

The Cover Story:

The statue of the Nebraska Sower, which graces the top of the State Capitol, is a symbol of the state's basic industry—agriculture. Using the word energy to form a silhouette of the Nebraska Sower depicts the continuing need for energy to fuel the state's agricultural economy.

CHARLES THONE
GOVERNOR



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V.B. BALOK
DIRECTOR

December 31, 1982

The Honorable Charles Thone
Governor of Nebraska
State House
Lincoln, Nebraska 68509

Robert Kerrey
Governor Elect
Room 1117 State Capitol
Lincoln, Nebraska 68509

Patrick J. O'Donnell
Clerk of the Legislature
Room 2018 State Capitol
Lincoln, Nebraska 68509

Gentlemen:

This 1982 annual report is submitted in accordance with provisions of Section 81-1607, Nebraska Revised Statutes, (1980 Supplement).

If you have any questions, please contact this office.

Sincerely,

A handwritten signature in cursive script that reads "V. B. Balok".

V. B. Balok
Director

Table of Contents

Executive Summary	3
Energy Information In Action	5
Section I — Information Programs Build on Energy Efficiency	
Conservation and Transportation	5
Energy Extension	7
Energy Education	9
Public Information	10
Building Blocks For Today	11
Section II — Building Programs Enhance Energy Efficiency	
Weatherization Assistance	11
School Weatherization	12
Institutional Conservation	14
State Building Audits	14
Commercial Program	15
Energy Management	18
Building Blocks Of Tomorrow	19
Section III — Alternates and Other Aspects of Energy's Future	
Alternate Energy	19
Legislation	22
Emergency Planning	22
Budget Operations	23
Employees	25
Transitional Building Blocks	27
Section IV — Data and Graphics Limn Energy's Shifting Scene	
General Energy Supply	27
State Energy Supply	31
State Energy Consumption	39
Energy Demand Model	40

Executive Summary

By V. B. "Buck" Balok

Nebraska Energy Office Director

From energy crisis to oil "glut" in less than a decade, the swings in supply and price of resources that power our world are more than pendulum-like. They are mind-bending.

Public perceptions generally are forged in the crucible of immediacy, bringing a rush to solve long-term problems with short-term solutions. Public policy, however, must be more than reaction. Indeed, public policy requires immediate but thoughtful action to temper those problems which prove real, but it also must deal with the realities of today in a manner that anticipates tomorrow.

In energy, this requires policymakers attuned to problems faced by the public today and yet involved in preparing for the inevitable change that comes in such a volatile field.

The past decade has proven this analysis is accurate. Beginning in the early 1970s, petroleum supplies tightened and energy costs in general began soaring. As if to emphasize the new realities, 1979 problems with oil supply and price kept the "crisis" mentality alive.

Yet in 1982, relative price stability has returned—though at higher levels—and thus our thinking again is in the process of revision. Oil supplies and the world price picture have improved.

Meanwhile, the shifting emphasis in fossil fuels finds natural gas and other types of resources following some of the trends that were established earlier in petroleum.

The price of natural gas is rising quickly in the 1980s as did the price of oil a decade ago, though some of the causes appear different.

Coal during the late 1970s and early 1980s is re-emerging as a fossil fuel with long-term prospects. Nuclear power, still a part of the energy mix, has reached a standstill due to public and government reaction to perceived safety hazards.

Solar, biomass, wind, geothermal and others among the renewable or alternatives have grown in fashion and favor with various segments of society—the public, private enterprise, and government.

All this leads to the overriding factor involving energy today: to deal with energy problems is to deal with a multitude of concerns and changing options. No single energy source will solve the problems. The task is to find a viable "energy mix."

The ingredients for coping with today's energy problems and tomorrow's energy possibilities include all the power sources with us now, plus research and development of new sources for the future.

This has been the charge and challenge of the Nebraska Energy Office. This office has become the focal point for these concerns in Nebraska.

Because Nebraska is a leading state in America's "breadbasket" region, agriculture dominates concerns regarding every issue. Energy needs take on great significance in the agricultural context.

Nebraska is an energy poor state. More than 90 percent of Nebraska's energy supplies come from outside the state's borders. For this reason, Nebraska government in recent years has approached energy problems with a heightened awareness of the vital need for as balanced an energy mix as possible.

Development of balance in Nebraska includes research into how the large biomass potential can be harnessed for in-state use, how conservation techniques can reduce reliance on outside forces, and how data and other information can contribute to an energy secure future.

The Nebraska Energy Office, cooperating with the Nebraska Gasohol Committee and the private sector, has stressed the potential benefits of biomass development during the Thone administration years. This culminated in 1982 with the Nebraska Independence Day Alternate Fuels Classic road rally.

The rally, designed to show the feasibility of alcohol and other alternate fuels and to demonstrate methods of converting vehicles to run on such fuels, drew 30 entries from across the country. It was a showcase of American ingenuity.

Another aspect of this development involves Gasohol. This 90 percent gasoline and 10 percent ethanol blend had a banner year in Nebraska in 1982. Growth of Gasohol sales was phenomenal, nearly tripling the sales of the previous year and making Nebraska the No. 2 state in Gasohol sales per capita, behind only Iowa.

Ongoing informational, conservation and related programs at the Nebraska Energy Office also have contributed to an energy secure future, while a couple of new programs were added to emphasize sound energy management techniques such as electrical load management or mechanical heating systems' improvements.

The Commercial Division, operating from the Omaha field office, provides technical assistance on conservation, alternates and related matters for business and industry.

The Nebraska Community Energy Management Program provides much the same type of aid for cities and towns in the state, offering technical assistance to local energy management committees set up from among the public and private citizens in local communities.

During 1982, continuing programs with notable accomplishments included Weatherization Assistance,

which provided \$3.2 million throughout the program year to weatherize more than 3,000 home.

The School Weatherization Program completed its initial year during 1982, providing nearly \$4 million in grants to help with energy efficiency projects at public school buildings in Nebraska.

Solar activities included the continued distribution of the *Path to Passive: Nebraska's Passive Solar Primer*, a 260-page resource guide on passive solar housing, developed by Solar Energy Associates under contract to the Nebraska Energy Office. Workshops and general distribution put nearly 2,000 of the Nebraska-specific guides in the hands of state residents, particularly builders.



President Reagan, during a visit to Omaha, signed national legislation permitting expansion of a grain-to-alcohol conversion program as Governor Thone applauds the action.

Nebraska's wind assessment project was in full swing during the year, determining that sufficient wind may be available to provide economical power in the northwestern section of the state. The project, which continues into 1983, was mounted in cooperation with federal and local power entities.

In response to legislation, the Nebraska Energy Office prepared guidelines during 1982 to carry out the Geothermal Grant Utilization program and rules and regulations to handle renewable tax credits.

The office data section completed work on the computerized energy demand model, which can project energy use patterns into the next decade. The data section also continued as the state's primary repository for energy statistics.

Nebraska's 1982 energy experience was one of vitality. Conservation gains, while they continued, were leveling off in relation to the gains achieved since 1977-78.

But consolidation of those gains and forays into new areas provide healthy signs for the long-term future and were the hallmarks of 1982. Such signs included action of national significance and of even greater importance for the "breadbasket" region of which Nebraska is a part. It was action taken in Omaha and it symbolized progress in the biomass field.

During October, President Reagan signed national legislation while on a trip to Omaha. The legislation permits the Commodities Credit Corporation (CCC) to expand the pilot program through which grain is converted into fuel alcohol.

Governor Thone and other Nebraska officials who had pushed for expansion of the program were on hand for the bill signing ceremony, which may have heralded a new era in the development of alcohol fuels. The possibility that the legislation could lead in 1983 to establishment of an alcohol fuels reserve has been voiced in the alcohol industry.

Such vision is as important as any action to alleviate day-to-day energy problems that demand immediate attention. These developments may point toward an "energy mix" attitude that will lead to richer diversity in energy resources, and eventually to a more energy secure future for Nebraska.

Energy Information in Action

Emphasis on energy matters over the past decade has shifted from scant attention by the public before the petroleum shortfall of 1973 to wary complacency in some quarters in the wake of a return to adequate oil supplies.

Even where this wary complacency holds sway, however, there is general awareness that never again can citizens of the United States take the energy supply and price situation for granted.

Nebraskans are continually reminded that their state is quite vulnerable to any shortfall that might develop in energy supplies.

As a net importer of more than 90 percent of its' energy supplies, Nebraska stands on the brink of economic hardship if there is a significant shortfall.

One method to combat that possibility is through conservation and related activities, which require a cohesive campaign of education, information dissemination and outreach programs that involve both state government and the populace.

The Nebraska Energy Office (NEO), the state's lead agency in energy matters, has mounted and is maintaining a host of such programs.

Outlined in this section of the NEO's 1982 annual report, they represent ways in which government provides a leadership role in the field of energy.

Conservation and Transportation

Nebraskans recorded modest gains in conservation of liquid motor fuels over the initial ten months of 1982, but demonstrated a preference for gasohol that proved to be the energy-awareness development of the year.

Gasoline usage was down by 7.7 percent during the January-October period covered in this report, but that drop was deemed less significant than corresponding cuts in previous years due to massive increases in use of gasohol.

Statistical analysts determined a growing trend among consumers of liquid fuels in Nebraska was toward a tradeoff—gasohol for gasoline. While use of gasoline dropped 7.7 percent, use of gasohol jumped a whopping 266.7 percent during the same ten-month period.

Stated in raw figures, gasoline usage for the initial ten months of 1982 was 588.6 million gallons compared with 637.8 million gallons for the same period in 1981. Gasohol use, meanwhile, soared from 24.8 million gallons in the initial ten months of 1981 to 66.1 million gallons for the same period in 1982.

During the corresponding ten-month periods of 1981 and 1982, special fuels for highway use showed a consumption increase of 3.9 percent, from 116.8 million gallons to 121.4 million gallons.

Combining those three liquid fuel categories—gasoline, gasohol and special fuels for highway use—provides the following figures for overall usage during the ten-month periods of 1981 and 1982; 779.5 million gallons in 1981; 776.2 million gallons in 1982.

The minimal cut in use of liquid fuels, which amounts for the comparable periods to 0.4 percent, is viewed as the result of various factors.

Gasoline usage during the three previous years was cut dramatically. Data indicates gasoline consumption in Nebraska dropped 5 percent from 1978 to 1979, more than 10 percent from 1979 to 1980 and 6 percent from 1980 to 1981. Better driving habits and use of smaller, more fuel efficient vehicles were the primary reasons.

Those factors remained in effect throughout 1982 also, but the margin for further conservation gains of significance had been narrowed. The shift to gasohol in large quantities provided for conservation gains, but they are considered smaller than in previous years.

However, the 1982 gains are viewed as significant by the NEO because gasohol is a fuel blend consisting of 90 percent gasoline and 10 percent ethanol (grain alcohol).

The growing trend toward gasohol was attributed to awareness among the public that gasohol provides another market for Nebraska grain and to a switch in marketing strategy for the fuel blend. The name gasohol was replaced by the label "Super Unleaded with Ethanol."

The gasoline and gasohol data detailed in this section of the NEO annual report is outlined in tables 1 and 2.

Expanded Role

During 1982, the NEO expanded the role of its transportation officer to include duties related to alcohol fuels development, published in limited quantity for state government the Nebraska Biomass Study and held an Independence Day Alternate Fuels Classic road rally.

Those interrelated activities were part of the NEO's ongoing bid to cooperate with the Nebraska Gasohol Committee and organizations in the private sector attempting to promote alcohol fuels and fuel blends utilizing ethanol or other alcohol products.

