
Nebraska Energy Office Dollar and Energy Saving Loan Program Profile #112

Executive Summary	2
Nebraska Energy Office Overview	3
Agency DSM Overview	4
State Energy Conservation Program; Nebraska Energy Office 1993 Conservation Programs; Energy Office Expenditures; Energy Office DSM Expenditure; Weatherization Assistance Program; Institutional Conservation Program; Cumulative Gasoline Equivalent Saved Through Energy Office Programs; Energy Financing Programs; Cumulative Gasoline Equivalent Saved	
Program Design and Delivery	7
Loans For Specialized Sectors; Delivery: The Basic Step-By-Step Process; Case Study: Hypothetical Example; Dollar And Energy Saving Loan Prescriptive Measures; Marketing; Measures Installed; Staffing Requirements	
Monitoring and Evaluation	13
Natural Gas Savings; Economic Impact Analysis; Electricity Savings; Economic Impacts	
Program Savings	16
Energy Savings Overview; Participation Rates; Participation By Sector; Evaluated Savings; Free Ridership; Measure Lifetime; Projected Savings	
Cost of the Program	18
Project Costs By Sector; Average Loan Amount Per Project; Cost Per Participant; Measure Costs; Cost Effectiveness; Total NEO and Leveraged Loans; Cost Components; Cost of Saved Energy 1990-1994 At Various Discount Rates	
Environmental Benefit Statement	20
Lessons Learned / Transferability	22
References	24

Executive Summary

The Nebraska Energy Office has implemented the Dollar and Energy Saving Loan program since 1990 with remarkable success, but without much deserved fanfare. Not only has the program resulted in over \$52.7 million dollars worth of retrofit activity, 4,394 MWh of annual electricity savings, and 137,107 MCF of natural gas savings, but to do so the Energy Office has effectively leveraged significant private sector funds from the program's base funding of oil overcharge monies. In an elegant yet simple program design that seems highly transferable, the Energy Office has used the interest income generated from oil overcharge funds to administer the program, while subsidizing low-interest energy efficiency loans by working in close cooperation with commercial lenders in the State.

Nebraska initially invested \$10.0 million in the loan program. Within a few years the program was allocated additional funds, bringing the total State investment to \$19.0 million. Perhaps the most exciting aspect of the program design is that this initial seed capital of public funds has been leveraged through matching private-sector funds, increasing the total dollar value of loans made to \$48.8 million. Over ten years, the Energy Office expects that the total amount of capital provided for retrofits will be fully 360% of the initial outlay of public funds! Furthermore, over 98% of the total dollars expended through the program have been dedicated to energy conservation measures, with comparably little expended for either administration or energy audits.

Unlike many financing and revolving loan fund programs, the Dollar and Energy Saving Loan program is quite unique in its emphasis on the residential sector. Of the 8,673 projects undertaken as a result of the program through 1994, fully 92% or 7,986 have been fuel-neutral residential loans. These loans have fostered both gas and electricity savings with average home efficiency gains of 13.5% and 5% respectively. The program has also supported retrofit activity in the agricultural, small business, local government, and rural nursing home sectors.

The program's macroeconomic impact has been evaluated in terms of job creation, income, and contribution to Nebraska's Gross State Product using input-output modelling. An analysis of the first four years of operations shows that over a ten-year period, the program will induce 789 job-years of employment, create \$17.26 million in net income from added wage and salary compensation, and contribute \$28.3 million to the Nebraska Gross State Product. Under normal investment conditions, nearly \$54,000 is required to create a single full-time equivalent job. However, because the Energy Office loans leverage funds from commercial lenders, an \$18,000 investment by the State creates a full-time position, one of the lowest dollar-invested to job-created ratios in the nation.

NEBRASKA ENERGY OFFICE **Dollar and Energy Saving Loan Program**

Sector: All sectors

Measures: Prescriptive and custom measures including all cost-effective energy conservation measures; especially residential HVAC and weatherization

Mechanism: Oil overcharge funds are leveraged to create an incentive for lenders to provide low-interest loans for energy conservation improvements

History: Pilot tested in 1989; launched in March 1990

1993 PROGRAM DATA

Energy savings: 279 MWh
Annual BTU savings: 11,634 MMBTU
Natural gas savings: 8,726 MCF
NEO Cost: \$680,868

CUMULATIVE DATA

Energy savings: 4,394 MWh
Total BTU savings: 182,809 MMBTU
Natural gas savings: 137,107 MCF
Loans leveraged: \$48,812,000

CONVENTIONS

For the entire 1994 profile series all dollar values have been adjusted to 1990 U.S. dollar levels unless otherwise specified. Inflation and exchange rates were derived from the U.S. Department of Labor's Consumer Price Index and the U.S. Federal Reserve's foreign exchange rates.

The Results Center uses three conventions for presenting program savings. **ANNUALSAVINGS** refer to the annualized value of increments of energy and capacity installed in a given year, or what might be best described as the first full-year effect of the measures installed in a given year. **CUMULATIVE SAVINGS** represent the savings in a given year for all measures installed to date. **LIFECYCLE SAVINGS** are calculated by multiplying the annual savings by the assumed average measure lifetime. **CAUTION:** cumulative and lifecycle savings are theoretical values that usually represent only the technical measure lifetimes and are not adjusted for attrition unless specifically stated.

Nebraska Energy Office Overview

The Nebraska State Energy Office (the Energy Office or NEO) was created in November 1973 as a division of the Nebraska Department of Revenue and was originally called the Fuel Allocations Office. After a brief period in that organizational structure the Energy Office then was given an independent agency status for ten years between 1977 to 1987. In 1987, and by Executive Order of the Governor who clearly saw the importance of the Energy Office and its work, the Energy Office became a division of the Governor's Policy Research Office, a status that it has enjoyed ever since.[R#10]

In Fiscal Year 1994 (July 1, 1993 to June 30, 1994) the Energy Office's budget amounted to \$11.01 million. This budget was derived from three primary sources. The FY 1994 budget was made up of \$5.4 million of petroleum violation escrow funds (also known as oil overcharge funds), \$1.5 million of State funds, and \$4.1 million of Federal funds. Thus the petroleum violation escrow funding accounted for approximately 49% of the Energy Office's funding, despite a 10% decrease in value from the previous year. State funds came almost exclusively from severance taxes, fees collected from companies which extract raw materials within the State. (Usually severance taxes are directly tilled into a permanent school fund; in Nebraska part of this capital was diverted to leverage greater savings through energy efficiency.) State funds in FY 1994 were also down, and like Federal funds decreased for the second year in a row. The Energy Office's budget has ranged from \$6 million in 1988 to a high of \$21.37 million dollars in 1991, to its present level of \$11 million. Despite these variations, the Energy Office continues to be highly effective and stands as a model for other energy offices seeking innovative means of leveraging funds for maximum public benefit.[R#10]

The Energy Office uses its financial resources for a number of dedicated and discretionary purposes. Over 45% of the budget has been allocated for petroleum violation escrow aid and contracted projects. Over 84% of all Federal funds have been expended as aid in the low-income Weatherization Assistance Program (WAP). In excess of 64% of all State severance taxes have been used as loans and grants for the School Weatherization program. Loans and grants which make up the largest portion of the Energy Office's budget, come from all three sources of funding (Federal, State, and oil overcharge). Through these programs, funds are received and then judiciously allocated to delegate agencies or directly to beneficiaries such as schools, hospitals, small businesses, local governments, and individuals. The final broad classification of the Energy Office's expenditures is administrative, money spent for agency operations such as travel, telephone, computers, salaries and other office expenses. As this Profile demonstrates later, NEO has been especially efficient in its operations and has even established innovative means of assuring the continued administration of their programs through interest payments on capital resources.[R#10,17]

Agency DSM Overview

The Nebraska Energy Office provides services ranging from promotion of energy conservation, to alternative fuels, to natural gas technical assistance, to research and development surrounding renewable energy for the future. Focusing on its energy conservation services, of particular importance has been its role in providing two federally mandated programs stipulated as part of the Energy Policy Conservation Act of 1975, the State Energy Conservation Program (SECP) and the Energy Extension Service. (The Energy Policy Act of 1992 eliminated the Energy Extension Service and incorporated its mission into the State Energy Conservation Program.) SECP provides funding for a range of projects determined by individual states. While states have discretion in the energy conservation services that they elect to provide, to do so they must submit annual plans to the U.S. Department of Energy for review and ultimate approval. Under the SECP umbrella in Nebraska, the Energy Office has implemented efficiency retrofits that in calendar year 1994 produced annual energy savings of 6.401 trillion British thermal units (Btus), equivalent to over 51 million gallons of gasoline. [R#10,17]

STATE ENERGY CONSERVATION PROGRAM

Federal government grants are funded on an 80/20 matching basis to states for the State Energy Conservation Program (SECP). In Fiscal Year 1994, the State Energy Conservation Program projects included a) federally-mandated projects, b) energy policy implementation, c) oil overcharge project management, d) energy shortage management and emergency preparedness, and e) financing programs such as the Dollar and Energy Saving Loan program, the subject of this Profile. [R#10]

