the periodic lulls in their workload. Unlike the CIP plans for the investor-owned

²⁵ Office of the Legislative Auditor analysis of unpublished tables from the Department of Commerce, received by the Office of the Legislative Auditor on January 11, 2005. The estimates apply to the energy conserved in the first year that the energy-efficient products are in place. The products will typically provide this level of savings for another 10 to 20 years.

²⁶ Office of the Legislative Auditor analysis of the Department of Commerce’s databases of CIP outcomes, *Electric dbase 5-04.xls*, received by the Office of the Legislative Auditor on July 1, 2004.

utilities, there is no deadline for the department completing its review of the CIP plans of the municipal and cooperative utilities.

The department currently requires some municipal and cooperative utilities to report a significant amount of information that receives only a limited review.²⁷ The state should either stop requiring this information or give it more attention. Collecting information for the sake of collecting it is not productive. However, we believe this information is important if it is actually used. Although the department has only an advisory role with respect to municipal and cooperative utilities, it is important for the state to monitor and track the conservation efforts of these utilities. As shown in Figures 1.1 and 1.2, in aggregate, the municipal and cooperative utilities provide a significant portion of the electricity and natural gas consumed in Minnesota. In addition, some of these utilities are growing rapidly. For example, in the next few years, the Department of Commerce expects electricity consumption to grow annually by 1.5 percent statewide,²⁸ while Great River Energy (the state's largest cooperative utility) expects its sales to grow by about 3 percent annually in the next couple years.²⁹

In the long run, the Department of Commerce should determine how much information it needs to adequately monitor the conservation efforts of the municipal and cooperative utilities. In addition, the department should determine when and how this information should be collected. As we described in Chapter 1, the department has traditionally collected CIP plans/reports from the municipal and cooperative utilities every two years; however, starting in 2005, the department intends to have the municipal and cooperative utilities submit annual status reports in addition to their biennial CIP plans.³⁰ The department should determine if all this reporting is necessary and may want to switch the municipal and cooperative utilities to four-year CIP plans, just like the investor-owned utilities. With four-year plans, it would be particularly important for the municipal and cooperative utilities to submit annual status reports. Before making the switch to the four-year plans, the department should determine how well its new reporting procedures (biennial plans with annual status reports) are working.

²⁷ As discussed in Chapter 1, small municipal electric utilities (those with less than 60 million kilowatt-hours of electricity sales) are not required to file a full CIP plan but only required a letter identifying the utility's minimum spending requirement and certifying that the utility has complied with the requirement.

²⁸ Department of Commerce, *Energy Policy and Conservation Report (Draft)* (St. Paul, July 2004), 13.

²⁹ Great River Energy, table titled "Net System Forecast Energy Requirements," received by the Office of the Legislative Auditor on November 22, 2004.

³⁰ Under the Department of Commerce's new policy of annual status reports for municipal and cooperative utilities, the small municipal utilities will not need to file annual status reports.

Summary of Recommendations

- The utilities and Department of Commerce should correct the methodological problems in the utilities' benefit-cost estimates (p. 38).
- The Legislature should give the Department of Commerce the authority to switch CIP from a two-year to a four-year program, and the department should increase the level of scrutiny that each plan receives (p. 51).
- The Department of Commerce should eliminate the restriction on communication between its analysts and the policy staff (p. 56).
- The Department of Commerce should submit to the 2006 Legislature a plan for improving the performance, evaluation, and oversight of low-income CIP projects (p. 61).
- The Department of Commerce should move the responsibility of reviewing CIP plans for municipal and cooperative utilities from its policy staff to its analysts (p. 62).



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January 14, 2005

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The Department appreciates the thorough and insightful evaluation of the Conservation Improvement Program (CIP) undertaken by the Office of the Legislative Auditor (OLA). The report is an excellent resource that the Department, Legislature, and interested parties can use to understand how CIP operates. We are pleased that the OLA's study has borne out our belief that the Department oversees a cost-effective program that provides hundreds of millions of dollars of benefits to the state of Minnesota. The report identifies many areas that deserve our attention. The Department has already begun addressing many of them; some we shall begin addressing soon; and others we will have to thoroughly examine to ensure that the benefits of any changes outweigh any potential costs.

Attached is a brief response of the Department to some of the recommendations of the report. We look forward to working with the Legislature and interested parties to ensure that the CIP program continues its critically important role in providing reliable, cost-effective and environmentally friendly energy conservation services to Minnesota.