The Nebraska Biomass Study, technically known as the Nebraska Agricultural Resource Base Assessment, was compiled in 1981 and published in 1982. It

Table 1. Gasoline Available for Sale in Nebraska *
(Metered Thousands of Gallons)

	1977	1978	1979	1980	1981	1982	Percent of Previous Year
January	69,334	69,166	69,602	63,763	60,917	53,344	87.6%
February	62,501	63,227	69,367	59,381	51,123	48,611	95.1
March	70,780	75,162	73,397	63,151	56,183	55,705	99.1
April	77,085	74,597	72,399	65,318	61,489	66,295	107.8
May	79,039	84,422	77,631	72,440	65,221	63,356	97.1
June	86,543	86,165	75,955	65,801	67,532	62,454	92.5
July	92,844	88,253	80,054	73,498	71,593	66,987	93.6
August	82,343	89,733	82,473	72,201	68,404	60,347	88.2
September	79,853	79,202	72,609	79,754	65,057	55,164	84.8
October	82,107	86,061	78,565	65,140	70,371	56,417	80.2
November	76,506	78,351	76,555	60,261	61,220		
December	75,453	76,887	74,824	68,169	62,200		
TOTAL	934,388	951,226	903,431	808,877	761,310	588,680	92.3%

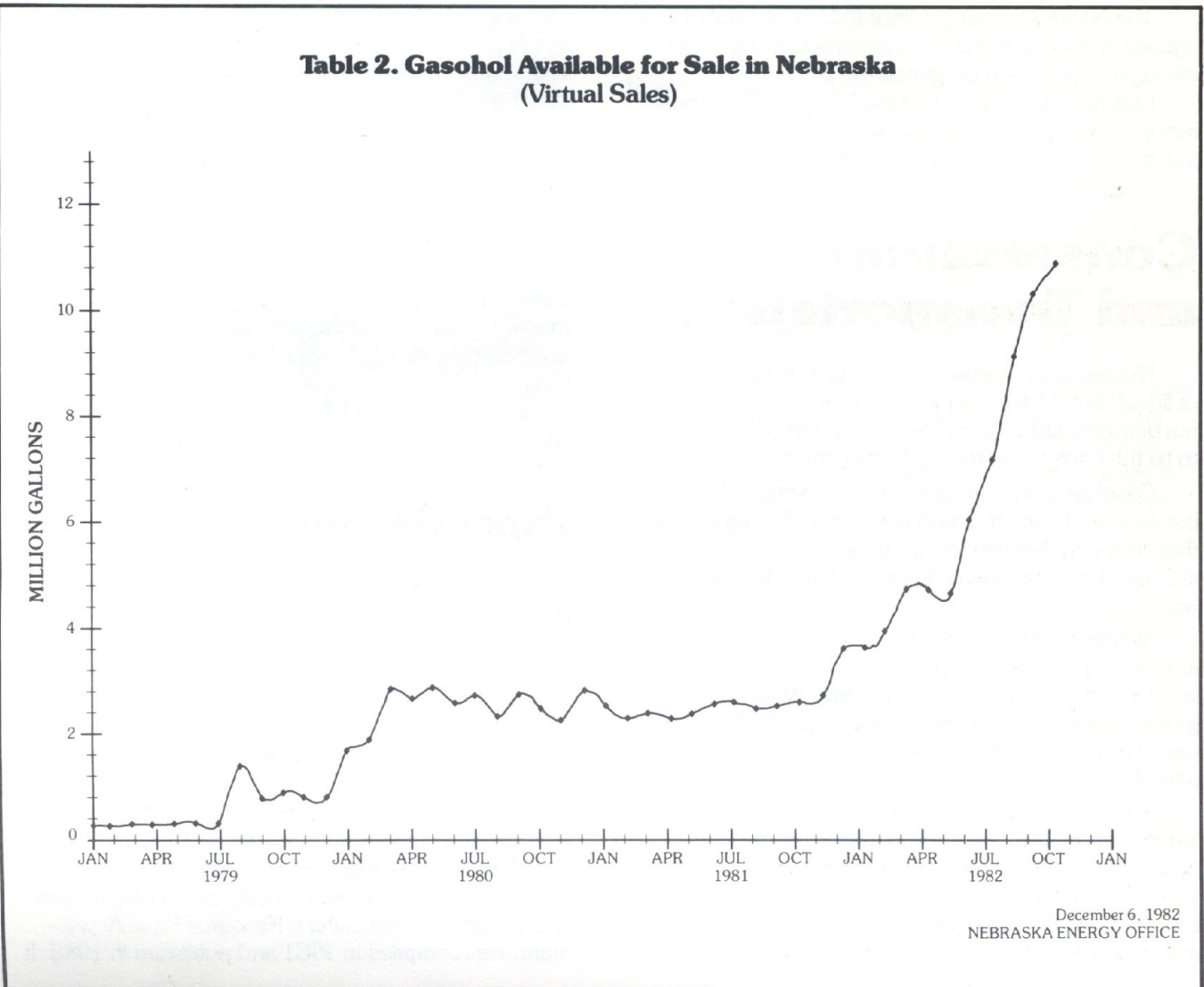
The last three months are preliminary.

*Gross imports into the state minus exports out of the state, excluding Gasohol.

Source: Department of Revenue Tax Form 81

December 6, 1982
NEBRASKA ENERGY OFFICE

Table 2. Gasohol Available for Sale in Nebraska
(Virtual Sales)



December 6, 1982
NEBRASKA ENERGY OFFICE

determined there is sufficient agricultural and related products in the state to support an alcohol fuels industry if policymakers determine that is a desirable decision.

The NEO during 1981 and 1982 converted a stock Ford Pinto into an experimental alcohol fuels vehicle to run on straight ethanol. It was a "pace" car, running as a noncompeting entry, in the Nebraska Independence Day Alternate Fuels Classic road rally sponsored by the NEO. More detail on that road rally will be provided later in this report in the section on future energy solutions.

The transportation officer, in addition to handling the new alcohol fuels duties, continued directing the Driver Energy Conservation Awareness Training (DECAT) program for the NEO.

The Nebraska DECAT program, which in 1981 was selected as an example to be used at the DECAT Training Office in Mercury, Nevada, provides both theoretical and behind-the-wheel efficiency training for motorists.

Conservation and transportation efforts at the NEO during 1982 continued to rely on outreach programs coordinated with various organizations in the private sector. Networking to disseminate NEO and federal energy publications and related materials remained an integral part of the office's bid to reach the public.

In addition, during the year the publication and audio-visual libraries at the NEO were enhanced as part of the ongoing plan to provide the public with the latest information available. And two new programs covering consumer protection and solar assistance were added to better serve Nebraskans.

Consumer Protection

During 1982, the NEO due to rising fuel prices mounted an organized consumer protection assistance program. Information on the efficiency of furnaces, hot water heaters and various conservation techniques was developed and is available to the general public.

Services under this program are expected to be expanded dramatically during 1983. A budgeted amount was assigned for this function and staff time was set aside to handle the new function in the Conservation Division.

In the past, consumer protection questions had been handled by the NEO on an individual basis, but there was no formal mandate, budget or staff assignment until 1982.

Generic information on fuels, appliances, vehicles, and other energy-using devices is provided, but in most cases the NEO avoids brand or trademark recommendations.

Solar Assistance

The NEO found in early 1982 that walk-in traffic and telephone requests related to solar energy increased significantly.

As a result, staff and budget were assigned to ad-

dress these increasing requests in an organized fashion.

Solar questions dealing with the appropriateness, the cost, payback periods, life expectancy, solar access, tax credit availability and government assistance were the ones asked most frequently.

Arrangements are under way for certification information on various collectors and components of solar devices to be provided to Nebraskans upon request.

These technical services are expected to be increased significantly during 1983 due to state tax credits and the rising price of natural gas.

The solar assistance effort is budgeted and handled by staff within the NEO Conservation Division.

NASIS Survey

Nebraskans in 1982 demonstrated their continuing response to energy-related issues in more than just driving conservation and switching to gasohol.

During 1982, for example, a group of energy-related questions were included in the Nebraska Annual Social Indicators Survey (NASIS) conducted by the Bureau of Sociological Research at the University of Nebraska-Lincoln. The responses revealed:

- Cost and gasoline mileage were more important than the car maker or comfort/luxury when respondents were shopping for a new or used vehicle. The survey showed 82.5 percent cited cost and 80.1 percent cited gas mileage as important.
- Nearly half the respondents gave "a great deal of consideration" to the energy efficiency of appliances when shopping for such items. The survey showed 49.5 percent gave much consideration to energy efficiency in such situations while just 12.7 percent gave no consideration at all.
- That 41.6 percent of the respondents read the energy guide labels on major appliances "always" while 16.8 percent read them "sometimes," 18.5 percent "rarely" read them and 23.1 percent "never" paid attention to such labels.

Finally, the survey showed that 58.5 percent of those queried in the NASIS poll were "very much interested" in what government is doing about energy and oil. It showed 35.3 percent were "somewhat interested" and only 6.2 percent termed themselves "not much interested."

The 1,907 Nebraskans surveyed amply demonstrated the need for continued government involvement in energy, an indicator the NEO will continue monitoring closely.

Energy Extension

The Nebraska Energy Extension Service, which entered its third year of operation in 1982, provides various energy efficiency and demonstration programs for Nebraskans.

These outreach programs dovetail, in some cases, with the conservation and transportation efforts mounted by the NEO.

Ga\$ \$aver

An excellent example, and one which fits well with the transportation component of the NEO conservation effort, is the Energy Extension Service Ga\$ \$aver Van.

This van is a mobile vehicle diagnostic center equipped with a computer and printout machine. Operated by two specially trained auto mechanics, the van and diagnostic equipment travels across Nebraska to offer free vehicle efficiency testing.

During 1982, the van visited 77 locations and tested approximately 2,000 vehicles for efficiency. Vehicle owners who have the tests conducted can expect to save between \$60 and \$220 worth of gasoline annually if they follow the Ga\$ \$aver team's recommendations.

The team provides only the testing data. The motorist is charged nothing for the service and is free to have the recommended corrections done by his or her own mechanic.

Vehicle testing is conducted during warm weather by the team after adequate advance notice in a locality. During the colder months, the van also visits technical community colleges in Nebraska to demonstrate the diagnostic equipment to auto mechanic students.

PUMP

The NEO's PUMP project—which is the Pumping Unit Management Program—is designed to reach the state's farmers who irrigate and to boost fuel efficiency of their irrigation pumping plants.

The University of Nebraska Cooperative Extension Service, under contract to the NEO, has provided this service to Nebraska farmers during the 1980s. In 1982, there were 21 PUMP demonstrations around the state with 450 in attendance. During 1981, 61 demonstrations reached some 1,400 persons.

This phased decrease in demonstrations was due partly to budget cuts at the federal level, which left just one PUMP team in the field rather than the two during 1981, but was also part of the plan to turn the project over to the private sector.

The PUMP team has provided training for well drillers, engine sales personnel, pump personnel and private consultants so there will be an adequate number of persons available in the private sector to test irrigation pumps.

In 1982, the Western Area Power Administration funded materials and two workshops in Nebraska on the PUMP techniques. The U.S. Department of Energy Region Seven office also funded training to export the program to Missouri, Kansas and Iowa.

Conservation Recognition

The primary program providing conservation achievement recognition in Nebraska is the "E Flag" program run by the Energy Extension Service.

The E Flags are awarded to those businesses and industries that have demonstrated innovation or commitment in addressing their energy problems.

Firms that can document energy savings through energy conservation practices, installation of new equipment, load management techniques or alternative energy devices may receive an E Flag and a certificate recognizing the achievement.

In 1982, the following businesses and industries were E Flag recipients:

Nielsen Chevrolet/Buick	Columbus
Dealership	Omaha
Western Electric	Omaha
Redfield & Company	Omaha
Thomsen & Company	Omaha
Bakers Food Stores	Omaha
Sixth Street Food Stores	North Platte
MIDWEC	Scottsbluff

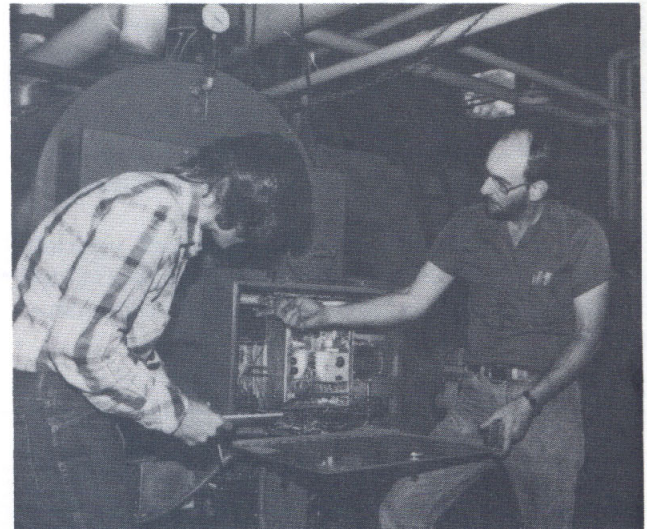
Boiler Efficiency

Continuation of the boiler efficiency workshop program during 1982 extended the number of boiler technicians reached by nearly 500.