NEBRASKA ENERGY OFFICE 1993 CONSERVATION PROGRAMS

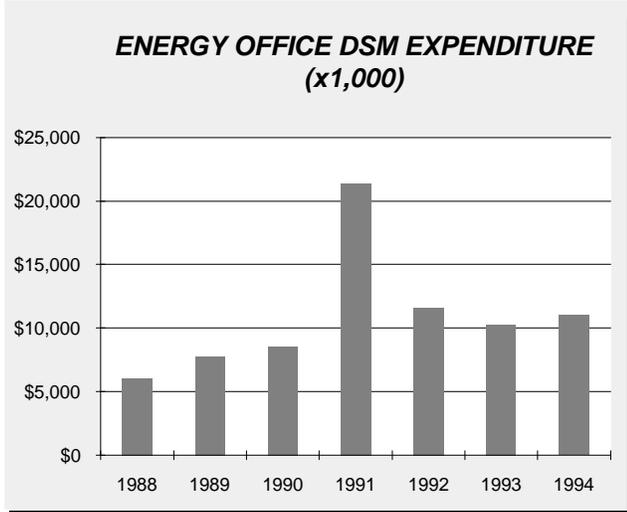
Agricultural Energy Management
Dollar and Energy Saving Loan
Hundred Points of Light
Municipal Loan
Nebraska Community Energy Management
Omaha Traffic Light
Public Buildings
Ride Share
Thermal Lighting Standards

ENERGY OFFICE EXPENDITURES	ANNUAL EXPENDITURE (x1,000)
1988	\$6,040
1989	\$7,750
1990	\$8,560
1991	\$21,370
1992	\$11,620
1993	\$10,250
1994	\$11,010
Total	\$76,600

Federally mandated projects: According to the Energy Policy Conservation Act, the Energy Office must fulfill five mandatory requirements in the specific areas of procurement, transportation, lighting standards, thermal standards, and right-turn-on-red signals. The Energy Office submits plans to the Federal government for its review and approval of projected activities in these areas. For example, as part of the Energy Office's efforts in compliance with federally-required activities, it coordinates and publishes a ride-share roster for State employees seeking to carpool. More than 125 State workers are listed on the roster from communities surrounding Lincoln. [R#10]

Energy policy implementation: As part of its requirement to help forge and then implement rational State energy policies, the Nebraska Energy Office completed a comprehensive assessment of the feasibility, cost-effectiveness, and potential savings of each of the recommendations in the "Nebraska Energy Policy Plan: Recommendations to the Governor," released by the Energy Policy Council in January 1992. In December of 1992, the Energy Action Plan that resulted was implemented to serve as a strategy for Nebraskans to meet present and future energy needs.

The Action Plan served as the first step in an on-going process to plan and implement effective programs to advance the conservation and efficiency of traditional, non-renewable energy sources; encourage the development of alternate and renewable energy sources; and further energy-related economic development activities. It calls for providing incentives for the purchase and conversion of vehicles to operate on alternative



fuels; increasing energy efficiency of new construction and existing buildings; providing timely and reliable information and education opportunities to help Nebraskans learn about energy and make good decisions regarding their energy costs and use; and utilizing energy efficiency strategies to strengthen Nebraska's economy. [R#10]

Oil overcharge project management: Since 1982 Nebraska has been receiving oil overcharge funds (also referred to as Petroleum Violation Escrow funds) as a result of various court actions against oil companies that overcharged their customers during the period of Federal price controls from 1973 to 1981. Since direct compensation to injured consumers seemed unrealistic, the courts ordered that the money recovered from law suits be distributed to the states to fund programs that provide indirect restitution to injured energy consumers. States were directed to use the money within parameters established by the courts to fund energy assistance and conservation programs. [R#10]

Total oil overcharge funds (including interest) received by the State of Nebraska as of June 30, 1994 have been \$41.61 million (unlevelized). This includes \$23.28 million in Exxon funds, \$17.80 million in Stripper Well funds, and \$0.53 million in Diamond Shamrock funds. Given these large sums of money, a major responsibility that the Energy Office has had over the past years has been to judiciously allocate oil overcharge funds under the rubric of the State Energy Conservation Program. This has enabled the Energy Office to administer a host of energy efficiency programs in Nebraska, made that much more important by the fact that all electric utilities in Nebraska

are public and thus generally unregulated in terms of required investments in customer energy efficiency or what has been called demand-side management. (Gas utilities in Nebraska are both publicly and privately held.)

Energy shortage management and emergency preparedness: Another key element of the State Energy Conservation Program is energy shortage management and emergency preparedness. The Energy Office's contingency plans developed in prior years provide the structure for any necessary energy emergency preparedness activities. The agency regularly tracks the status of energy supplies in the State and any conditions which might disrupt supplies. This attention to the State's balance of energy resources and consumption is a feature of the Energy Office's Annual Report. Expressed in gallons of oil equivalent, a vestige from the past and indication of the impetus behind the creation of all state energy offices – the oil shocks of the 1970s – the Annual Report (as well as the regularly published Energy Statistics and the Nebraska Quarterly Energy Report) provide useful snapshots related to oil and energy dependence and how State programs have mitigated adverse dependence and inefficient use.

WEATHERIZATION ASSISTANCE PROGRAM

The Energy Office's Weatherization Division has administered the low-income Weatherization Assistance Program (WAP) since 1979. WAP is a Federally-mandated program for weatherizing homes to save money and energy. In Nebraska, Federal funds are provided to the Energy Office which in turn disburses them to community action agencies which audit and weatherize homes. Since 1979, over \$50 million has been provided to weatherize well over 40,000 homes while over 60,000 homes remain eligible for the service. The Energy Office is responsible for inspecting about 35% of the weatherized homes and for monitoring and auditing the subgrantees that actually perform the retrofits. [R#10]

INSTITUTIONAL CONSERVATION PROGRAM

NEO also implements the Federal Institutional Conservation Assistance program which provides 50:50 matching grants to hospitals and public and private schools. The Energy Office provides program information to applicants, reviews and ranks applications, submits project proposals to the U.S. Department of Energy. By the end of 1992 nearly \$9.3 million in Federal funds had been awarded to the State's schools and hospitals since the program became operational in 1980. [R#10]

Agency DSM Overview (continued)

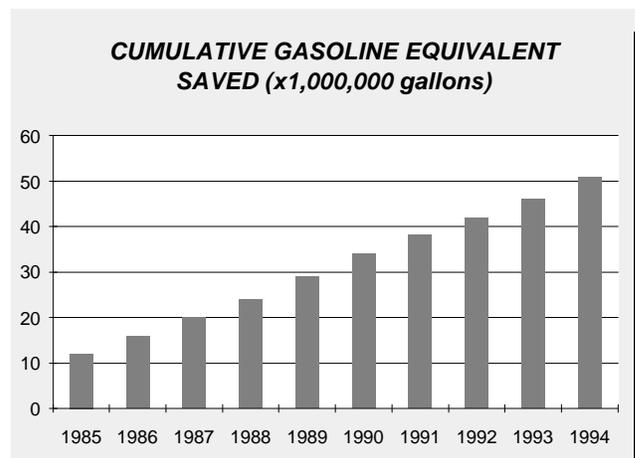
CUMULATIVE GASOLINE EQUIVALENT SAVED THROUGH ENERGY OFFICE PROGRAMS (MILLIONS OF GALLONS)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Agricultural Energy Mgt.	0.50	0.74	0.99	1.24	1.24	1.40	1.40	1.40	1.40	1.40
Dollar and Energy Saving Loan	0	0	0	0	0	0.13	0.74	1.23	1.46	2.38
Hundred Points of Light	0	0	0	0	0	0	0	0.25	0.35	0.35
Municipal Loan	0	0	0	0	0	0.10	0.20	0.40	0.07	0.10
Community Energy Mgt.	0.25	0.34	0.38	0.38	0.39	0.39	0.39	0.39	0.39	0.39
Omaha Traffic Light	0	0	0	0	1.80	1.80	1.80	1.80	1.80	1.80
Public Buildings	0	0	0	0	0	0	0.80	0.80	0.08	0.08
Ride Share	0	0	0	0	0	0	0	0.30	0.05	0.05
Thermal Lighting Standards	11.07	14.90	18.77	22.37	26.08	30.14	33.30	36.84	40.54	44.66
Total Gallons Saved	11.82	15.98	20.14	23.99	29.52	33.89	37.74	42.06	46.15	51.21

ENERGY FINANCING PROGRAMS

The Energy Office operates several Federal, State, and local programs which finance energy improvements in homes, businesses, farms and ranches, nursing homes, government buildings, schools and hospitals. These programs include the Nebraska School Weatherization program, the State Building Revolving Fund, and the Dollar and Energy Saving Loan program. Collectively, these programs are designed to reduce the cost and use of energy in buildings and systems. During the time these programs have been in existence, Nebraskans have saved millions of dollars through more efficient use of energy resources. [R#10,17]

Dollar and Energy Saving Loan program: A prime example of a program administered through SECP, funded with oil overcharge money, and administered thanks to NEO's expertise in financing is the Dollar and Energy Saving Loan program, the subject of this Profile. As of late 1994 the program had been allocated a total of \$16.0 million. Of this, \$12.34 million came from Exxon funds and \$3.7 million came from Stripper Well funds. In December 1994, another \$3 million was allocated to the program bringing the total investment of public funds to \$19 million. As discussed later, this public investment has leveraged far greater retrofit activity. [R#10]