Sincerely,

A handwritten signature in black ink that reads "Edward A. Garvey". The signature is written in a cursive, flowing style.

EDWARD A. GARVEY
Deputy Commissioner

EAG/ja

RESPONSE OF THE MINNESOTA DEPARTMENT OF COMMERCE
TO THE OFFICE OF THE LEGISLATIVE AUDITOR'S REPORT ON
THE CONSERVATION IMPROVEMENT PROGRAM

The Department believes the CIP program has greatly benefited from the independent, professional, and thorough analysis conducted by the OLA. The Department wholeheartedly agrees with the six major findings of the OLA report:

- The benefits of the Conservation Improvement Program (CIP) are greater than its costs, and the program has the potential to provide cost-effective energy conservation in the future (pp. 22 and 41 of full report).
- On balance, the methods and assumptions used by investor-owned utilities to calculate the benefits and costs of their 2003 conservation activities tended to understate CIP's cost effectiveness (p. 25-27).
- While cost-effective energy conservation is a primary goal of CIP, some Minnesota laws, rules and procedures reduce the cost-effectiveness of the program to achieve a desired distribution of program benefits (p. 57).
- Utilities, low-income advocates, environmental groups, and the Department of Commerce have concerns about how conservation projects for low-income households are being carried out and evaluated (p. 59).
- The Department of Commerce conducts relatively thorough reviews of investor-owned utilities' conservation plans and activities, but the review process has some deficiencies (pp. 46 and 50).
- A Department of Commerce policy that limits communication within the department about CIP plans makes the department's review process inefficient and creates confusion (p. 55).

Rather than comment on each finding, the Department will focus its response on the Report's four key recommendations.

I. Key Recommendation 1: The Legislature should give the Department of Commerce the authority to switch CIP from a two-year to a four-year program, and the department should increase the level of scrutiny that each CIP plan receives (p. 51).

The OLA Report found that the Department reviews utility filings thoroughly, but that it may be able to increase its scrutiny if utilities are allowed to file their CIP plans once every four years instead of once every two years. The Department notes that this recommendation has been suggested in the past. Some of the utilities favor the longer time between filings, while others have stated that they prefer to file once every two years. Although this change is recommended

in order to save time resources and to enable a standardization and increased level of review, the end result could be the same amount of time being expended over a longer timeframe with the same or less standardization. This could be the outcome because utilities are likely to have to update their filings before the end of the four-year period due to changes in standards, etc. and to update avoided cost assumptions. In addition, most of the electric CIPs are currently reviewed at the same time as the other electric CIPs. The same is true for the gas CIPs. If the CIPs were spread out over more years, there would be less opportunity to compare electric CIPs or gas CIPs side by side. Having said this, the Department is agreeable to the longer time between filings. Amending the CIP statute to allow, at the Commissioner's discretion, a utility to file its CIP plans up to four years apart is a good way to handle this suggestion.

II. Key Recommendation 2: The utilities and Department of Commerce should correct the methodological problems in the utilities' benefit-cost estimates (p.38).

Preceding this recommendation, the OLA identified the following issues with the Department's CIP cost-effectiveness evaluation:

- The use of out-of-date natural gas prices resulted in a significant understatement of the 2003 benefit-cost ratios for the natural gas utilities (p. 27).
- The use of out-of-date discount rates also resulted in an understatement of the 2003 benefit-cost ratios (p. 28).
- In 2003, electric utilities did not use the same discount rate to calculate the value of benefits received in future years under the societal test (p. 29).
- Electric utilities do not use the same methods and assumptions as each other to estimate the energy, power plant, transmission line, and distribution system costs that were avoided through conservation, which led to widely varying estimates (p. 29).
- The electric utilities used different methods to estimate the value of health and environmental damages that energy conservation voids, which has led to widely varying estimates (p. 30).
- Minnesota's benefit-cost model for natural gas projects generally understated the utilities' 2003 reported benefit-cost ratios because of structural problems in the model (p. 33).

The Department and the utilities have been working on modifying the natural gas cost-effectiveness model (BenCost) and are nearing completion of that process. As part of that process, it became apparent that some of the electric and natural gas assumptions could be revised or made consistent. Nevertheless, the Report provides a solid foundation for all parties to consider on how to standardize cost-effectiveness analysis. We address the identified issues below.