In cooperation with the Blue Flame Gas Association and the Legislature's 309 Task Force, the NEO has held a series of a dozen workshops over two years in an effort to cut the energy use of industrial boilers.

Seven of those workshops were held during 1982. Two were held in Lincoln, and one each at Omaha, Grand Island, Norfolk, McCook and Scottsbluff.

The NEO encourages continuation of the boiler efficiency workshop program through the private sector.



Nebraska Energy Office auditor works with boiler operator to check energy efficiency during a state building audit.

Energy News

The *Nebraska Energy News* is published six times annually to provide the state's energy consumers with up-to-date information on a potpourri of energy topics.

Nearly 12,000 citizens and organizations receive the newsletter, which is published by the NEO on a contract basis through the University of Nebraska-Lincoln College of Engineering.

Cooperating agencies, which contribute articles for the newsletter, include the Nebraska Energy Office, the Department of Economic Development, the university's Engineering Extension Service, Cooperative Extension Service, Division of Continuing Studies, and the Nebraska Solar Office.

Alternative Energy

Another facet of the NEO's Energy Extension Service is alternative energy. During 1982, solar and wind projects continued and the alcohol fuels project culminated with the Independence Day Alternate Fuels Classic road rally.

The solar component included research on passive solar techniques, which led to publication and distribution of a comprehensive manual on the subject especially keyed to Nebraska needs.

The wind component covers research into the average annual wind speed at various locations through the state. Twenty locations were selected and anemometers placed at strategic spots to assess whether wind velocity is sufficient for conversion to electrical power.

The alcohol fuels component included research regarding the feasibility of using ethanol as a liquid fuel for motor vehicles. It led to the Classic road rally, which drew some 30 entries to Nebraska from 16 states to compete in the July 4th road rally to determine energy efficiency.

All three of these alternative energy projects will be detailed further in the section of this NEO annual report dealing with future energy solutions.

Energy Education

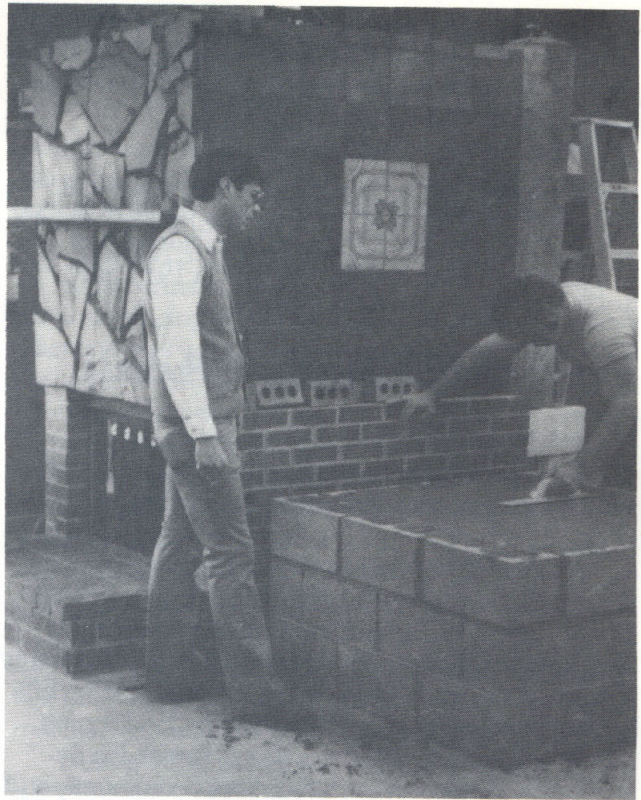
Energy education plays a key role in Nebraska's long term commitment to move toward less reliance on outside forces in the field of energy.

This commitment by the NEO to energy education includes efforts at all levels—elementary, secondary, vocational training, post-secondary.

Without such a coordinated approach, Nebraska students would be left to fend for themselves in the future as they sought information to help make crucial energy-related decisions.

Elementary

Energy Conservation Activity Packets (ECAP) were developed for the elementary school level by the



Southeast Community College-Beatrice instructor watches as student lays foundation for a second "Russian" fireplace. The initial "Russian" fireplace unit stands in the background.

NEO in conjunction with educators. The materials underwent statewide evaluation in 1981.

During 1982, ECAP materials were revised in line with the evaluation. Along with the revisions came in-service teacher training for instructors at the elementary level. Elementary school teachers were exposed to the curriculum materials and teaching techniques recommended for energy issues during workshops held for 12 weeks during the summer at Wayne State University.

Secondary

Basic Teaching Units on Energy (BTU) is the curriculum developed for grades seven through 12, which is the secondary school level. The BTU curriculum coordinates with science and social studies.

Evaluated in 1981, the BTU curriculum underwent revision in 1982 based on that evaluation. In-service training was provided at a faculty development workshop held during the summer at the University of Nebraska-Lincoln.

Industrial Arts

The "Russian Fireplace" Demonstration Project continued into 1982 in cooperation with Nebraska community colleges.

During 1981, two demonstration units based on the Medieval fireplace concept were constructed at the Southeast Community College campus at Beatrice.

The high efficiency masonry units—also known as “Russian” or “Finnish” fireplaces—proved to be 90 percent energy efficient, compared with the 30 percent or less of conventional fireplaces.

During 1982, a “how-to” manual on the best of the units was developed along with a slide show presentation. Western Nebraska Community College at Sidney agreed to continue with the demonstration project.

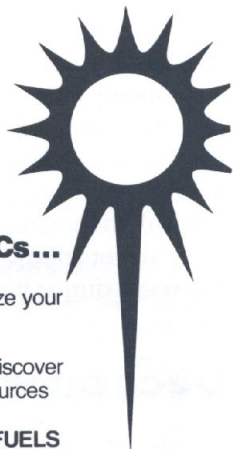
Demonstration workshops, held in 1981 and 1982, were also scheduled for 1983.

Post-secondary & Adult

A five-part curriculum series developed by the NEO and the Vocational Education Division of the Nebraska Department of Education underwent revision during 1982 and is available for classroom use.

The vocational/technical curriculum guides cover Energy Efficiency for Architectural Drafting Instructors, Energy Efficiency for Building Construction Technology, Energy Efficiency for Electrical Technology, Energy Efficiency for Automotive Technology and Energy Efficiency for Heating, Ventilating and Air Conditioning.

In addition, the NEO is acting as the lead to develop—in conjunction with Nebraska’s community and state colleges—an Energy Education Management Plan for adult education.



Remember your energy ABCs...

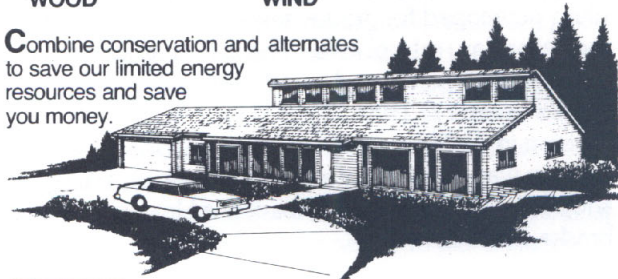
Achieve energy efficiency first. Weatherize your home and drive efficiently to save fuel.

Build on these conservation practices. Discover cost effective ways to use alternate resources such as...

**PASSIVE SOLAR
WOOD**

**ALCOHOL FUELS
WIND**

Combine conservation and alternates to save our limited energy resources and save you money.



March is Energy Conservation Month

Above is a black-and-white representation of the color poster distributed to promote energy conservation and the use of renewable energy resources during the “March Is Energy Conservation Month” campaign.

Public Information

The public information effort of the NEO is designed to complement every other program mounted by the agency, highlighting each for the citizens of Nebraska.

The legislatively-mandated function includes compilation and publication of this annual report each year, the publication of quarterly reports, the research and publication of various printed materials, and updating of the public about energy developments through news releases or other appropriate means.

The NEO also maintains a library of audio-visual materials, as well as printed items, for the public. A handbook entitled “Energy Info” has been published and is available to provide information regarding the various materials—printed and audio-visual (films, slides, video cassettes, etc.)—that citizens may obtain from the NEO.

The public information officer functions as contributing editor for the *Nebraska Energy News* and spearheads the media effort during the annual “March Is Energy Conservation Month” campaign. During 1982, he also acted as media coordinator for the Independence Day Alternate Fuels Classic road rally, and as coordinator of the NEO’s State Fair booth.

The 1982 March campaign sub-theme was “Alternates Boost Conservation.” Public Service Announcements featuring the NEO director highlighted variations on that theme, urging conservation but suggesting use of cost-effective alternate energy sources such as passive solar and alcohol fuels or blends.

Print materials distributed during the March campaign included extensive press packets with timely features on alternates and posters, flyers or related materials pushing the “Alternates Boost Conservation” message.

Significant media coverage accompanied the promotion and running of the Alternate Fuels Classic. The NEO’s alcohol fuels program culminated with the energy efficiency competition and provided a forum for national alcohol fuels spokesmen as well as a proving ground for converted vehicles.

A technical assessment of the vehicles entered in the Classic is being printed and will be available in 1983.

The Ford Pinto converted by the NEO into an experimental vehicle to run on ethanol in the Classic road rally was later the focal point of the NEO State Fair booth, which drew thousands of interested fairgoers to examine the potential for alcohol fuels in transportation.

BUILDING BLOCKS FOR TODAY

The importance of spreading accurate and helpful information regarding ways to save energy and energy-related costs is equaled by the importance of the actual savings.

At the Nebraska Energy Office (NEO), information is an integral part of every program. The programs in most cases, however, also are aimed at actual savings.

This is especially true of the general conservation/transportation programs outlined in the first section of this 1982 annual report and of the building-related conservation programs outlined in this section.

This section details the ways in which government works to plug holes in existing structures by providing funds or offering technical assistance in various forms to those in the private sector of the economy.

Some of these programs are federally funded and rank among the biggest of the "big ticket" efforts mounted by the NEO. Others are funded through various means and rely more on helping people, business and industry, or government units to help themselves.

The thrust of such programs is to keep the heat or the cool in buildings during winter and summer rather than wasting energy through inefficient operations.

Increasing utility costs in recent years have provided the impetus for a partnership between the NEO and various managers, executives, officeholders, homeowners—those Nebraskans who have realized that saving energy means saving money.

Weatherization Assistance

The number of dwellings weatherized in Nebraska since the inception of the Weatherization Assistance Program was near the 15,000 mark as calendar 1982 drew to a close.

Since the program began in Nebraska in 1977-78, some 12,000 or more homes of low-income residents were weatherized before the 1982 program cycle began.

The 1981 program cycle goal was to weatherize 2,600 homes during the program period of March, 1981, to April, 1982. The goal was exceeded, with 2,774 homes finished.

The 1982 program cycle, from April, 1982, until March, 1983, called for the weatherization of 3,176 dwellings. The goal was within reach as 1982 drew to an end.

Program funds expended during the 1981 cycle exceeded \$2.5 million. The estimated expenditure during the 1982 cycle was more than \$3.2 million.

The NEO administers the federal funds involved to weatherize homes of state residents whose incomes do not exceed 125 percent of the federal poverty level.

Weatherization assistance includes caulking and weatherstripping around doors and windows, insulating attics and side walls, covering windows, and other measures to enhance a dwelling's energy efficiency.

To perform this service, the NEO contracts with ten Community Action Agencies and the Nebraska Inter-Tribal Development Corporation to weatherize homes at the local level across Nebraska. These contracting agencies receive an initial allocation based on past performance and additional funds, if available, may be granted to agencies which demonstrate productivity and need.

Material costs for weatherization assistance are limited to \$700 per home and the total cost for labor and materials cannot exceed \$1,200 per dwelling.

During 1982, the NEO and the community agencies mounted a follow-up program in an effort to heighten the impact of weatherization services. Follow-up visits were made at recently weatherized homes to provide residents with information that helped stimulate energy efficient home management techniques.

Positive reaction resulted as the program began near the end of 1982, but there was insufficient time to determine if residents were taking complete advantage of their weatherization services by fully utilizing the information supplied.

Quality Control

Quality control in the weatherization program is provided by the contracting agencies and the NEO. This includes inspection of homes weatherized by each agency to make certain that material and labor standards were met. The NEO also inspects some of the weatherized dwellings on a random basis.

In addition, the NEO makes a minimum of two monitoring visits each year to each of the agencies under contract. The monitoring visits include inspection of files, records, requests for service and actual field work on dwellings.