School Weatherization program: Another innovative program implemented by the Energy Office is the School Weatherization program, approved by the Nebraska Legislature in 1981, and as such the first on-going, state-supported program



to weatherize kindergarten to twelfth grade public schools in the nation. During its first four years, only matching grants for energy conservation building improvements were given. In 1985, grants of up to \$2,500 per school for engineering studies were added. For the first 11 years, State oil and natural gas severance taxes financed the program using loans. The program has similar financing features to the Dollar and Energy Saving Loan program. As a result of repayments, since 1991 the program has been self-supporting, making loans from a revolving fund capitalized by loan repayments and interest earnings. Unfortunately, in 1995 the Nebraska State Legislature, an unusual unicameral body, elected to discontinue the School Weatherization program despite its success in favor of one-time grants to schools to establish Internet communications capabilities. [R#10]

Program Design and Delivery

In 1986, the Nebraska Energy Office commissioned a marketing study to assess the wants and needs of Nebraskans for energy efficiency improvements. The research indicated that Nebraska's homeowners were willing to undertake a total of \$97 million worth of energy saving home improvements if financing with interest rates in the range of 3-5% was available. Fourteen percent of the small businesses indicated a willingness to make similar types of improvements. Local government leaders were almost unanimous in their reaction to adopt means to employ low-cost financing to garner energy efficiency improvements in the State. In the residential sector, the dollar figures were based upon an average project cost of \$1,700. However, five years of experience has shown average project costs to be \$4,737, which means there is potentially \$270 million worth of energy improvements in the residential sector.[R#1]

Recognizing that few public funds were available to meet these demands, the U.S. Department of Energy approved Nebraska's Dollar and Energy Saving Loan program in March 1990. The resulting program design was pilot tested and announced to the general public by the Nebraska Energy Office in July 1990.

Funded originally with \$10.0 million of Exxon money, the program employs a revolving loan mechanism whose primary purpose is to allow as many Nebraskans as possible to share meaningfully in the restitutionary benefits of the oil overcharge funds by helping them undertake energy conservation improvements through low-cost financing. The program is unique in that thanks to a carefully crafted partnership with the private sector financial community, public funds are leveraged to provide an incentive for lenders to make low-interest loans for energy conservation improvements to homes, buildings, and facilities. The program also provides no-interest loans to finance energy audits undertaken to identify, or to analyze more closely, such efficiency improvements.[R#1]

Through the program, low-cost financing for energy efficiency improvements is available for residential, small business, agricultural, local government, and rural nursing home sectors. Originally, Exxon funds were allocated to each of the sectors based on the percentage of petroleum products used by the

sector during the period of price controls. Sixty percent of the funds were designated for residential loans, 15% each for small business and local governments, and 10% for agricultural loans. Small businesses must have gross annual revenues of less than \$2.5 million and must be staffed by 25 full-time equivalents or less to be eligible for the program. The allocations to these sectors have since been collapsed to make one large pool of funds. While large businesses and industries are not currently eligible for loans, under disaster conditions such as tornadoes and floods they may become eligible under emergency status.[R#11]

Essentially the Energy Office screens potential efficiency projects for their effectiveness. Provided that an end-user's retrofit either falls within the Energy Office's extensive list of prescribed measures or is determined to be valid following an audit, commercial banks lend capital to customers at an interest rate well below market rates. From the program's inception until February 1995, the maximum interest rate charged to borrowers was 5%. Currently the rate is 6%. The rate is reviewed semi-annually. The Energy Office then provides one-half of the loan value to the bank at zero percent interest – drawing from a loan pool – allowing the bank to collect the full sum from the customer at 5%. Through this mechanism, the bank essentially earns 10% – a highly attractive return – on its share of the outstanding debt. The Energy Office also purchases 100% of loans under \$1,000. As the borrower repays the loan, the lender sends the Energy Office its share of the principal payment which the Energy Office then uses to fund more loan purchases.[R#12]

Statewide, 324 financial institutions in 649 locations are participating in the program and serve as lenders. The Energy Office provides capital to these lenders without recourse. This means that the lender has the responsibility to collect the loan in the event of a default and must pay all collection costs to do so. In this event, however, the lender would receive payments first, before the Energy Office. In the event of bankruptcy, neither the lender nor the Energy Office have means of collecting the loan value. However, loan defaults have been negligible, totaling only \$29,063 on the Energy Office's \$25,924,813 investment in the loans made.

Program Design and Delivery (continued)

Electric and natural gas utilities that want to provide one-stop shopping for their customers have also been welcome to submit proposals to the Energy Office, essentially brokering the Dollar and Energy Savings Loan Program. The Energy Office envisioned that this would be attractive to utilities and thus a significant aspect of the loan delivery mechanism. In practice, however, this option has been unused despite interest expressed. Lincoln Electric System, for example, considered using the program in this way and considered collecting loan payments through its utility bills, however it elected not to engage this mechanism.[R#16]

The loan terms and frequency of installments are set by the lender but must remain within the parameters of the program. Institutions writing loans for the maximum loan payback term are allowed to charge a 2% origination fee at the time the loan is made. Other expenses incurred by the lender processing the loan as well as documentation and inspection fees are allowed and may be added into the loan.

If an individual other than the borrower is performing the labor, the charges may be included in the loan request. A written bid from the person performing the work needs to be submitted to the lender along with the bid for materials.

The lending institutions service the loans and reimburse the Energy Office for their portion of the repayments within three months after the payment is received from the borrower. Ultimately, 100% of the borrower's project is paid for from private sources by using low-interest loans rather than grants, and 100% of the loan pool capital is preserved. Interest earned on the loan capital finances the Energy Offices operation of the loan program.[R#1]

Financial institutions are also allowed to make loans for energy audits following the same procedure as for a loan on an improvement or replacement, either adding the energy audit's cost to the loan or setting up a separate loan. To provide an additional incentive for program participants to conduct energy audits, loans to cover the costs of energy audits performed are made directly by the Energy Office at zero interest. These loans must be repaid over a period not to exceed three years, with a minimum monthly payment of \$10.00. However, only three energy audit loans have been made directly by the

Energy Office for a total of \$8,770.[R#12]

A borrower may have more than one loan. A resident may borrow up to \$20,000 for improvements on a single-family home; up to \$60,000 on a multi-family building; up to \$75,000 on an agricultural operation; up to \$100,000 on a small business, non-profit operation or rural nursing home; and up to \$175,000 per political subdivision for local governments. Additionally, loans for up to \$150,000 for alternate fuel vehicles, fueling facilities, and telecommunications equipment are available. Loans of up to \$200,000 for light density railroad line rehabilitation are also available.[R#3]

The borrower has the option of getting one loan or several loans over a period of time for the improvements as long as the total amount borrowed does not exceed these maximums. Combining several loans into one is at the discretion of the lender. However, the term of that loan cannot exceed the term of the original loan.[R#3]

LOANS FOR SPECIALIZED SECTORS

A category of Energy Efficient Mortgages is also included in the Dollar and Energy Saving Loan program. Through this, the Energy Office participates in conventional home mortgage loans made by lenders for the purchase of homes that meet higher energy efficiency standards than are presently in effect in Nebraska.[R#9]

The goal of the Energy Office's energy efficient mortgage loans is to make purchasing or building an energy efficient home more attractive through a lower interest rate and less restrictive qualifying requirements. Nebraska has allocated \$2 million of Stripper Well oil overcharge funds to the energy efficient mortgage sector of the Dollar and Energy Saving Loan program.

The Energy Office's role is to buy a share of the mortgage loan at no interest, in order to impact the interest rate by lowering it 1/4 to 1%. The Energy Office participates in all the mortgage loan products offered by lenders, including Adjustable Rate Mortgages, fixed rate mortgages up to 30 years, and mortgage loans which fix the rate for a period of time longer than a year and then adjust.[R#9]

The Energy Office's level of participation in the mortgage loans is in the 5-20% range versus the 50% level of the other loans in the program. However, this aspect of the loan program allows borrowers to finance a higher percentage of the cost of a home. It does not impose guidelines or debt to income or equity ratios on lenders, but rather lets them determine the credit-worthiness of the borrower as they now do in the program.[R#9,12]

In February of 1994, the alternate fuel and telecommunication sectors were added to the loan program. Loans in the alternate fuel sector may be made to convert existing vehicles to an alternate fuel; to purchase dedicated alternate fuel vehicles; to pay for the additional cost exclusively associated with alternate fuel or the purchase of a dual-fuel vehicle; and to pay for the cost of property or equipment needed to establish an alternate fuel fueling facility site. An alternate fuel means ethanol, methanol, electricity, compressed natural gas, liquefied natural gas, propane, and any other alternate fuel approved and recognized by the U.S. Department of Energy. Any Nebraska resident or entity, except State government, may borrow up to \$150,000 for alternate fuel activities. The Energy Office has recently earmarked \$250,000 for the alternate fuel sector.[R#12]

Also, any Nebraska resident or entity, except State government, may borrow up to \$150,000 for the purchase of pre-qualified telecommunications equipment. Through telecommuting (and other forms of teletravel) energy can be saved. The Energy Office has earmarked \$500,000 for the telecommunications sector but so far no loans have been made through this program element.