A. Out of Date Assumptions

During its investigation, the OLA discovered that when reporting the results of their 2003 CIP investments, the investor-owned electric and natural gas utilities (IOUs) used the assumptions (e.g., natural gas prices, discount rates, energy and demand savings) approved by the Commissioner in 2001 and 2002. Given that natural gas price projections had risen significantly since the utility filings were originally submitted, the utilities' annual status reports for 2003 underestimated the value of the CIP investments.

The IOUs are required to submit annual status reports that detail the achievements of each CIP project and the resulting cost-effectiveness. The annual update reports serve two purposes: (1) they are used to judge how well a project is performing and (2) they are used to determine the size of financial incentive, if any, a utility will earn based on its achievements and incurred costs. Currently utilities are required to use Commissioner-approved assumptions when reporting results in the annual reports. This requirement is made to ensure that a utility's incentive is based on performance, not on changes in fuel costs or discount rates for which the utility has no control. The incentive mechanism still functions well, and should not be modified. However, we recognize that in some instances, particularly given the recent volatility in natural gas prices, the utility's reporting of results may not provide an accurate portrayal of the value of the project to society. We will work with utilities to overcome this potential downfall.

B. Differing Assumptions and Methods Used by Electric Utilities

The Department agrees that efforts should be made to standardize the differing assumptions used by electric utilities. An example is the societal discount rate used by each electric utility.

In the electric assumption and method standardization section of the Report, the OLA also mentions that the American Council for an Energy Efficient Economy (ACEEE) recommended that the Department either use the electric cost-effectiveness model used by the four investor-owned electric utilities, or require the utilities to select a new model/software package equally accessible to the utilities and the Department. The Department is currently soliciting feedback from utilities and consultants concerning the resources (chiefly personnel time) needed to learn and operate the cost-effectiveness model used by the electric IOUs. The Department will continue this assessment and judge whether the increased benefits are greater than the potential costs of operating a PC-based electric cost-effectiveness model.

C. Natural Gas Model Structural Problems

The Department, utilities and other interested parties are already in the process of updating BenCost, the cost-effectiveness model used to determine the cost-effectiveness of natural gas CIP projects. This effort should help address the OLA's concern about the gas cost-effectiveness model.

III. Key Recommendation 3: The Department of Commerce should eliminate the restriction on communication between its analysts and policy staff (p. 56).

The Department agrees that there are advantages to removing the wall between analysts and policy staff and will implement this recommendation as soon as possible.

IV. Key Recommendation 4: The Department of Commerce should submit to the 2006 Legislature a plan for improving the performance, evaluation, and oversight of the low-income CIP projects.

The Department agrees that the low-income programs components of CIP need to be closely reexamined. Indeed, in Xcel Energy's most recent CIP, the Deputy Commissioner approved a plan for Xcel's CIP Advisory Group to investigate the best means of improving Xcel Energy Electric's electric low-income programs. Thus, some of the discussion necessary to fulfill this recommendation is already occurring. Also, the Department has observed that the current CIP statute regarding the rolling three-year average of low-income CIP spending serves as a practical detriment to the development of low income CIP programs.

V. The Department of Commerce should move the responsibility of reviewing CIP plans for municipal and cooperative utilities from its policy staff to its analysts.

As noted in the report, the Department has only an advisory role with respect to municipal and cooperative utility CIPs. In this limited role, the Department assists these utilities in understanding what CIP projects may be a good fit for their customers, providing advice on each project's likely energy and demand savings, and encouraging the utilities to seek new avenues of energy savings. Given that the Department will remove the Chinese Wall, reviewing municipal and cooperative CIP filings will most likely be done by analysts.