The agencies under contract to the NEO for the local delivery of weatherization services include: Blue Valley; Central Nebraska; Goldenrod Hills; Greater Omaha; Lincoln Action Program; Mid Nebraska-East; Mid Nebraska-West; Panhandle; Northwest; Southeast; and the Inter-Tribal unit.

The more than \$3.2 million slated for expenditure in Nebraska on low income weatherization assistance during 1982 was the most spent during any single program year since the program began in the state, and the 3,176 estimated homes reached was the second highest total completed.

Continuation of the program seemed assured as 1982 drew to a close. The NEO had secured a commitment that \$500,000 in Low Income Energy Assistance Program (LIEAP) funding would be available in 1983 for weatherization assistance. The bulk of LIEAP funding is used by the Department of Public Welfare for utility bill assistance.

In addition, the post-election 1982 session of Congress passed funding legislation that included weatherization assistance monies which would supply Nebraska an estimated \$1.5 million more for 1983.

Low-income, elderly and handicapped Nebraskans whose homes are weatherized under the program realize significant energy savings, which also translate to lower utility bills. A study by the NEO of energy use before and after weatherization showed an average saving of more than 24 million British thermal units (Btus) is realized in a weatherized home over a year's time.

That represents the equivalent of 24.6 MCF (thousands of cubic feet) of natural gas annually and translates to well over \$100 per year in financial savings.

Even though the program has reached some 15,000 homes over the six years of its existence in Nebraska, estimates indicate the task of weatherizing dwellings of eligible recipients may be less than two-thirds accomplished.

Analysis of 1980 census data is underway to determine how many more eligible recipients may be reached in the future, but current estimates by NEO In-

Table 3. Nebraska Weatherization Summary

Program Year	Contract Period	Contract Amount	Homes Weatherized
1977	Jan. 1978 - April 1979	\$ 365,000	1,365
1978	July 1978 - Feb. 1980	834,494	1,644
1979	June 1979 - July 1981	2,293,206	3,094
1980	March 1980 - July 1981	2,514,578	3,339
1981	March 1981 - April 1982	2,526,762	2,774
1982	April 1982 - March 1983	3,234,084	3,176
TOTALS		\$11,768,024	15,392

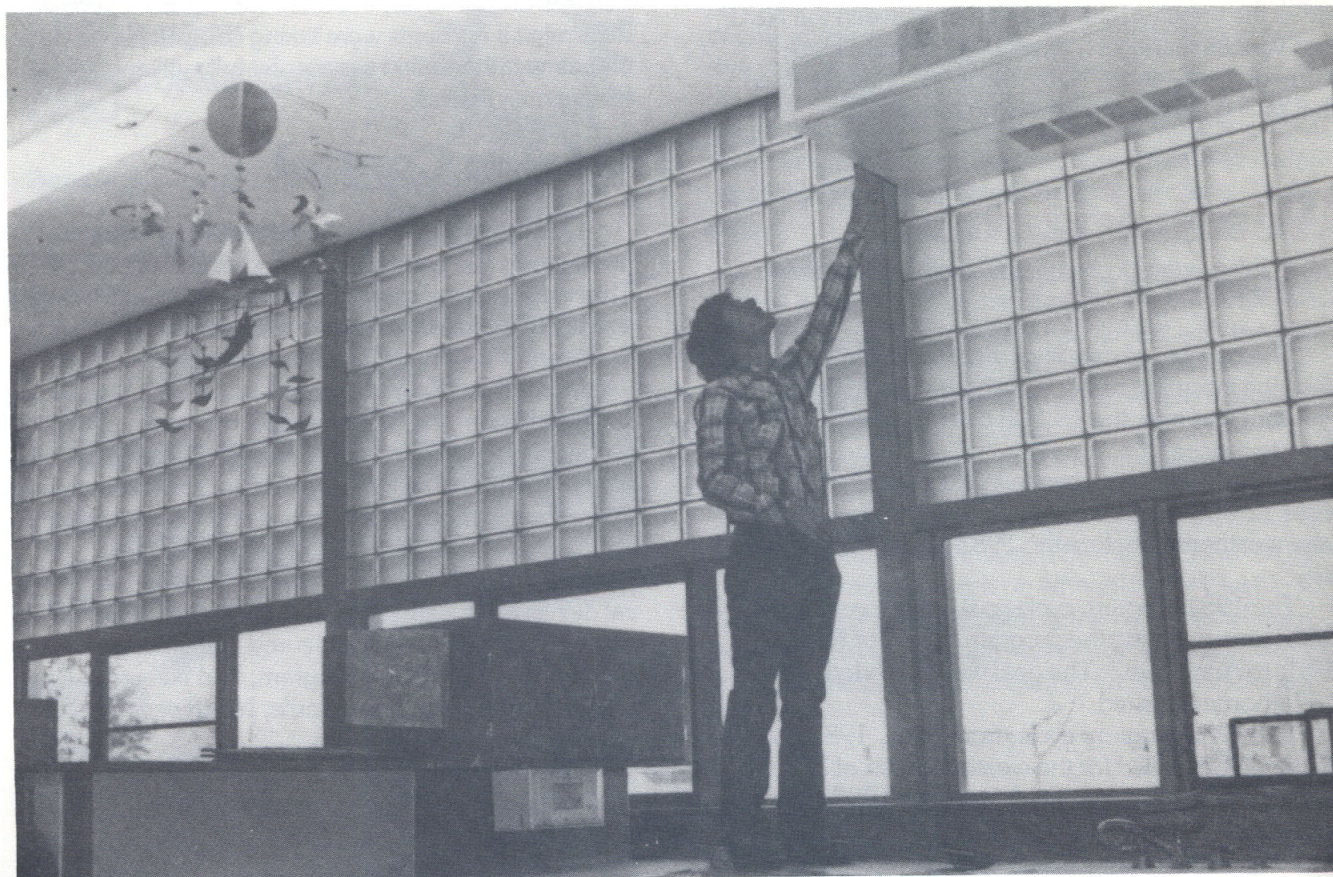
teragency Division personnel indicate at least 7,500 more Nebraska homes could be done under terms of the program.

The Nebraska Weatherization Summary provided in table 3 gives a capsule version of the Weatherization Assistance Program administered by the NEO Inter-agency Division.

School Weatherization

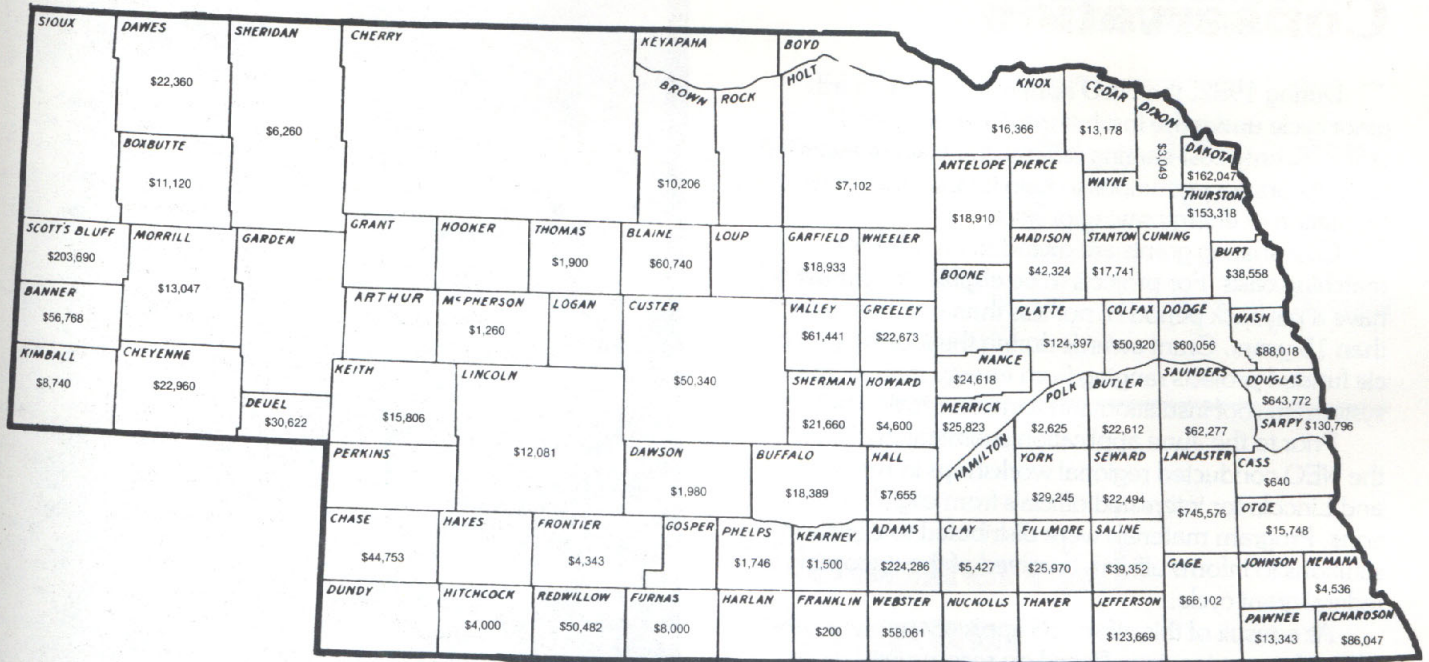
The initial year of the Nebraska School Weatherization Program concluded in mid-1982 with more than \$3.9 million distributed through the NEO-administered program to 122 public school districts across the state.

Grant Cycle I was completed during late 1981 and



Nebraska Energy Office auditor checks heating ductwork during energy audit at high school in North Platte.

Table 4. Distribution of School Weatherization Funds by County During Fiscal Year 1981-83



just under \$1 million was distributed in that first phase of the program. Two more grant cycles were completed during the first half of 1982, resulting in distribution of an additional \$2.9 million.

The \$3,969,258 provided through the program, which is funded by State Oil and Gas Severance tax receipts, represented 80 percent of the money for energy efficiency projects at 221 public school buildings in the 122 districts served. The districts provided 20 percent in matching funds, bringing the total to near \$5 million for school energy efficiency in the initial year.

Created in 1981 by Legislative Bill 257, the program requires the matching funding from school districts, determination that projects proposed will provide energy and financial payback, and limits funding for any single building in a district to a top of \$100,000 in state money.

During 1982, Legislative Bill 799 expanded the life of the program. Originally slated for two years, the program was extended to five years and other changes were made. Those changes included a requirement that funding be distributed on an approximately equal basis among the state's three congressional districts and allowance for a school district to use in-kind services as part of the monetary match requirement.

In the initial grant cycle in late 1981, 39 school districts sought \$3,415,292 in funding from the state through the program. Distribution amounted to \$983,861 involving 26 buildings in 17 districts.

The second grant cycle drew 180 applications from 105 districts, which were seeking more than \$5.5 million. With approximately \$1.6 million available, the NEO awarded grants to 79 local districts for projects at 135 buildings.

The third grant cycle drew applications for projects at 105 districts seeking more than \$4.3 million. After thorough review, the NEO awarded approximately \$1.3 million to 73 buildings in 46 local districts.

The NEO estimates annual cost savings from projects funded in the three grant cycles completed in the program's first year should be approximately \$1.2 million. The estimate of energy savings from these projects amounts to the equivalent of 469,582 barrels of oil on an annual basis.

The second year of the program began in September, 1982, with distribution of program materials to school superintendents across the state. Potential applicants were encouraged to attend workshops on the program held prior to the December submittal deadline. The workshops were held in North Platte and Lincoln.

By the December 1-3 submittal deadline, 228 applications were filed requesting more than \$4.9 million. Notice of the grant awards was slated for early 1983.

Grant recipients are required upon completion of projects to provide the NEO with copies of Grant Close-Out forms and copies of invoices pertaining to their projects. The forms document the amounts spent and provide the NEO an opportunity to monitor projects accurately. Monitoring visits have been performed on a few of the first-year projects that were completed and more are planned over the life of the program.

Table 4 is a map showing the distribution by county of funds to school districts in Nebraska for energy efficiency projects under the School Weatherization Program.

Institutional Conservation

During 1982, the NEO administered the fourth grant cycle under the Institutional Conservation Program. Twenty cost-sharing federal grants were awarded to 12 Nebraska institutions to help finance the implementation of energy saving projects.

Cost-sharing grants are awarded on a 50-50 matching basis. For projects to be eligible, they must have a payback period of not less than one nor more than 15 years. Grant awards during the fourth grant cycle funded projects ranging from energy management systems to roof insulation and window replacement.