DELIVERY: THE BASIC STEP-BY-STEP PROCESS

While the Energy Office has established a simple means for residents of the State to access low-cost financing from commercial lenders, its role in the program is key and central. The Energy Office is responsible for all facets of administering the program, ranging from promoting the program to the collection and review of program paperwork. The Energy Office handles all program contacts and subsequent paperwork. It reviews all energy audits and makes the final decisions on loan approvals and audit acceptances. Borrowers can also seek assistance from the Energy Office to help them through the pro-

CASE STUDY: HYPOTHETICAL EXAMPLE

A borrower wants to replace two old 100 HP electric motors with new, high efficiency motors of the same size. The efficiency will be improved from about 83 percent to over 95 percent, which means that the motor upgrade will save \$5,000 per year in electricity costs. The new motors cost \$5,000 each and will be installed by the borrower's employees so the total cash outlay for the improvement is \$10,000. Thus, the simple payback of this improvement is two years. The borrower approaches the lender to request a 5% loan to install the energy efficiency improvement.

The lending institution applies its own credit requirements and approves or disapproves the loan. If the lending institution approves the loan, the lender obtains a commitment from the Energy Office to participate in the loan. Assured of Energy Office participation, the lender loans the borrower \$10,000 and the borrower installs the motors, which begin paying for themselves in reduced electricity bills. The lender provides the Energy Office with proof of the loan; this triggers the Energy Office to mail the lender a check for \$5,000 for its share of the loan.

The \$10,000 loan is to be repaid over a period of two years in 24 monthly payments of \$438.71 each. Over the two-year period the lender collects these payments and each quarter sends a payment to the Energy Office on its \$5,000 investment. The lender keeps the other \$5,000 of principal payments and the full \$529 of interest earned over the two years.

Note that the improvement has been saving the borrower \$5,000 per year for two years, so that when the loan matures at the end of the second year, the improvement has effectively repaid the \$10,000 principal to the borrower. Thus, the borrower's actual out-of-pocket cost to install the improvement is the interest cost of \$529. Six weeks after the loan's maturity date, the improvement has saved enough additional electricity to repay the \$529 interest which the borrower had paid on the loan. If we conservatively assume that the improvement has an economic life of five years, at the end of that time the improvement would have paid the borrower a net of \$14,471 in electricity savings.[R#12]

Program Design and Delivery (continued)

cess of obtaining financing under the program. Such assistance includes locating a lender, completing the required paperwork, deciding on improvements to be made, deciding whether an energy audit may be necessary, and locating a participating energy auditor if one is needed. [R#4]

The Energy Office sends out all approval and denial notices regarding the technical feasibility of an energy audit supported project to the financial institutions. Repayments on energy audit loans made directly by the Energy Office can flow back through participating electric and natural gas utilities or directly from the borrower. To date, no energy audit loan payments have been made through a utility. [R#16]

The Energy Office also provides technical and professional support to lenders, electric and natural gas utilities, and participating energy auditors to assist them in participating in the program. They develop program documents, procedures and promotional plans to facilitate program activities, and participate in regional meetings and program presentations as needed to help build program awareness. In order to participate in the program a borrower follows the following steps:

Start by selecting improvements: To begin participation in the program borrowers may first contact the Energy Office to obtain program application materials or may get them from a local lender, supplier, contractor, vendor, or utility. The participant then decides either to proceed with retrofits that are part of the prescribed list of eligible program measures, a situation whereby an audit is unnecessary, or to proceed with an audit. To date, 88% of the retrofits have been prescribed measures.

The audit procedure is conducted: If an audit is necessary the borrower then obtains audit forms from the Energy Office, a utility, financial institution, energy supplier, or contractor. If the borrower elects to obtain a 0% energy audit loan directly from the Energy Office, the audit must be performed by a registered engineer or an energy auditor participating in the program. With the assistance of the registered engineer or energy auditor, potential participants decide whether to undertake a comprehensive or limited audit.

Alternatively, the borrower may have the audit done at their own expense by someone other than a participating energy

auditor or complete a self-prepared energy audit on the forms prepared by the Energy Office. To date, the self-prepared energy audit has been the primary instrument used in the program to support measures not on the prescribed lists. [R#4,12]

Audits are reviewed by the Energy Office: The borrower then submits the completed and signed energy audit to the Energy Office for technical review. Once the energy audit is determined to be acceptable and the project is eligible for the program, the Energy Office sends a signed Energy Audit Summary/Acceptance Statement to the borrower. This process usually takes less than a week.

Necessary paperwork is submitted to the lender: The borrower then takes his or her application forms for the prescribed measures or the Energy Audit Summary/Acceptance Statement papers along with their bids or quotes for the improvements to the lender and requests a loan. At this time the lender approves or disapproves the borrower's loan based on internal credit guidelines.

If the loan application is approved, the lender then mails the documents to the Energy Office for final review, acceptance, and commitment of program funds. The Energy Office returns a signed commitment agreement to the lender, agreeing to purchase one half of the loan from the lender at zero percent interest. With this agreement in hand, the lender notifies the borrower to proceed with the project. This commitment process is transparent to the borrower and usually takes one to three days.

Retrofit activity ensues followed by verification: Using the loan funds, the borrower then proceeds with the implementation of energy saving improvements. A verification of completion of the project by physical inspection or proof of purchase documentation is then performed by the lender.

Loan repayments commence: The borrower pays back the loan plus interest to the lender. The lender keeps the full interest amount, gets its portion of the loan back, and returns the Energy Office's portion of the loan. As the Energy Office receives loan repayments, it is ready to start the process again, leveraging greater and greater savings with the same capital.

**DOLLAR AND ENERGY SAVING LOAN
PRESCRIPTIVE MEASURES****Door, Window, Wall and Ceiling Projects***Weatherstripping**Thresholds**Air leaks**Broken windows**Replacement windows**Storm windows**Insulating:**Frame walls (minimum R-10)**Ceilings (minimum R-30)**Floors over unheated spaces (minimum R-10)**Slab edge, masonry wall (minimum R-5)***Heating, Air Conditioning and Plumbing***Duct and pipe insulation and repairs**Replacement heating, cooling, and water heating systems at least 5 years old**New space heating or water heating system if no system exists**New central or room air conditioners if no air conditioning exists**Automatic flue or vent dampers**Electronic or pilotless ignitions**Programmable thermostats**Furnace or boiler burners**Water heater insulation blankets**Hot water flow restrictors**Heat recovery systems**Combustion airducts**Whole house fans***Lighting***Replacements for incandescent or mercury vapor**High efficiency fluorescent lights and ballasts**Conversion of gas lights to electric**Timers or controls for lights***Household Appliances***Refrigerator and freezer replacements**Clothes washer replacements**Dishwasher replacements***MARKETING**

The Nebraska Energy Office does no marketing of the program outside of word-of-mouth. On July 10, 1990, the Governor called a press conference to announce the initiation of the revolving loan program. The initial television and newspaper press coverage that resulted was enough to create such a demand that the Energy Office phones "rang off the hooks" for two weeks. The Energy Office has been inundated with loan activity ever since. Nevertheless, the Energy Office does provide brochures and statement stuffers to utilities and lenders. Continued awareness of the program has been supported by additional press coverage; the Dollar and Energy Savings Loan program has been featured in numerous newspaper, journal, banking, and government agency publications.[R#11]

Most of the marketing for the program has been institutionalized and is done by the lenders, contractors, and utilities in the State. Lenders use the loan program as another product to increase business and spur loan activity. Heating contractors, for example, promote the program to their customers, resulting in increased business activity for them.[R#11]

MEASURES INSTALLED

Energy conservation measures installed fall into two broad categories: those prescriptive measures that may be implemented without the benefit of an energy audit; and any others not listed by the Energy Office that require an energy audit and meet the payback criteria of the various loan types set forth. [R#16]

The prescriptive measures have been by far the most predominant improvements, accounting for 88% of those made, or \$43.7 million. These measures generally cover the following: [R#14]

(1) door, window, wall and ceiling projects such as weatherstripping, thresholds to doors, air leaks, broken windows, replacement windows, storm windows and insulating walls, ceiling and floors over unheated space;

(2) heating, air conditioning, water heating, and plumbing projects including duct and pipe insulation and repairs and the replacement of heating, cooling, and water heating systems that are at least five years old;

Program Design and Delivery (continued)

(3) lighting projects, such as incandescent light or mercury vapor light replacements, conversion of gas lights to electric, and timer or controls for lights;

(4) household appliances like refrigerator and freezer replacements, clothes and dish washer replacements, and window air conditioners, which are at least 3 years old.

To date, the most frequently made improvements are replacing furnaces, air conditioners, and windows, and adding insulation. The most popular agricultural improvements have been pivot irrigation system modifications, which must be justified through energy audits.

NEO staff report that literally any energy efficiency measure improvement has the potential to qualify for a loan if it can save enough energy cost to pay for itself within: 15 years for energy saving home and building improvements; 5 years for replacement household appliances; and 10 years for all other projects. An energy conservation improvement or measure is defined as a building or system modification, replacement or related activity which is undertaken primarily to reduce energy consumption, increase energy efficiency, or reduce peak electrical demand. In addition, a measure must result in a savings of fuel or electricity cost.