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Recent Program Evaluations

<i>Funding for Probation Services</i> , January 1996	96-01	<i>Affordable Housing</i> , January 2001	01-03
<i>Department of Human Rights</i> , January 1996	96-02	<i>Insurance for Behavioral Health Care</i> , February 2001	01-04
<i>Trends in State and Local Government Spending</i> , February 1996	96-03	<i>Chronic Offenders</i> , February 2001	01-05
<i>State Grant and Loan Programs for Businesses</i> February 1996	96-04	<i>State Archaeologist</i> , April 2001	01-06
<i>Post-Secondary Enrollment Options Program</i> , March 1996	96-05	<i>Recycling and Waste Reduction</i> , January 2002	02-01
<i>Tax Increment Financing</i> , March 1996	96-06	<i>Minnesota Pollution Control Agency Funding</i> , January 2002	02-02
<i>Property Assessments: Structure and Appeals, A Best Practices Review</i> , May 1996	96-07	<i>Water Quality: Permitting and Compliance Monitoring</i> , January 2002	02-03
<i>Recidivism of Adult Felons</i> , January 1997	97-01	<i>Financing Unemployment Insurance</i> , January 2002	02-04
<i>Nursing Home Rates in the Upper Midwest</i> , January 1997	97-02	<i>Economic Status of Welfare Recipients</i> , January 2002	02-05
<i>Special Education</i> , January 1997	97-03	<i>State Employee Health Insurance</i> , February 2002	02-06
<i>Ethanol Programs</i> , February 1997	97-04	<i>Teacher Recruitment and Retention: Summary of Major Studies</i> , March 2002	02-07
<i>Statewide Systems Project</i> , February 1997	97-05	<i>Local E-Government: A Best Practices Review</i> , April 2002	02-08
<i>Highway Spending</i> , March 1997	97-06	<i>Managing Local Government Computer Systems: A Best Practices Review</i> , April 2002	02-09
<i>Non-Felony Prosecution, A Best Practices Review</i> , April 1997	97-07	<i>State-Funded Trails for Motorized Recreation</i> , January 2003	03-01
<i>Social Service Mandates Reform</i> , July 1997	97-08	<i>Professional/Technical Contracting</i> , January 2003	03-02
<i>Child Protective Services</i> , January 1998	98-01	<i>MinnesotaCare</i> , January 2003	03-03
<i>Remedial Education</i> , January 1998	98-02	<i>Metropolitan Airports Commission</i> , January 2003	03-04
<i>Transit Services</i> , February 1998	98-03	<i>Preserving Housing: A Best Practices Review</i> , April 2003	03-05
<i>State Building Maintenance</i> , February 1998	98-04	<i>Charter School Financial Accountability</i> , June 2003	03-06
<i>School Trust Land</i> , March 1998	98-05	<i>Controlling Improper Payments in the Medical Assistance Program</i> , August 2003	03-07
<i>9-1-1 Dispatching: A Best Practices Review</i> , March 1998	98-06	<i>Higher Education Tuition Reciprocity</i> , September 2003	03-08
<i>Minnesota State High School League</i> , June 1998	98-07	<i>Minnesota State Lottery</i> , February 2004	04-01
<i>State Building Code</i> , January 1999	99-01	<i>Compensation at the University of Minnesota</i> , February 2004	04-02
<i>Juvenile Out-of-Home Placement</i> , January 1999	99-02	<i>Medicaid Home and Community-Based Waiver Services for Persons With Mental Retardation or Related Conditions</i> , February 2004	04-03
<i>Metropolitan Mosquito Control District</i> , January 1999	99-03	<i>No Child Left Behind</i> , February/March 2004	04-04
<i>Animal Feedlot Regulation</i> , January 1999	99-04	<i>CriMNet</i> , March 2004	04-05
<i>Occupational Regulation</i> , February 1999	99-05	<i>Child Care Reimbursement Rates</i> , January 2005	05-01
<i>Directory of Regulated Occupations in Minnesota</i> , February 1999	99-05b	<i>Gambling Regulation and Oversight</i> , January 2005	05-02
<i>Counties' Use of Administrative Penalties for Violations of Solid and Hazardous Waste Ordinances</i> , February 1999	99-06	<i>Community Supervision of Sex Offenders</i> , January 2005	05-03
<i>Fire Services: A Best Practices Review</i> , April 1999	99-07	<i>Energy Conservation Improvement Program</i> , January 2005	05-04
<i>State Mandates on Local Governments</i> , January 2000	00-01	<i>Nursing Home Inspections</i> , February 2005	05-05
<i>State Park Management</i> , January 2000	00-02	<i>Workforce Development Services</i> , February 2005	05-06
<i>Welfare Reform</i> , January 2000	00-03		
<i>School District Finances</i> , February 2000	00-04		
<i>State Employee Compensation</i> , February 2000	00-05		
<i>Preventive Maintenance for Local Government Buildings: A Best Practices Review</i> , April 2000	00-06		
<i>The MnSCU Merger</i> , August 2000	00-07		
<i>Early Childhood Education Programs</i> , January 2001	01-01		
<i>District Courts</i> , January 2001	01-02		

Evaluation reports can be obtained free of charge from the Legislative Auditor's Office, Program Evaluation Division, Room 140, 658 Cedar Street, Saint Paul, Minnesota 55155, 651/296-4708. Full text versions of recent reports are also available at the OLA web site: <http://www.auditor.leg.state.mn.us>