Prior to the June application submittal deadline, the NEO conducted regional workshops in Kearney and Lincoln for interested officials from eligible institutions. Program materials were distributed to eligible institutions to inform officials involved of the upcoming federal grant cycle.

As a result of this effort, 68 applications were submitted for grant review. Based on recommendations made by the NEO, the U.S. Department of Energy office in Kansas City awarded \$460,290 to seven schools and five hospitals.

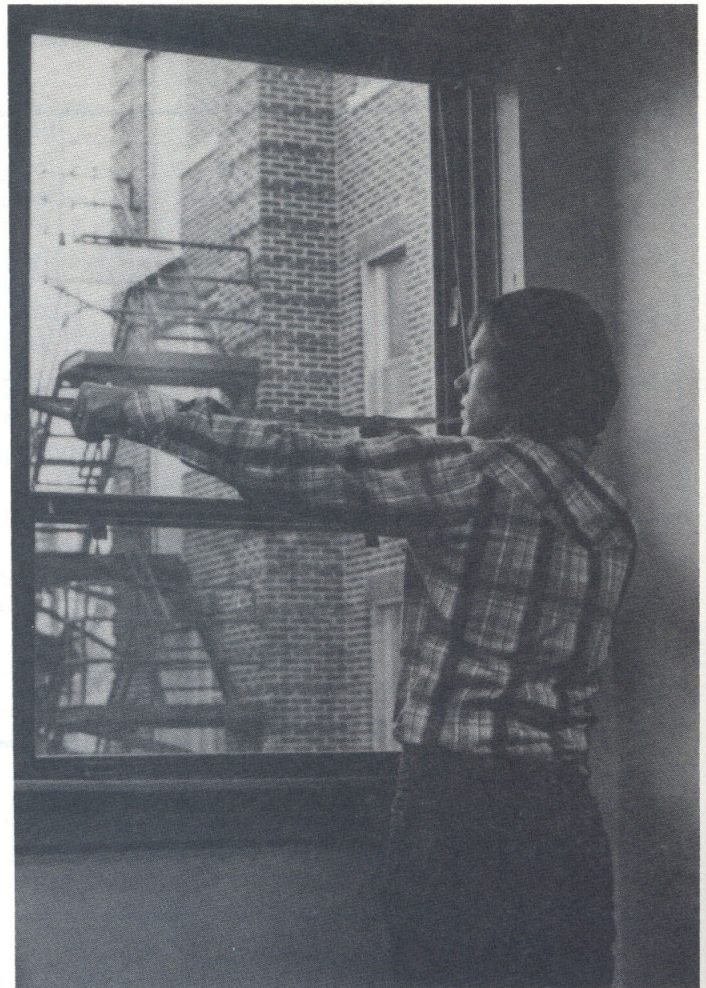
The Institutional Conservation Program was created under the National Energy Conservation Policy Act of 1978. Besides the opportunity for schools, hospitals, local government buildings and public care facilities to receive cost-sharing energy grants, until December of 1981 these institutions were eligible to receive free energy audits from the NEO.

More than 2,020 buildings received audits which identified areas to improve energy efficiency. If the audited institutions were to implement all the audit recommendations made, an estimated annual energy cost savings of more than \$14 million would be achieved. This corresponds to an energy savings equivalent of 431,315 barrels of oil.

The NEO's Institutional Conservation Program includes grant monitoring activities of two kinds. Technical Assistance and Energy Conservation Measure grantees are monitored by telephone, letter and on-site inspections.

The NEO conducts on-site visits at all institutions that have received federal Technical Assistance funds in excess of \$1,500 per building. The NEO conducts monitoring visits of all institutions that have received federal Energy Conservation Measure funds, with primary emphasis on grants of more than \$10,000.

The NEO has made 25 on-site monitoring visits involving Energy Conservation Measure grant recipients. Ten on-site monitoring visits were conducted involving Technical Assistance grant recipients. Follow-up by the NEO includes notification of compliance or non-compliance, along with additional on-site visits in cases of non-compliance.



Measuring the size and counting the number of windows in a building is an important key to determine energy loss.

State Building Audits

The State Building Audits Program, created in 1981 by Legislative Bill 158, requires the NEO to perform energy audits on all appropriate state-owned structures not previously audited under the federal Institutional Conservation Program.

During 1982, there were 532 structures audited by the NEO to meet this legislative mandate. The buildings audited ranged in size from approximately 500 square feet to 100,000 square feet. They are operated by 21 state agencies and are spread across Nebraska in various locations.

Since the inception of the State Building Audits Program in September, 1981, more than 650 buildings have been checked by NEO auditors for potential energy savings.

Before audit activity began, the NEO contacted all state agencies to provide program information and to request preliminary auditing data regarding energy consumption at structures operated by those agencies. Responses from 23 agencies provided information about 964 state buildings.

Personnel and Procedures

NEO auditors stationed in Omaha, Lincoln and North Platte perform the energy audits on state buildings. The auditors have been trained in methods of recognizing energy deficiencies in all types of structures.

Each audit involves an on-site inspection to pinpoint cost-effective opportunities for more efficient use of resources. During a walk-through inspection, the energy auditor examines building construction, window condition, insulation, infiltration, lighting and mechanical systems.

After the on-site inspection, the energy auditor prepares a written report which is transmitted to the state agency that operates the structure involved. The report identifies areas of energy waste and recommends cost-effective ways to reduce energy use. Recommendations are separated into two categories—operation and maintenance procedures or energy conservation measures.

Revisions of operation and maintenance procedures are low or no cost methods of saving energy such as weatherstripping, caulking, thermostat setback, reduced lighting, cleaning of filters and efficient boiler operation. Energy conservation measures are capital improvements, which require high initial investment and therefore might not be possible immediately. They include such projects as replacement or reduction of windows, changing lighting systems, installation of thermostat control valves and similar renovations.

Program Results

Analysis of energy audit reports has shown that energy use in state structures could be cut by an estimated average of 28 percent if all audit recommendations were followed. Estimated energy savings would amount to 155,000 million British thermal units (Btus) annually.

Such projected energy savings represent the equivalent of more than 1.1 million gallons of fuel oil or 155,000 MCF (thousands of cubic feet) of natural gas. Annual monetary savings potential represented in the audits amounts to an estimated \$1,031,072.

For various reasons, including ongoing increases in energy prices, these estimated cost savings can be viewed as conservative. Table 5 indicates the amount of energy and cost savings available through implementation of audit recommendations under the program.

In an effort to determine the effectiveness of the State Building Audits Program, the NEO conducted a survey during the third quarter of 1982. Survey results showed almost all agency personnel contacted felt auditors had identified problem areas unique to the buildings and had offered realistic suggestions for correction.

Of the agencies surveyed, 85 percent indicated they either had complied with the operation and maintenance recommendations or they would do so soon. Twenty percent indicated they planned to carry out the energy conservation measure recommendations. They indicated the program was worthwhile.

Table 5. Recommended Savings in State-Owned Buildings

Type of Savings	MBtus Recommended for Savings	Percentage Savings	Dollar Savings
Operating & Maintenance	49,902	8.7%	\$333,036
Energy Conservation Measures	104,656	18.3%	\$698,036

MBtus are millions of British thermal units.

Commercial Program

A separate NEO division based at the Omaha field office was created in 1982 to expand services provided commercial and industrial establishments in Nebraska.

The Commercial Program has targeted efforts toward small commercial businesses. Work completed during 1982 determined that less than 10 percent of the small businesses in the state were making concerted efforts to conserve energy.

In the autumn of 1981, NEO officials decided to encourage communities across Nebraska to establish their own commercial conservation programs. Since the inception of the new Commercial Division at the NEO, this effort has been upgraded.

Each community involved has been asked to set up an energy committee to assist in (1) selecting five representative businesses that would be interested in having on-site energy analyses completed at their facilities, and (2) scheduling a slide presentation to share results with other commercial enterprises in the community. Self-audit materials were distributed to assist the businessmen involved in analyzing their own facilities.

The main theme for each presentation has been targeted along these lines: "Save money and conserve energy." With the stagnation of the national economy, emphasis was placed on those energy areas that show a good return on investment.

A critical area is operation and maintenance of mechanical systems. Improvements to mechanical systems and the manner in which they are operated show average savings in the 30 percent range.

Commercial Program outreach activities were completed in West Point, Wymore, Grand Island and Geneva. Presentations were scheduled in early 1983 at Papillion and Fremont. Thirty businesses were audited in 1982 under terms of the program, and more than 200 businessmen attended conservation seminars.

In addition to the community outreach activities, the Commercial Division and the staff at the Omaha field office continued to perform on-site audits upon requests from individual commercial and industrial concerns, local government, churches, elderly housing and others.

An example of the success involved in such service is provided by experience of the Diesel Power Company, the John Deere (implement) Dealership in Valley, Nebraska. After a walk-through audit of the dealership building, Diesel Power officials reviewed NEO recommendations and completed several projects:

- Some 560 square feet of south glazing was converted into active solar collectors.
- Insulation in walls was increased to R-20.
- The ceiling was lowered and insulated to R-38.
- A vestibule (double-entry) was installed at the main entrance.
- A new furnace was installed in the shop to burn waste oil.
- Insulated panels were installed in all large, overhead doors.

Diesel Power plans to save 4,300 gallons of propane during 1983 and 3,200 kilowatt hours of electricity.

In April of 1982, the Legislature passed new tax

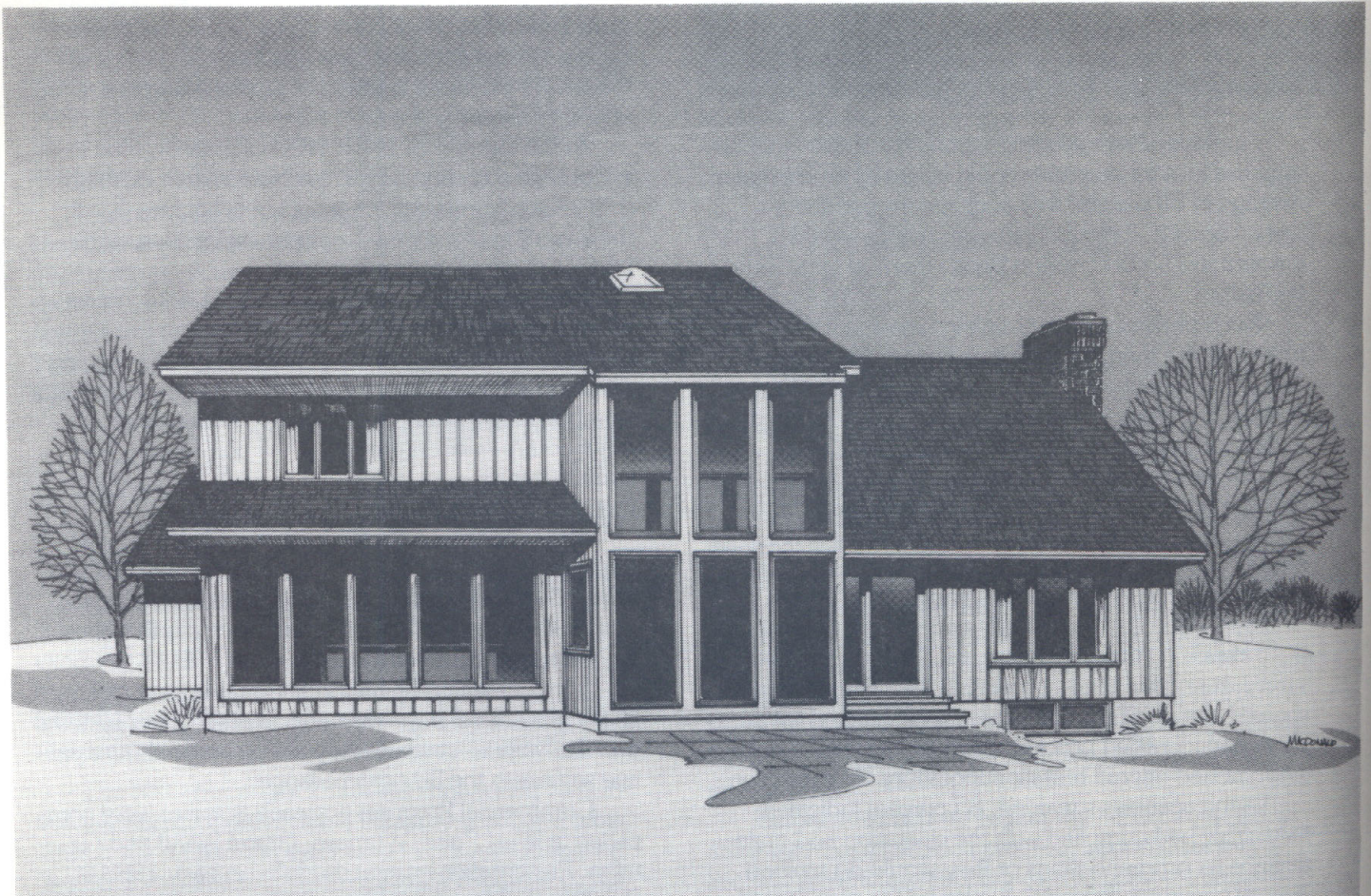
credits to encourage corporations and homeowners to use alternate energy sources such as solar and wind. The Omaha field office serves as a distribution center for information on both active and passive solar systems (including details regarding the new tax credits).