STAFFING REQUIREMENTS

One administrator, a loan processor, a data entry person, and an accounting clerk each devote their full attention to the loan program. John "Jack" Osterman, Chief of the Energy Financing Division, devotes around a third of his time to the program. Osterman's background as a banker, however, has been a key ingredient in the program's success and thus cannot be overemphasized. General Energy Office support staff also contribute minor amounts of time towards the program. Evaluations are performed by in-house staff as well. [R#11]

No significant staff time is needed to run the program from the lender's side of the program. They view the program as another product that can be delivered to their customers, a feature of their offered services that simply rolls into their current loan processing. Similarly, contractors who install energy efficiency improvements use their normal staffing for the program. Just like the lenders, they see a spurred activity in their businesses. [R#11]

Monitoring and Evaluation

MONITORING

In comparison to many more conventional utility-driven demand-side management and energy service programs, the Energy Office performs relatively little monitoring of the specific energy savings that result from the Dollar and Energy Savings Loan program. After the Energy Office approves loans based on the technical merit of the proposed retrofit, the commercial lenders involved are responsible for the majority of customer/participant interaction. As for interacting with the lenders themselves, the Energy Office periodically monitors lenders' loan files for compliance with program requirements, a provision which is included in the Loan Commitment Agreement and Loan Participation Agreement between the Energy Office and the lenders.

The Utility Release, signed by each program participant, contains a provision allowing the Energy Office to request information on the participant's utility bill payments. Through this mechanism and the terms established with the lenders, the Energy Office has left itself the option to rigorously monitor and evaluate the program and its effect if need be. To date, however, this has not been considered necessary.

Periodically, the Energy Office both formally and informally evaluates program procedures through interactions with various program participants including lenders, energy suppliers, electric and natural gas utilities, and energy auditors. Through these interactions the Energy Office solicits comments and suggestions to further refine the program and assure its continuing success. The Energy Office also randomly evaluates projects to assess actual energy savings versus estimated and before energy usage versus after, to determine the merit of work implemented, with or without energy audits.[R#11,16]

EVALUATION

In late January, 1992 the Energy Office began an evaluation to determine how successful the program has been in terms of saving energy and money. It was decided that the initial evaluation efforts would be concentrated in the Omaha area. This

came about primarily because of the interest expressed by the Metropolitan Utilities District and the Omaha Public Power District on the impact of the program on energy consumption. The Energy Office elected to limit the scope of the evaluation to ease the process and keep its expenditures in check. As such the evaluation focused on collecting and evaluating data from a restricted area of the state. To further restrict the scope of the evaluation, only those loans approved prior to November 1, 1990 were selected for the initial study. This was necessitated by the fact that loans approved later than that date would not have available the necessary energy consumption data needed for analysis after completion of the loan projects.[R#5]

Between July 10, 1990 and November 1, 1990, 346 loans were approved in the targeted area and thus became the basis for the impact evaluation. With the exception of four loans to small businesses, all were to home owners for residential improvements. A preliminary analysis was presented in September 1992 based on energy consumption for 12 months before and after completion of the loan-approved projects. Since that analysis was complete the report was updated with an additional 12 months of energy consumption to better reflect possible variations in energy savings due to weather conditions and other variables.[R#13]

NATURAL GAS SAVINGS

A total of 255 loans were evaluated for their impact on natural gas consumption for the first 12-month period after completion of the loan approved projects. Total adjusted natural gas consumption for the 255 residences for the 12 months prior to participation in the program was 314,539 therms (30.7 MMCF of natural gas) at a cost of \$130,801.[R#5]

Total estimated savings was 42,597 therms (4.16 MMCF of natural gas) at a cost savings of \$18,075 annually. On average, these homes each consumed 1,233 therms of natural gas prior to program participation and saved 167 therms (or \$71) annually. For the 255 loans the average natural gas consumption was reduced by 13.54%. The evaluation also found that most

Monitoring and Evaluation (continued)

ECONOMIC IMPACT ANALYSIS	TOTAL INVESTMENT (x1,000)	COST SAVINGS (x1,000)	NET INCOME (x1,000)	VALUE- ADDED (x1,000)	ANNUAL EMPLOYMENT (Job-Years)
All Projects	\$43,900	\$18,300	\$17,260	\$28,300	798
Efficiency Projects	\$16,440	\$18,300	\$8,920	\$14,620	440

of the loans were used to replace old natural gas furnaces with new models whose annual fuel utilization efficiencies were required to be at least than 80%. [R#5]

For 242 residences evaluated in the second 12 months after completion of the loans, total estimated savings was 40,623 therms of natural gas at a cost of \$18,545. These homes saved an average of 168 therms (or \$77) in the second 12 months. For these 242 loans, natural gas consumption was reduced by an average of 13.7%, extremely close to the one-year savings data. [R#5]

ELECTRICITY SAVINGS

A total of 225 loans were evaluated for their impact on electricity consumption 12 months after completion of the loans. These homes were also heated by a natural gas, propane, or other non-electric furnace. Total adjusted electricity consumption for the 225 residences prior to participation in the program was 2.684 GWh. Twelve months after completion of the loan, the total estimated savings was 136.2 MWh, representing \$9,582 in annual electricity costs. On average these homes used 11.9 MWh prior to program participation and saved 605 kWh (or \$43) annually. For these 225 loans, electricity consumption was reduced by 5.07%. [R#5]

Of these 225 loans, 157 included the replacement of central air conditioning units with more efficient units as part or all of the work financed by the loan. These homes saved an average of 922 kWh (or \$64) annually, a 7.52% reduction in electricity usage.

Six all-electric homes were included in the study group. These homes used an average of 37,529 kWh of electricity in the year prior to program participation and saved an average of 5,112 kWh (or \$228) annually, a 13.62% reduction. [R#5]

Due to extremely cool summer weather during the second 12 months, any meaningful analysis for this period was impossible to obtain.

ECONOMIC IMPACTS

In order to determine whether the Dollar and Energy Saving Loan program has resulted in net economic benefits for the State's economy, the Nebraska Energy Office requested that the American Council for an Energy-Efficient Economy (ACEEE) review the program impacts to date and determine whether the program has increased or decreased overall employment and income for Nebraska residents. This information was then used to estimate the contribution of the program to Nebraska's Gross State Product (GSP).

A tool that assisted in the ACEEE macroeconomic impact evaluation was input-output modeling, also called multiplier analysis. These models were initially developed to trace supply linkages in the economy. For example, they show how purchases of lighting equipment not only benefit lighting manufacturers, but also the fabricated metal industries and other businesses supplying inputs to those manufacturers.

The impact analysis of Nebraska's loan program was carried out in essentially two steps. The first step was to fully de-

scribe from an accounting perspective just how the program expenditures affected each of the major economic sectors. The second step was to match each expenditure with its appropriate employment and income multipliers. For purposes of the study, a job is defined as sufficient work to employ one person full-time for one year; income refers to the employment compensation likely to be generated from a given expenditure.

The table on the previous page summarizes the total investment leveraged by the loan program as well as the anticipated annual energy cost savings made possible through the installed efficiency improvements. It also anticipates the ebb and flow of dollars from one sector to another as a result of the loan program. For example, when homeowners borrow money from banks, a positive impact is stimulated in the finance sector of Nebraska's economy. Trade contractors also benefit as their construction crews are given new work to complete. At the same time, once the households begin to repay the bank loans, they forego other expenditures which become a loss to the economy. Lower energy bills become a source of income that is spent by the households on typical consumer purchases. Those purchases act as a positive stimulus to the economy. Inversely, the energy suppliers lose revenues which means a loss to the economy. The sum of all of these gains and losses are identified and matched up with the appropriate sectoral multiplier, resulting in the net impact shown.[R#2]

The bottom line of the economic evaluation is that whether compared on a total project basis or only in terms of the actual efficiency improvements that can be documented, the loan program has a positive economic benefit for Nebraska. Over a ten-year life of the \$44 million in improvement projects completed in the first four years of the program—which is a conservative estimate of the effective life of a project, the economy will support an estimated 789 job-years of employment and \$17.26 million in net income from added wage and salary compensation to the State of Nebraska. It is expected that these benefits will contribute a total of \$28.3 million to the Nebraska Gross State Product over the ten-year period, or an

average of \$2.83 million annually. Furthermore, under normal investment conditions nearly \$54,000 is required to create one job. However, because the Energy Office loans leveraged funds from commercial lenders, an \$18,000 investment from the state created one job, a feature that ACEEE reports is one of the lowest dollar-invested to job-created ratios in the nation.[R#2,19]

Based upon the ACEEE analysis, it is clear that the Nebraska Dollar and Energy Saving Loan program is a positive contribution to the State's economy. These insights prompt two suggestions. First, if the Energy Office can find other ways to leverage additional funds for energy efficiency improvements, the size of the economic return will increase accordingly. Second, the Energy Office may want to increase the level of energy efficiency in buildings compared to improvements which are more broadly related to structural improvements. For example, had the ratio of pure efficiency improvements risen from 37% to 85% of the total investment, the net employment gain would have increased to over 1,000 job-years. However, many of the structural improvements were necessary to make the energy improvements viable.[R#2]

Program Savings

ENERGY SAVINGS OVERVIEW	ANNUAL ELECTRICITY SAVINGS (MWh)	ANNUAL NATURAL GAS SAVINGS (MCF)	COMBINED SAVINGS (MMBtu)
Loans Prior to 1993	4,115	128,381	171,175
Loans During 1993	279	8,726	11,634
Total	4,394	137,107	182,809