The Commercial staff at the Omaha office also had an opportunity during the summer of 1982 to work with the Omaha area homebuilding industry regarding solar matters.

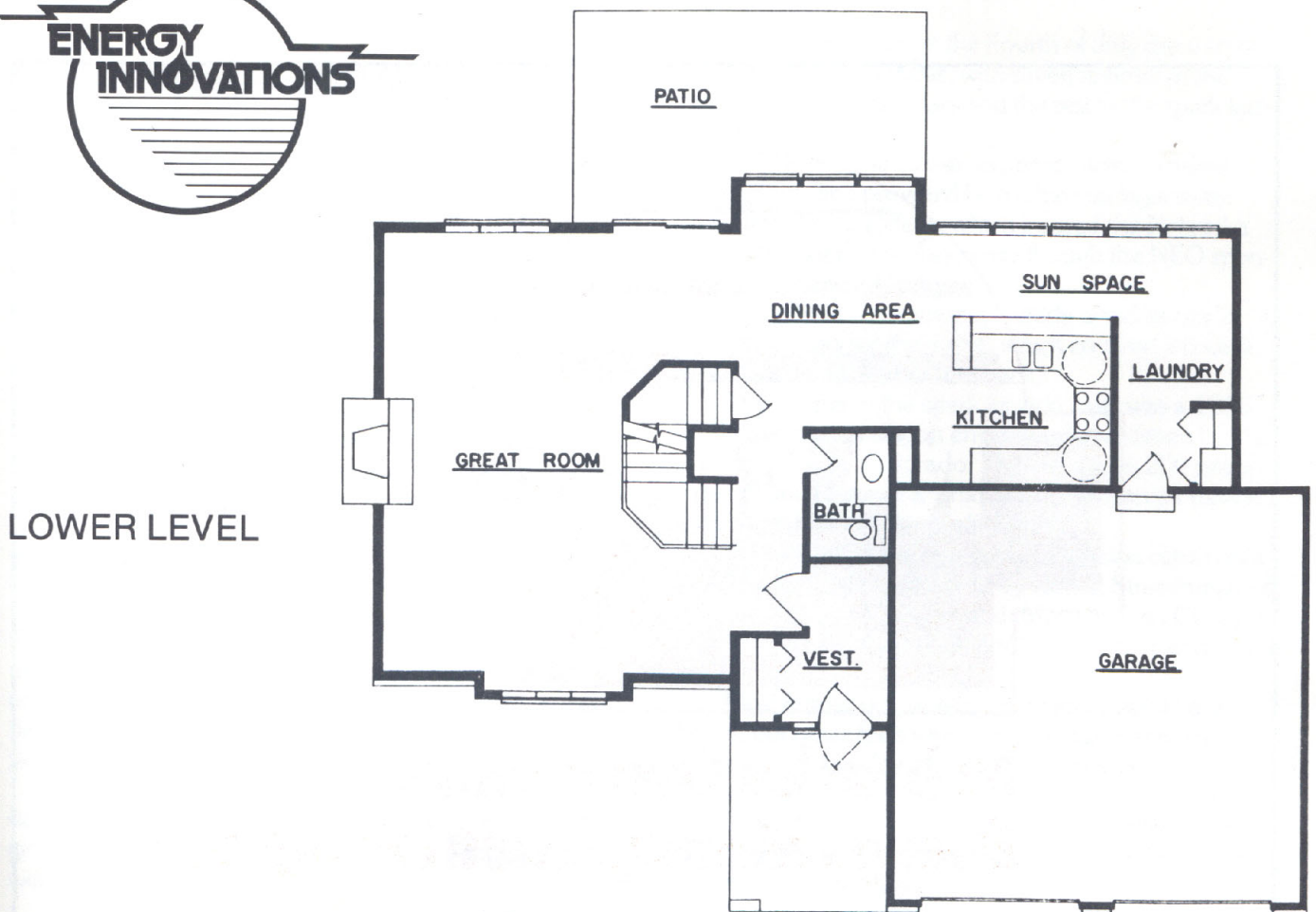
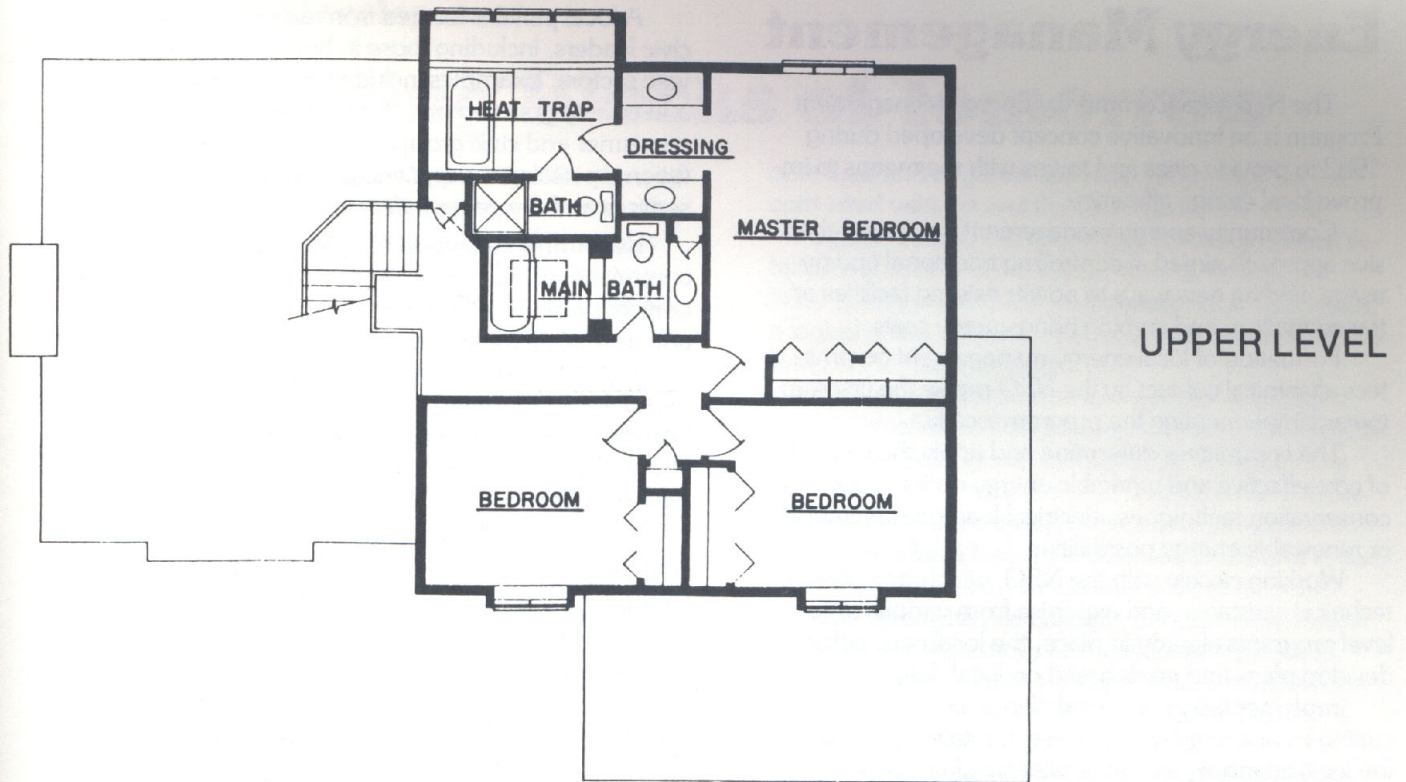
Information was given to local contractors on passive solar design and effective conservation techniques. New home buyers are concerned with such issues due to rising energy costs.

In July, more than 10,000 persons toured an "Energy Innovations" show home on display under the auspices of the Metropolitan Omaha Builders Association. All the conservation measures were analyzed to determine the amount of energy saved and the estimated return on investment. Both "solar gain" and "heat loss" calculations were made to evaluate the benefits of passive solar design.

The NEO's Omaha field office played an integral role in determining the cost effectiveness of various features of the show home and joined with MOBA in generating interest among Omaha area residents in the concepts embodied by the structure.



Above is an artist's rendering of the Energy Innovations show home featured by the Metropolitan Omaha Builder's Association. The Nebraska Energy Office was involved in determining the energy savings calculations for this energy-efficient, passive solar structure. This illustration is by George L. MacDonald of Omaha. The following page illustrates floor plans of this show home.



Energy Management

The Nebraska Community Energy Management Program is an innovative concept developed during 1982 to provide cities and towns with the means to improve local energy efficiency.

Community energy management is a comprehensive approach aimed at controlling traditional energy usage, finding new ways to power existing facilities or transportation, and curbing rising energy costs.

Formation of local energy management committees after initial contact by the NEO marks the first step toward implementing the program locally.

The committees determine and apply the best mix of cost-effective and workable energy options, such as conservation techniques, electrical load management or renewable energy possibilities.

Working closely with the NEO, which provides technical assistance and expertise from various state-level programs already in place, the local committees develop plans and goals based on local data.

Implementation of a local plan is aimed at not only cutting local energy use, but also at retaining money in the local economy that otherwise would have left the area because of rising energy costs.

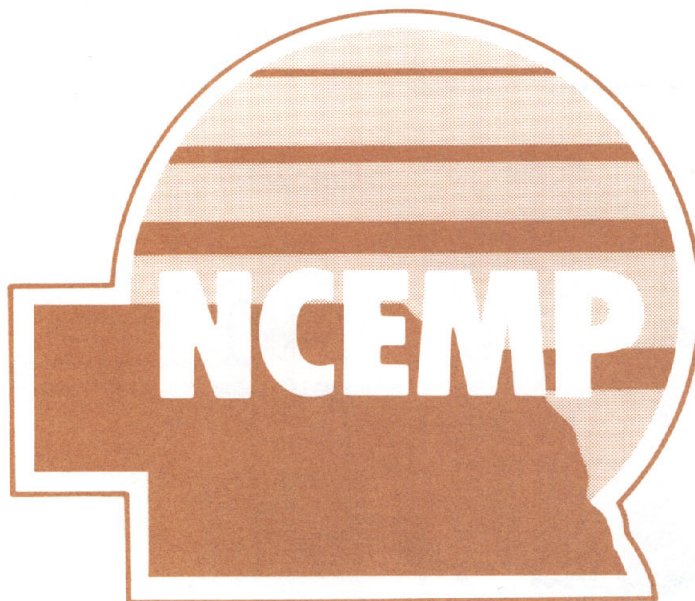
A local panel is formed from among community civic leaders, including those in both the public and private sectors. Examples include representatives of city and county government, the Chamber of Commerce, consumer and civic groups, local utilities, financial institutions, petroleum suppliers, providers of emergency services and the general citizenry.

Recommendations in the plan adopted by the committee will help cut energy costs in government operations, residential, commercial, industrial, agricultural and transportation end-use sectors of the community.

The initial phase of the program at the state level found the NEO during the final quarter of 1982 meeting with leaders in various communities to explain NCEMP via slide show presentations and question/answer sessions.

By December, leaders in five communities had initiated the program locally and those in three more were considering it. This nucleus of pilot projects was expected to grow during 1983.

The long-term goal of the NEO is to set up local energy management committees in every Nebraska community possible. The program is funded at the state level with general state revenues for special NEO projects.



Nebraska Community Energy Management Program

Building Blocks of Tomorrow

Neither energy information properly utilized nor efforts to make our cars and buildings more energy efficient will totally solve the energy riddles of tomorrow.

The first two sections of this 1982 annual report from the Nebraska Energy Office (NEO) dealt with energy information and energy efficiency programs. This section focuses on what is being done currently to deal with the vagaries of the future.