Data Alert: The savings presented in this section are based on early evaluations described in the previous section. Among the key assumptions in the data is that 89.8% of residential loans have had an impact on heating fuel use; 81.9% of residential loans have had an impact on electricity use; for loans which impact heating fuel use, the average savings is the equivalent of 175 therms of natural gas or 17.5 MMBTU per home; for loans which impact electricity use, the average savings is 913.8 kWh or 9.55 MMBTU per home based on an average Nebraska power plant heat rate of 10,400 BTU per kWh; no effort has been made to date to separate the remaining savings between natural gas, diesel fuel, heating oil, and propane. [R#20]

during 1993 have been estimated to be 11,634 MMBtu. In 1993, 807 residential-sector loans resulted in 81% of the total annual savings, equivalent to 9,424 MMBtu. [R#12,15,20,21]

PARTICIPATION RATES

The Dollar and Energy Saving Loan program has enjoyed phenomenal success in participation both with borrowers and lenders. To date a total of 8,673 projects have been funded as a result of the program. The residential sector has accounted for over 92% of all projects approved with 7,986 as of March

The Dollar and Energy Saving Loan program has resulted in total annual energy savings of 182,809 million Btus. This has been essentially made up of savings that are divided between 25% electricity and 75% natural gas savings when calculated on a Btu basis. Thus the total annual energy savings has been made up of 4,394 MWh of electricity savings and 137,107 MCF of natural gas savings. Total annual savings from both natural gas and electricity for all loans made prior to 1993 have been estimated to be 171,175 MMBtu. The 5,223 residential loans made during this period comprised 71% of this, equivalent to 121,534 MMBtu. Annual savings from loans made

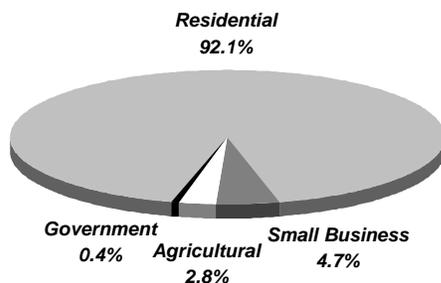
PARTICIPATION BY SECTOR	NUMBER OF PROJECTS
Residential	7,986
Small Business	411
Agricultural	242
Government	31
Nursing Home	3
Total	8,673

EVALUATED SAVINGS	NUMBER OF RESIDENCES	SAVINGS (MMCF or MWh)	COST SAVINGS	COST SAVINGS PER HOME	PERCENT SAVED PER HOME
Natural Gas	255	4	\$18,075	\$71	13.54
Electricity	225	136	\$9,582	\$43	5.07

31, 1995. The small business sector has made up 4.8% of all projects, or 411, while the agricultural sector has comprised 2.7% of all projects approved with 242. The government and nursing home sectors, with 31 and 3 loans, respectively, have comprised the balance.[R#1,12]

To date, over 324 different financial institutions at more than 649 locations throughout the State have or currently participate in the program. Participating financial institutions include

PARTICIPATION BY SECTOR



commercial banks, savings banks, savings and loan associations, and credit unions. The Energy Office has not had to market this program because lenders, utility companies, contractors, and the media have all enthusiastically assisted in promoting it. The borrowers have also helped promote the program through their own networks.

FREE RIDERSHIP

The Nebraska Energy Office has not calculated free ridership for the Dollar and Energy Saving Loan program. Invariably, some retrofit activity that was supported through the program with low interest rates would have occurred in the absence of the Energy Office's program. On the other hand, the program has served to stimulate the market for energy efficiency retrofits, creating subtle market shifts and transformations that have fostered an efficiency ethic and trade proficiency in this area. This effect, what utility analysts call free drivership, will likely

result in degrees of retrofit activity not subsidized by the program. Thus the net result of the program may balance out between free ridership and free drivership.

MEASURE LIFETIME

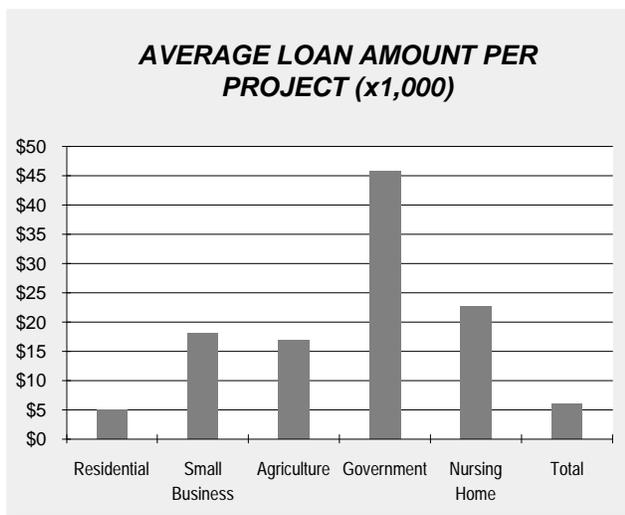
For the purposes of this profile – and to determine lifecycle savings and the cost of saved energy – an assumed weighted average measure life of 15 years is conservatively presented. This is based on the predominance of heating and cooling equipment employed through the program that typically has a 10 to 15-year average measure life and weatherization equipment that typically has a 20-year average measure life.

PROJECTED SAVINGS

As loans are repaid, new loans will be financed and the energy savings will continue to accrue within the state. Additional equipment sectors and targeted groups have been and are being added to the loan program: telecommunications equipment, alternate fuel vehicles and fueling facilities, energy efficient mortgages, light density railroad rehabilitation, weatherization assistance programs for landlords, manufacturers, and community development organizations. By the year 2000, the Energy Office projects that \$100 to \$150 million in loans will be financed. Additionally, the list of participating lenders continues to grow, currently accounting for over 70% of the banks, savings institutions, and credit unions in the State.

Cost of the Program

PROJECT COSTS BY SECTOR AS OF MARCH 31, 1995	PROJECT COSTS (x1,000)	MEASURE COSTS (x1,000)	LOANS (x1,000)	NEO CONTRIBUTIONS (x1,000)	AVERAGE LOAN AMOUNT PER PROJECT
Residential	\$39,789	\$37,827	\$37,086	\$19,803	\$4,982
Small Business	\$7,375	\$6,882	\$6,729	\$3,520	\$17,944
Agriculture	\$4,059	\$3,957	\$3,938	\$2,054	\$16,773
Government	\$1,418	\$1,123	\$990	\$511	\$45,742
Nursing Home	\$68	\$68	\$69	\$36	\$22,667
Total	\$52,709	\$49,857	\$48,812	\$25,924	\$6,077



Nebraska initially invested \$10.0 million from oil overcharge funds into the loan program. Perhaps the most exciting aspect of the program design is that this seed capital had leveraged more than \$52.7 million of retrofit activity in the State by the Spring of 1995. As of March 31, 1995, \$48.8 million has been loaned to State citizens, institutions, and businesses using a blend of Energy Office and commercial lender money. In fact, the public funds committed to the program have leveraged over 100 percent in matching funds and it is expected that the percentage of private sector matching funds generated by the program over its ten-year lifetime will be about 360 percent. In addition to stimulating private sector capital investments, as loans have been repaid (enabling dollars to be continuously recycled to support additional retrofits) and interest on the fund balance has accrued, the original \$10.0 million in public funds has enabled Energy Office participation of \$25.9 million in private sector loans.[R#12,15]

In terms of the total Energy Office capital generated for investments in energy loans from the seed money and loan repayments, (\$25.9 million), the residential sector has accounted for the largest share at \$19.8 million (76%) while the small business sector has accounted for 14%, or \$3.5 million. The cost of energy conservation measures coupled with projects not eligible for loans totaled \$52.7 million.

As of March 31, 1995, the total program outlay including all costs for all involved has been \$54.0 million. This comprises \$680,868 for Energy Office administration; \$8,770 for energy audit loans; \$49,846,920 for energy conservation measures; \$614,585 for bank loan fees; and \$2,853,738 for projects not eligible for loans. Note that of this is another remarkable measure of the program's success in delivering efficiency services, the measures themselves have accounted for fully 92.3% or \$49.8 million of the program total.[R#15]

The loan program has been possible in part because the Energy Office has administered it for very little cost, roughly \$136,000 per year totaling \$680,868 over the five years of the program. This cost covers salaries, the ACEEE Economic Impact Evaluation (\$4,000), and all other administrative costs to implement the program. As previously noted, funding to cover administrative costs is derived from the interest on the oil overcharge funds. To date, over \$1.2 million in interest has already accrued, securing the costs to administer the program through the year 2000, the original ending date for the program at initial set-up. This is the interest earned on idle loan pool funds not yet invested in participations. This amount fluctuates depending on cash outlays for loan purchases.[R#11]