Traditional energy sources such as coal for the generation of electricity, petroleum and natural gas will continue as the bulk of Nebraska's energy supplies for the foreseeable future, but a growing realization exists that tomorrow's energy mix will be different from today.

The alterations will take the form and direction dictated by the dimensions that people explore along with the limitations of technology and economic realities.

This section details some of those dimensions and directions, the legislation in force in Nebraska to pave the way, energy emergency planning, economic realities in the form of the NEO's budget, and the people at the NEO involved in building on the past to secure the future.

Alternate Energy

Research and development projects in the field of alternate energy sources are under way at all levels of government, in the academies of public and private institutions of higher education, and throughout the private sector.

At the state government level in Nebraska, the NEO is the lead agency for projects dealing with alcohol fuels in the biomass area, geothermal, solar, wind and similar unconventional energy sources.

The NEO spearheads some of these alternate energy programs. It acts as an information clearinghouse on various renewable and other alternative energy projects underway in Nebraska and elsewhere.

Biomass

The primary thrust of the NEO biomass development program during 1982 related to Nebraska's Independence Day Alternate Fuels Classic road rally, a 150-mile event designed to test the fuel efficiency of competing vehicles in two categories.

The categories were spark ignition and compression ignition, the equivalent of gasoline and diesel engines, respectively. Only non-petroleum based fuels were allowed.

The Classic was conceived to provide a competitive arena for experimental vehicles and various non-fossil fuels, to offer a forum to those espousing use of alter-

nate fuels and to gather technical information on the converted vehicles and the fuels used in the event.

A road rally to test the energy efficiency of such vehicles and fuels was the culmination of work at the NEO to determine the biomass potential in liquid fuels, a logical investigation for energy-conscious Nebraskans living in the midst of the grain belt.

Nebraska government has long pioneered such work in an effort to find growing markets for the bountiful grain supplies grown in the state and region. The NEO, with the advent of the 1980s, joined in this continuing effort by mounting coordinated projects to compile and publish a Nebraska Biomass Study and to convert a Ford Pinto into an experimental ethanol car.

The Nebraska Agricultural Resource Base Assessment, known informally as the Nebraska Biomass Study, determined that sufficient grain and other alcohol-producing sources exist in the state to support a growing ethanol industry.

The experimental Pinto provided the NEO with technological data on conversion of a stock automobile to run on an alcohol fuel. The next logical step was the Classic.

The competition on the Fourth of July drew some 30 entries from 16 states, with seven entered in the compression ignition class and the rest in the spark ignition field.

The bulk of the Classic expenses were handled through funding provided by a Chevron legal settlement and the entry fees, which insured the Nebraska taxpayer bore minimal expense though the NEO sponsored and hosted the event.

The NEO's experimental vehicle acted as one of the "pace" cars for the event, which covered a course from Lincoln to Aurora and back.

The winner in the spark ignition class was a 1966 Chevrolet station wagon engineered and driven by Dan Kunau of Simla, Colorado. The car ran on 200 proof ethanol and featured a unique heat exchanger device that helped boost energy efficiency.

The winner in the compression ignition class was a 1982 Oldsmobile engineered by Robert Strassburger of the University of Michigan and driven by Dan Cleary. It ran on a combination of ethanol, soybean oil and castor oil.

Most entries ran on ethanol or an ethanol-based blend, but other fuels represented ranged from methane and methanol to lard and sunflower oil.

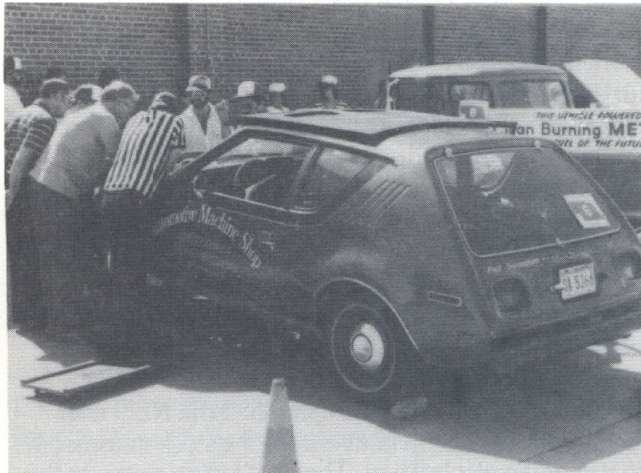
Winners were selected on the basis of energy efficiency using a formula that involved the British Thermal Unit contents of the fuel, the weight of the vehicle and the distance traveled.

Even though mileage wasn't used as the determining factor in selecting winners, there were some notable performances in that regard.

In the spark ignition class, a vehicle engineered by Bud Parsons of the Parsons Energy Research Group in Belvidere, New Jersey, did the course at 38.1 miles per gallon on ethanol.

In compression ignition, vehicles engineered by Frank Polowy of Kewanee, Illinois, and by Walter "Bob" Kruse of Freedom Synthetic Oil Corporation in New Kensington, Pennsylvania, topped 60 miles per gallon. Each ran on ethanol blends.

A technical assessment of entries in the Classic is being printed for distribution in 1983.



Alternate Fuels Classic judges and participants survey the engine of a "lard" burning vehicle entered in the Nebraska Energy Office's 150 mile, Independence Day road rally.

Geothermal

Nebraska government moved during 1982 toward exploration of the geothermal potential in the western part of the state.

The NEO drafted and completed after public hearings geothermal guidelines that are aimed at providing a framework for the grant process the Unicameral and the Thone administration fashioned to promote geothermal pilot projects.

The legislation provided \$100,000 in State Oil and Gas Severance Tax funds annually for geothermal project grants in Nebraska.

Interest in the Nebraska Panhandle prompted the NEO to hold a public hearing on the guidelines in Scottsbluff. A second hearing was held at the State Capitol in Lincoln.

By the end of 1982, the guidelines had cleared the hearing process and had won approval from the office of the Attorney General. The NEO stood prepared to take geothermal grant applications.

The University of Nebraska-Lincoln has developed temperature logs from thousands of wells to prepare estimates of the geothermal potential in western Nebraska.

The university mounted a cooperative effort between the Lincoln and Omaha campuses over the past three years to finish the task. It culminated in 1982 with publication of the first Nebraska geothermal resource map.

Temperature ranges of underground water in the western part of the state were from 112 to 190 degrees Fahrenheit, with the highest temperatures in the Panhandle.

Solar

Efforts to provide Nebraskans with the latest state-of-the-art information on solar highlighted NEO solar programs during 1982.

A coordinated effort was mounted during 1981 and 1982 to reach Nebraskans with information on solar, especially passive solar housing. That program continues into 1983.

In conjunction with the Passive Solar Test Facility at the University of Nebraska-Omaha and Solar Energy Associates, Ltd., of Omaha, the NEO published *PATH TO PASSIVE: Nebraska's Passive Solar Primer*.

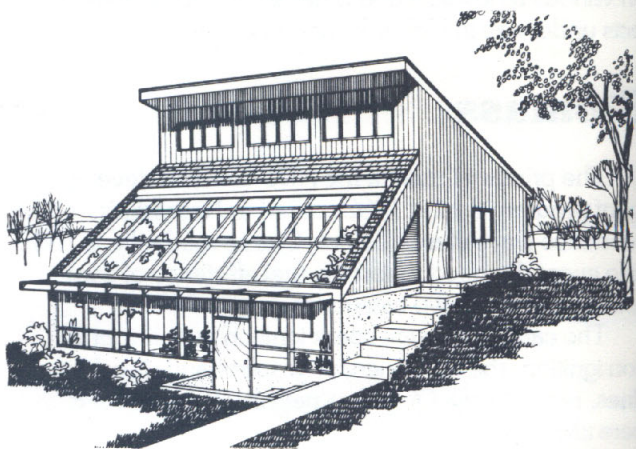
The manual, a 270-page document covering Nebraska-specific information on passive solar housing, was the resource guide for a series of workshops held throughout Nebraska in late 1981 and early 1982. Those six workshops for builders, contractors and the general public were held in Lincoln, Norfolk, Kearney, Scottsbluff and Omaha, with two in the latter city.

The NEO's initial printing of the publication was 1,600 documents. Due to widespread demand for the manual a second printing of 1,000 manuals was completed and of the 2,600 total, nearly 2,000 had been distributed by the end of 1982.

Demand for the Primer remained relatively constant despite the NEO's \$6.50 charge for each to defray cost of printing and handling.

Success in this effort and growing interest regarding solar matters among the public led the NEO to initiate budgeted staff time to answer solar questions. This also coincided with a changeover of the Nebraska Solar Office to the UNL Solar Office and an end to the formal ties between the university office and the NEO.

In 1983, the NEO plans to continue solar work by holding 11 solar workshops on solar agriculture buildings. Operating in conjunction with an existing solar demonstration project of the University of Nebraska-



*The Moran residence in Auburn, Nebraska, is one of the examples of passive solar housing showcased in *The Path to Passive: Nebraska's Passive Solar Primer*. (Illustration by Solar Energy Associates, Inc.)*

Lincoln, workshops were scheduled on dairy, beef and swine solar facilities.

In addition, the NEO plans during 1983 to publish case studies of passive and active solar residential structures and domestic solar hot water heating systems in Nebraska.

inally, 1983 plans in the solar area call for the NEO to hold ten workshops on solar retrofit for existing structures, covering passive, active and domestic hot water potential for residential and small commercial users.

Wind

A statewide wind assessment began in Nebraska during 1981. It produced preliminary wind velocity data throughout 1982.

The wind assessment program is a cooperative effort of the NEO, Western Area Power Administration (WAPA), Nebraska Rural Electric Power Association and various public power districts.

The participating districts are Cornhusker, Cuming County, Custer, Dawson, KBR Rural, McCook, Northwest, Omaha (OPPD), Roosevelt, Seward County, Southwest and Twin Valleys; the Midwest, Niobrara Valley and Panhandle Rural Electric Membership Corporations, and the Wyrulec Company.

Twenty anemometers were sited by the end of 1981. A few delays occurred and it wasn't until the end of June in 1982 that all sites had operational anemom-

eters. The accompanying map indicates the locations of the sites.

During the first quarter of 1982, the Kearney site recorded the highest average wind speed at 11.34 miles per hour (mph). However, most of the sites weren't operational for the entire first quarter. In the second quarter, the Hyannis site recorded the highest average wind velocity of the sites reporting. It recorded 14.05 mph. The site east of Palisade recorded lowest average wind speed for the quarter at 9.59 mph.