COST PER PARTICIPANT

Comprising over 76% of all loans, the average residential loan

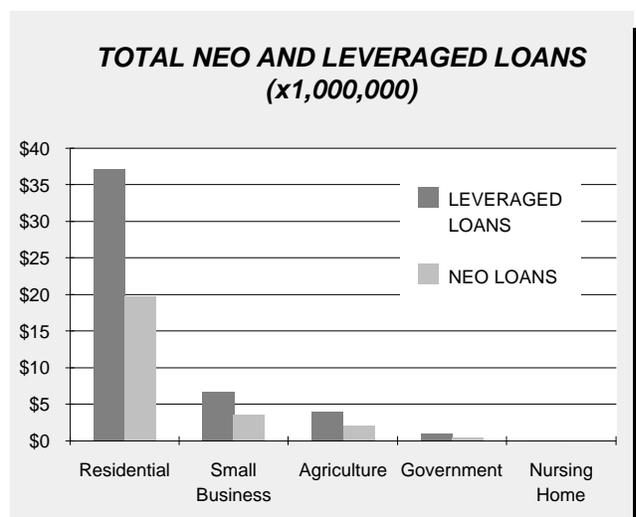
MEASURE COSTS	RESIDENTIAL (x1,000)	SMALL BUSINESS (x1,000)	AGRICULTURE (x1,000)	GOVERNMENT (x1,000)	NURSING HOME (x1,000)	ALL SECTORS (x1,000)
Appliance Replacement	\$366	\$10	\$15	\$0	\$0	\$391
Door, Window, Wall & Ceiling	\$16,945	\$1,898	\$85	\$154	\$30	\$19,112
Htg., Cooling, & Water Htg.	\$20,411	\$2,575	\$40	\$750	\$33	\$23,809
Lighting	\$17	\$274	\$248	\$99	\$0	\$638
Audit Supported Measures	\$83	\$2,118	\$3,816	\$116	\$4	\$5,907
Total	\$37,827	\$6,882	\$3,957	\$1,123	\$68	\$49,857

provided has been for \$4,982. The average size of small business loans has been significantly higher at \$17,944. The government sector accounts for the largest average amount per loan at \$45,742 and the nursing home sector has the next largest average loan amount at \$22,667. Also, the average loan for the agricultural sector is \$16,773. All told, the average loan over all sectors has been \$6,077. Note however, that perhaps the most appealing aspect of the program from the recipient's standpoint is that there is virtually no cost to the customer as loans are set up to provide positive cash flow. Energy audit and labor costs are also included in the loan. [R#12,15]

COST EFFECTIVENESS

The Results Center has calculated the four-year overall cost of saved energy at various discount rates for electric savings and electric and gas combined savings shown in the accompanying table. The Results Center used the four-year cost to the Energy Office of \$544,000 and a total electricity savings of 3,183 MWh and a combined gas and electricity savings of 17,577 MWh to calculate the cost of saved energy. At a 5% discount rate the cost of saved energy from the Energy Office perspective is 1.65 ¢/kWh when considering total costs and electricity savings only, and 0.30 ¢/kWh for a combined electricity and gas savings.

COST OF SAVED ENERGY 1990-1994 AT VARIOUS DISCOUNT RATES (¢/kWh)	3%	4%	5%	6%	7%	8%	9%
Electric	1.43	1.54	1.65	1.76	1.88	2.00	2.12
Gas and Electric	0.26	0.28	0.30	0.32	0.34	0.36	0.38



COST COMPONENTS

By measure, heating and cooling equipment and improvements have accounted for 48% of all measure costs at \$23.8 million. Door, window, wall, and ceiling improvements have constituted the next largest cost at \$19.1 million, or 38%. Measures supported by audits, lighting, and appliance replacement make up the rest of the \$49.9 million cost of energy conservation measures. [R#1,12,15]

Environmental Benefit Statement

AVOIDED EMISSIONS: Based on 4,394,000 kWh saved						
Marginal Power Plant	Heat Rate BTU/kWh	% Sulfur in Fuel	CO2 (lbs)	SO2 (lbs)	NOx (lbs)	TSP* (lbs)
Coal						
Uncontrolled Emissions						
A	9,400	2.50%	9,473,000	225,000	45,000	5,000
B	10,000	1.20%	10,102,000	87,000	29,000	22,000
Controlled Emissions						
A	9,400	2.50%	9,473,000	22,000	45,000	0
B	10,000	1.20%	10,102,000	9,000	29,000	1,000
C	10,000		10,102,000	58,000	29,000	1,000
Atmospheric Fluidized Bed Combustion						
A	10,000	1.10%	10,102,000	27,000	15,000	7,000
B	9,400	2.50%	9,473,000	22,000	18,000	1,000
Integrated Gasification Combined Cycle						
A	10,000	0.45%	10,102,000	18,000	3,000	7,000
B	9,010		9,087,000	6,000	2,000	0
Gas						
Steam						
A	10,400		5,510,000	0	13,000	0
B	9,224		4,785,000	0	30,000	1,000
Combined Cycle						
1. Existing	9,000		4,785,000	0	18,000	0
2. NSPS*	9,000		4,785,000	0	9,000	0
3. BACT*	9,000		4,785,000	0	1,000	0
Oil						
Steam--#6 Oil						
A	9,840	2.00%	7,975,000	121,000	14,000	14,000
B	10,400	2.20%	8,458,000	120,000	18,000	9,000
C	10,400	1.00%	8,458,000	17,000	14,000	5,000
D	10,400	0.50%	8,458,000	50,000	18,000	3,000
Combustion Turbine						
#2 Diesel	13,600	0.30%	10,585,000	21,000	33,000	2,000
Refuse Derived Fuel						
Conventional	15,000	0.20%	12,567,000	32,000	43,000	9,000

In addition to the traditional costs and benefits there are several hidden environmental costs of electricity use that are incurred when one considers the whole system of electrical generation from the mine-mouth to the wall outlet. These costs, which to date have been considered externalities, are real and have profound long term effects and are borne by society as a whole. Some environmental costs are beginning to be factored into utility resource planning. Because energy efficiency programs present the opportunity for utilities to avoid environmental damages, environmental considerations can be considered a benefit in addition to the direct dollar savings to customers from reduced electricity use.

The environmental benefits of energy efficiency programs can include avoided pollution of the air, the land, and the water. Because of immediate concerns about urban air quality, acid deposition, and global warming, the first step in calculating the environmental benefit of a particular DSM program focuses on avoided air pollution. Within this domain we have limited our presentation to the emission of carbon dioxide, sulfur dioxide, nitrous oxides, and particulates. (Dollar values for environmental benefits are not presented given the variety of values currently being used in various states.)

HOW TO USE THE TABLE

1. The purpose of the accompanying page is to allow any user of this profile to apply the Nebraska Energy Office's level of avoided emissions saved through its Dollar and Energy Saving Loan program to a particular situation. Simply move down the left-hand column to your marginal power plant type, and then read across the page to determine the values for avoided emissions that you will accrue should you implement this DSM program. Note that several generic power plants (labelled A, B, C,...) are presented which reflect differences in heat rate and fuel sulfur content.

2. All of the values for avoided emissions presented in both tables include a 10% credit for DSM savings to reflect the avoided transmission and distribution losses associated with supply-side resources.

* Acronyms used in the table

TSP = Total Suspended Particulates

NSPS = New Source Performance Standards

BACT = Best Available Control Technology

3. Various forms of power generation create specific pollutants. Coal-fired generation, for example, creates bottom ash (a solid waste issue) and methane, while garbage-burning plants release toxic airborne emissions including dioxin and furans and solid wastes which contain an array of heavy metals. We recommend that when calculating the environmental benefit for a particular program that credit is taken for the air pollutants listed below, plus air pollutants unique to a form of marginal generation, plus key land and water pollutants for a particular form of marginal power generation.

4. All the values presented represent approximations and were drawn largely from "The Environmental Costs of Electricity" (Ottinger et al, Oceana Publications, 1990). The coefficients used in the formulas that determine the values in the tables presented are drawn from a variety of government and independent sources.

Lessons Learned / Transferability

LESSONS LEARNED

The Dollar and Energy Saving Loan program has shown that implementation of energy efficiency can be promoted and at very low cost to taxpayers using a win-win program design based on an elegant, but simple financing mechanism. Using a revolving loan fund mechanism, the Nebraska Energy Office has proven that public funds can be used to leverage private sources of capital which can be loaned to State citizens for energy efficiency retrofits at favorable interest rates, while providing participants with positive cash flow. In addition to the underlying success of the program, a host of pragmatic lessons have been learned.

The program is a win-win situation for all involved: According to Jack Osterman, Chief of the Energy Financing Division at the Nebraska Energy Office, the biggest lesson to be learned from this program is simply that, "Governments across the country need to figure this program out. We have a \$19 million pool of funds available for investments in energy loans made by the lenders; our administrative costs covered by the interest earned on any idle dollars; virtually no default rate, and lenders and contractors with spurred businesses and new products. This has resulted in a total success of moving market technologies and stimulating business for lenders and contractors. It has resulted in cost-effective, positive cash flow for the implementation of energy efficiency while preserving all the loan pool. And the whole process is really quite simple." [R#11]

Revolving funds can be employed in the residential sector with marked success: Unlike other revolving fund programs documented by The Results Center, in Nebraska this mechanism has been effectively employed in the residential sector with noted success. Through a financing mechanism based on low-interest loans and positive cash flow, residential customers have been willing to borrow money for retrofits rather than relying on utility handouts and other direct subsidies.

Key to Nebraska's "residential success" has been the cooperation between government and private lenders: Operating in a market environment in cooperation with the financial community, the program has proven itself to be an ideal instrument for leveraging private sector funds. Public funds have served as a catalyst to the private financiers who would otherwise not have participated. Risks to private financiers are self-assessed and acceptable to them. The program now serves as a new financing paradigm. Energy efficiency is

expanded throughout Nebraska on a market level whereby consumers actively decide to implement energy efficiency measures due to positive cash flow and invested capital preservation. This has enabled the program to become an excellent vehicle for promoting the wide-scale adoption of energy efficiency and renewable energy technologies and practices. Key to this success has been the financial and creative abilities of the program's designer, Jack Osterman. [R#12]

Thanks to this cooperation, minimal staffing is required: The Energy Office's accomplishments have been realized in a lean environment with no expansion in bureaucracy. By harnessing the expertise and initiative of the private sector, a tremendous volume of energy efficiency improvements has been made with relatively little (and certainly low cost) administrative support or expenditure. The successful implementation of the Dollar and Energy Saving Loan program has been accomplished thanks to a clever program design and minimal red tape. [R#11]

Despite a period of economic uncertainty, the program continues to create greater and greater economic activity: Nebraska Governor Ben Nelson challenged the State's business leaders to invest in the Energy Office's revolving loan program so they can take advantage of the energy and financial savings resulting from energy efficiency improvements being made to buildings and systems. "While business openings, expansions, layoffs and closings grab the headlines," said the Governor, "it's on-going, job-creating activity like this that keeps the State's economy humming." Nelson said that the people who have already taken advantage of the loans are realizing, on average, ten percent savings. "In 1992, Nebraska's total energy bill was over \$3.1 billion," said Nelson. "A ten percent savings would pump \$311 million into the State's economy, the equivalent of adding in excess of 19,000 jobs." [R#7,8]

Removing barriers to implementing energy efficiency is the key to a successful financing program: The revolving fund used in Nebraska has increased the involvement of private sector partners and expanded the adoption of energy efficiency measures through empowerment of the private sector and removal of barriers associated with financing. The biggest barrier to financing energy efficiency has been high interest rates and long paybacks that prohibit improvements from being effective. By purchasing 50% of the loans at no interest, thereby reducing the interest rate to the borrower, the Energy Office has effectively removed the greatest barrier to financing retrofits. [R#12]

The economic benefits of the program are ubiquitous: Financial institutions benefit from the program by using it to promote their services to their service area, build loan demand, invest available funds in a higher earning asset, enhance borrowers' financial stability through reduced energy costs and to satisfy requirements of the Community Reinvestment Act of 1977.

Vendors, contractors, energy suppliers and electric and natural gas utilities benefit from the program by making their customers aware of the program and directing them to the Energy Office for the necessary program documents or to participating lenders for program information. They also provide additional incentives such as cash rebates which can be piggybacked with the loan program to the financial benefit of their customers. [R#11]

The program helps reinvent the government's role: Using a loan program which is responsive to competitive market forces increases the volume and quality of private decisions and reduces government involvement in decision making. This results in the adoption of appropriate technologies including renewable energy and high energy efficiency technologies. Jack Osterman recommends that the Department of Energy make revolving loans its predominant financial incentive, reserving grants for unusual cases.

TRANSFERABILITY

The Dollar and Energy Saving Loan program appears to be highly transferable to any jurisdiction with the ability to establish a pool of capital for subsequent efficiency retrofits. Given the efficacy of the Nebraska model, program managers wonder why other states haven't adopted similar mechanisms. Some have, of course, implemented programs based on variations of the same revolving fund theme. Texas, for example, has implemented the LoanSTAR program with marked success (See Profile #101). It however, rather than leveraging private sector capital, has provided its own capital for retrofits. There nearly \$100 million has been used for a range of exciting institutional retrofits with a strong emphasis on performance monitoring and verification.

The LoanSTAR program provides a revolving loan mechanism whereby low-interest loans are granted for energy-efficiency retrofits to be made in state, public school and government buildings. Instead of buying 50% of the loans for energy efficiency improvements, the LoanSTAR program simply loans the money to an agency or facility and is repaid through the savings that are realized. Unlike the Nebraska revolving fund,

LoanSTAR usually lends money to extremely large facilities, often times lending millions of dollars to one site. To date, the program has included 201 buildings at 71 sites.

Texas A&M's Energy Systems Laboratory (ESL), which conducted the monitoring and metering of these buildings, is working to promote the dissemination of the LoanSTAR program to other states and energy ministries. Recently, ESL was selected as the metering and monitoring subcontractor for a DSM/Energy Conservation Revolving Loan program for the State of Minnesota. The State is starting its program with the retrofit of two facilities over the next three years. Northern States Power, an investor-owned utility located in Minneapolis, is providing \$15 million (interest free) for this revolving fund energy conservation program. ESL is now under contract negotiations with Northern States Power and expects to start work before the first of December.

In Florida, ESL is also working with the Florida Energy Office on a similar LoanSTAR type revolving loan program. The Energy Office is thinking of calling the program "SunSTAR," however it is not officially named yet. ESL is also working with the United States Federal Buildings program to encourage adoption of the LoanSTAR revolving loan fund as a model for all Federal facility energy efficiency initiatives.

Other revolving loan funds provide indexes of success as well. In Oslo, Norway the Ekon Fund has been capitalized by applying a small surcharge on every kilowatt-hour sold (See Profile #79). In Phoenix, a reinvestment program for savings in municipal facilities has resulted in over \$25 million in annual bill savings (See Profile #118). At the School District of Philadelphia, a revolving loan fund begun with no capital at all has resulted in over \$83 million worth of bill savings in the past 11 years (See Profiles #114). Each of these programs represents a variation on the same theme of circulating dollars to pay for energy efficiency retrofits which shortly thereafter, pay for themselves, enabling subsequent retrofits for continued benefit.

Finally, revolving funds of this kind need not be limited to investments in energy efficiency. The Nebraska Energy Office has proposed that the U.S. Department of Energy consider allowing Nebraska to use oil overcharge funds for financing akin to the mechanism in the Dollar and Energy Savings Loan program to further the development of several other areas such as the advancement of new technologies including photovoltaics and wind energy, and the mitigation of global warming through planting trees, producing biomass crops, developing mass transit, and means to sustain agriculture in farm operations. [R#12]

References

1. State of Nebraska Energy Office, "Nebraska's Dollar and Energy Saving Loan Program, Overview and Current Status," July 1994.
2. American Council for an Energy-Efficient Economy, "The Economic Impacts of Nebraska's Dollar and Energy Saving Loan program," by Skip Laitner, September 30, 1994.
3. Nebraska Energy Quarterly, "5% Dollar and Energy Saving Loans," Fall 1994.
4. Nebraska Energy Office, "Steps to Obtain a Low-Interest Loan Using an Energy Audit," Nebraska Energy Office Dollar and Energy Saving Loan Program, February 1991.
5. Nebraska Energy Office, Dollar and Energy Saving Loan Program, "Final Savings Analysis: Omaha Area Pilot Study," September 28, 1994.
6. Post-Gazette, "Loans are available to help reduce energy costs," by Jolene Moseman, March 29, 1994.
7. News Release, State of Nebraska, "Governor Nelson Challenges Businesses to Match Oil Overcharge Loan Dollars," February 17, 1993.
8. News Release, State of Nebraska, "Nelson Praises Schuyler for Innovate Use of Keno Proceeds," February 23, 1994.
9. State of Nebraska Energy Office, Nebraska's Dollar and Energy Saving Loan Program, "Nebraska's Energy Efficient Mortgages," July 1994.
10. Nebraska Energy Office, "1993 Annual Report - So What's a BTU?" June 30, 1993.
11. John S. (Jack) Osterman, Chief Energy Financing Division, Nebraska Energy Office, personal communication, January - July 1995.
12. Nebraska Energy Office, "Reinvention Laboratory on Federal/State/Local Partnerships, Ways of Overcoming Barriers, Expanding Commercialization and Creating Regional Responsiveness," July 27, 1993.
13. Nebraska Energy Office, "Dollar and Energy Saving Loan Program - A Preliminary Analysis," September 9, 1992.
14. Dollar and Energy Saving Loan Program, "Procedures and Forms," January 1995.
15. Dollar and Energy Saving Loan Program, "Summary of Loans by County, Sector, and Congressional District," December 31, 1994.
16. Oil Overcharge Low Interest Energy Conservation Loan Program, "Program Plan," Nebraska Energy Office, July 1990.
17. Nebraska Energy Office, "1992 Annual Report," June 30, 1992.
18. An Energy Action Plan for Nebraska, "The First Year," A Progress Report, March 28, 1994.
19. Nebraska Energy Quarterly, "5% Dollar and Energy Saving Loans," Winter 1994.
20. Nebraska Energy Office, "Dollar and Energy Saving Loan Program Energy Savings Conversions and Assumptions," February 1995.
21. Lawrence Kinyon, Research Analyst, Nebraska Energy Office, personal communication, March - July 1995.
22. Bonnie Ziemann, Assistant Director for Operations, Nebraska Energy Office, personal communication, May - July 1995.
23. Ann M. Selzer, Energy Projects Division Chief, Nebraska Energy Office, personal communication, July 1995.

Special thanks to Jack Osterman and Larry Kinyon for their guidance and support throughout the development of this profile.