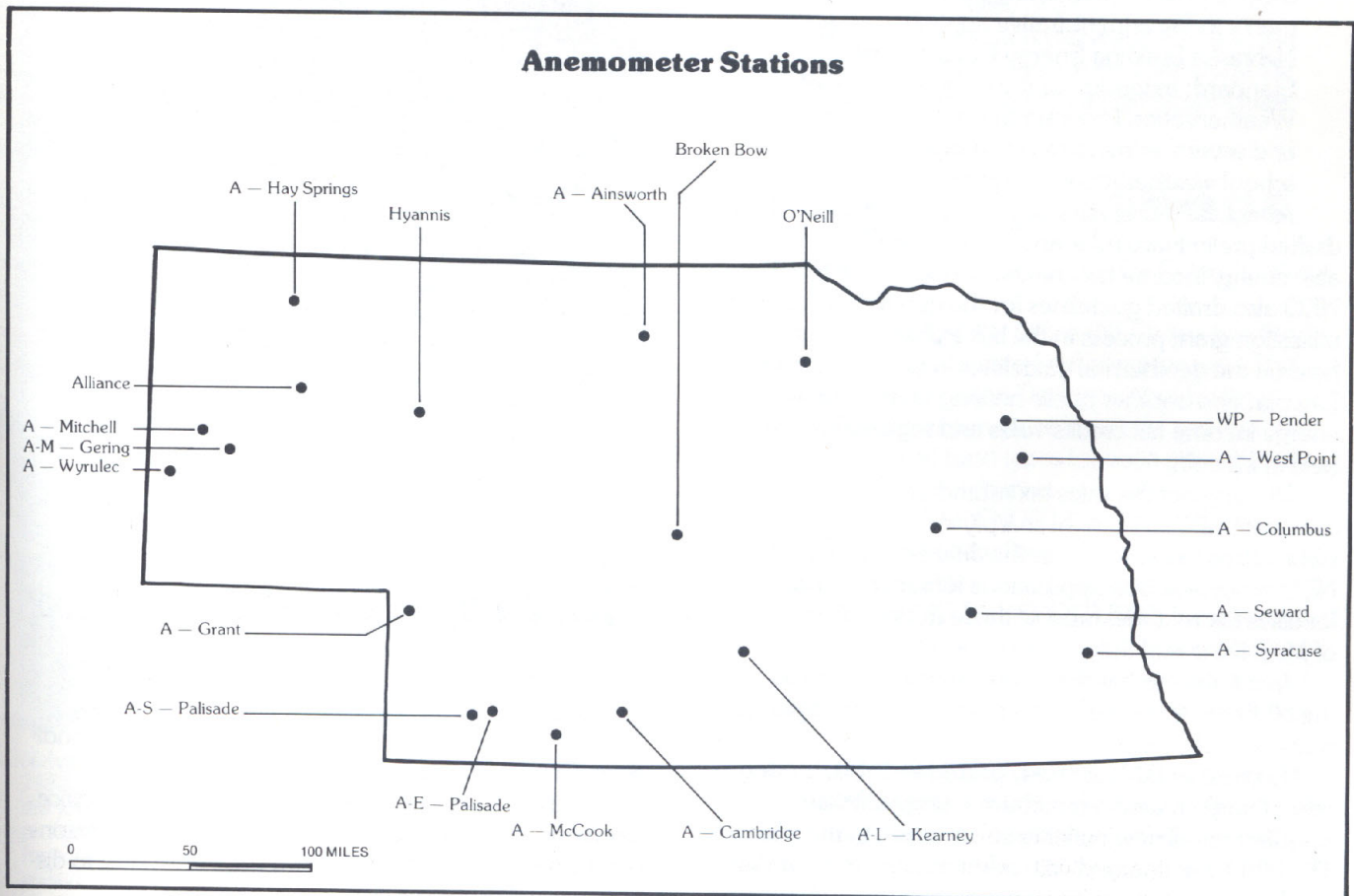
The site south of Stegel recorded the highest average wind speed for the third quarter with 11.19 mph, while the site east of Palisade recorded the lowest wind velocity of that quarter, registering 6.47 mph.

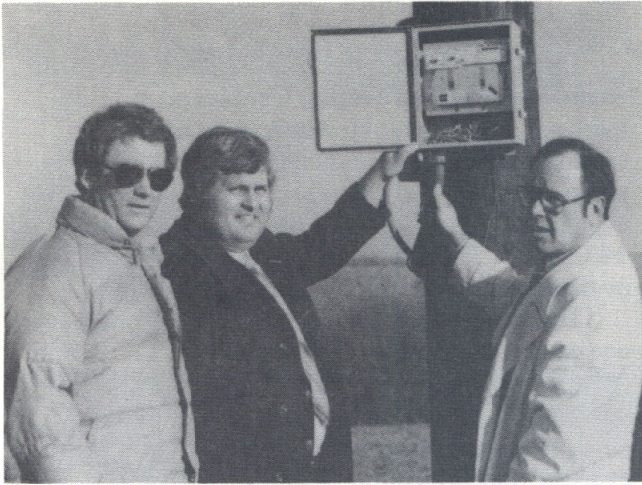
Data covering the fourth quarter of 1982 won't be available until late February or March of 1983.

Preliminary analysis indicates the average wind velocity is generally lowest in the southeastern section of Nebraska and that wind speed is higher in the northwest. In addition, it appears the wind blows strongest in the spring and is weakest in summer. The preliminary data also indicates wind in Nebraska blows stronger during the day than it does at night.

A full year of wind velocity data is expected by mid-1983. At least one year of data is required for any meaningful analysis of whether wind velocity is sufficient to produce power in a manner that makes economic sense.

Generally speaking, a 12 mph wind speed or greater is required on average to sustain electric power production in an economical manner.





Seward County Rural Public Power District officials and Nebraska Energy Office Deputy Director check the anemometer site device that records wind speed east of Seward.

Legislation

Nebraska's Unicameral Legislature during 1982 passed the third major piece of energy legislation in as many years. Legislative Bill (LB) 799 contained various provisions, including:

Income tax credits to individuals and corporations for installation of renewable energy systems; geothermal energy utilization grants to political subdivisions; repeal of sales tax refund and property tax exemption incentives for purchasers of renewable energy systems; amendments to the administrative apparatus of the Nebraska Building Energy Conservation Standard; extension of the Nebraska School Weatherization Program through mid-1986, and several administrative changes in the school weatherization program.

After LB799 became law July 16, 1982, the NEO drafted preliminary rules and regulations for the renewable energy income tax credits outlined in the bill. The NEO also drafted guidelines for the geothermal energy utilization grant process in the bill. Public hearings were held on the geothermal guidelines in Scottsbluff and Lincoln, and another public hearing on the renewable energy income tax credits' rules and regulations was held in Lincoln.

Phasing out the sales tax refund program in compliance with LB799 brought sharply increased activity as Nebraskans rushed to meet the July 16 deadline. The NEO processed 305 applications for facility approval for sales tax refunds, most of those during the months of May, June and July.

In addition to handling new directives from LB799, the NEO continued handling mandates from legislation passed in prior years.

Legislative Bill (LB) 954, passed in 1980, among other things created a minimum energy efficiency standard for all new building construction in the state. The NEO was charged with administering the standard.

Local jurisdictions have been encouraged by the

NEO to adopt an energy efficiency standard equivalent to the state standard, thus retaining local jurisdictional control. In 1982, the NEO processed more than 1,000 building energy certification forms.

In addition, the NEO continued with a host of programs designed to comply with the general mandate provided the agency by the Unicameral Legislature. Objectives and goals of the NEO as outlined in legislation are:

Serve as or assist in developing and coordinating a central repository within state government for the collection of data on energy; to undertake a continuing assessment of trends in the availability, consumption and development of all forms of energy;

To collect and analyze data relating to present and future demands and resources for all sources of energy and specify energy needs for the state; to recommend to the Governor and the Legislature energy policies and conservation measures for the state and to carry out such measures as are adopted;

To provide for public dissemination of appropriate information on energy, energy sources, and energy conservation; to accept, expend or dispense funds, public or private, made available to it for research studies, demonstration projects, or other activities which are related to either energy conservation or development;

To study the impact and relationship of state energy policies to national and regional energy policies (and) engage in such activities as will reasonably assure that the state of Nebraska and its citizens receive an equitable share of energy supplies, including the administration of any federal or state mandated energy allocation programs;

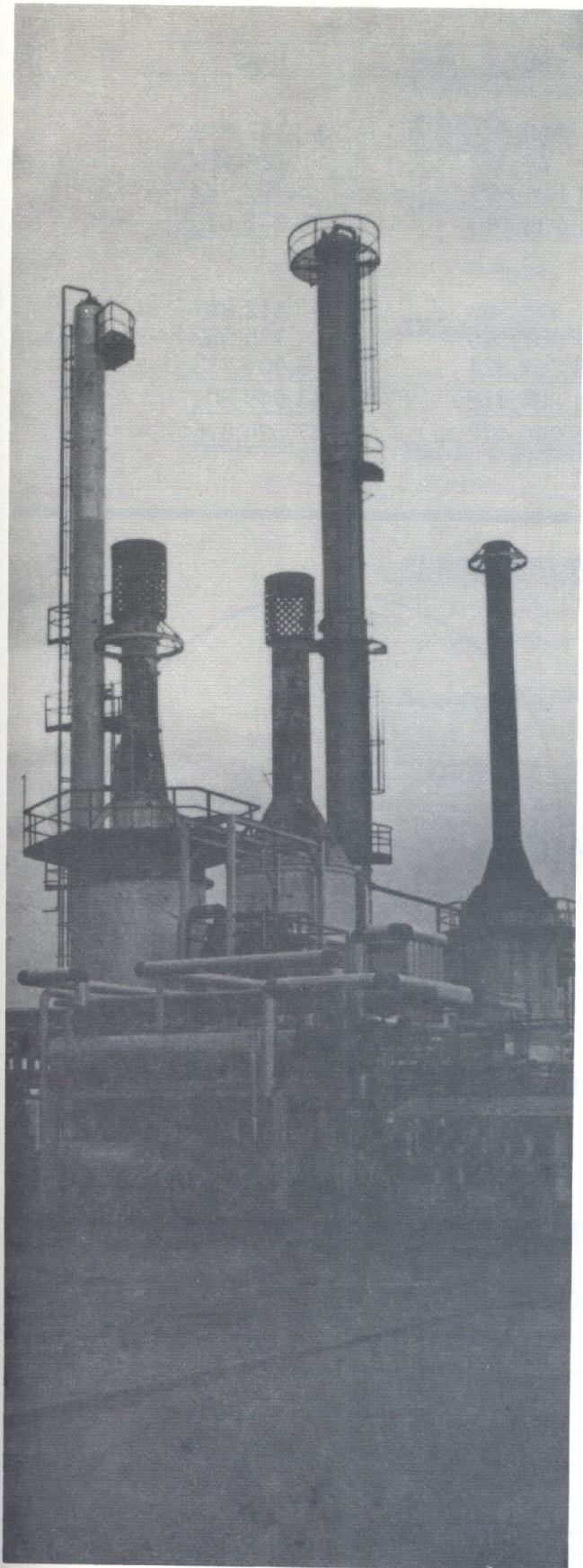
To actively seek the advice of the citizens of Nebraska regarding energy policies and programs; to prepare emergency allocation plans suggesting to the Governor actions to be taken in the event of serious shortages of energy;

To design a state program for conservation of energy; to provide technical assistance to local subdivisions of government, and to provide technical assistance to private persons desiring information on energy conservation techniques and the use of renewable energy technologies.

Emergency Planning

Energy emergency preparedness questions prompted the NEO to take the regional lead during 1982 in determining how to cope with changing conditions on the national and international scenes.

At the invitation of the NEO director, energy office directors and their energy emergency planning personnel from seven states met for two days in August to discuss mutual problems.



Nebraska's only oil refinery, located at Scottsbluff, closed during 1982 due to economics of scale. Larger refineries were handling the job and smaller refineries across the nation were closing, probably permanently. Such events must be taken into account for accurate emergency planning and analysis of product availability.

On hand to answer national and international questions were two representatives from the U.S. Department of Energy. The questions they fielded dealt for the most part with operation of the federal Strategic Petroleum Reserve and with the international oil supply situation.

Energy officials from Nebraska, Iowa, Missouri, Kansas, Colorado, Wyoming and South Dakota were told the world petroleum situation appeared relatively stable until at least 1985, barring escalation of the Mideast conflict or some other trigger to a major supply disruption.

They were also provided details on workings of the Strategic Petroleum Reserve, discussed at length problems of emergency planning held in common by the states represented, and set up among their offices a communications network to deal with energy emergencies in a cooperative fashion.

In Nebraska during 1982, the summer and winter Energy Emergency Plans were updated with new federal legislation on the subject taken into consideration for the winter 1982-83 plan.

The federal Energy Emergency Preparedness Act, passed by Congress and signed by the President in August, had the following impact:

It required the U.S. Department of Energy (DOE) to prepare and submit a drawdown plan for the Strategic Petroleum Reserve; required the President to review and report to Congress on his statutory authority in an energy emergency; required DOE to review and examine the possibility of establishing regional petroleum reserves, and required DOE and the U.S. Department of Agriculture to examine the feasibility of establishing a strategic alcohol fuels reserve.

Budget Operations

A Comparison of Expenditures for Calendar Years 1981 and 1982.

The Nebraska Energy Office (NEO) has two funding sources, the state and federal governments. The major federal source is the Department of Energy.

The following expenditure breakout and comparison, by sources and fund types for each calendar year, is broken into three categories:

1) SALARY EXPENDITURES include total costs for wages and fringe benefits (social security, state retirement program, health and life insurance).

2) OPERATING EXPENDITURES include total cost for operating expenses such as postage, printing, data processing, building rent, utilities, consultants, office supplies, travel expenses and capital outlay equipment.

3) CONTRACT EXPENDITURES include total cost for contracts with outside sources such as community action agencies, Nebraska Inter-Tribal Development Corporation, the University of Nebraska, and Nebraska public schools.

Table 6. NEO Expenditures

Description:	1981	1982
State Monies:		
Salary Expenditures	\$ 168,409	\$ 347,733
Operating Expenditures	42,332	124,420
Contract Expenditures	<u>1,024,699</u>	<u>3,102,922**</u>
SUB-TOTAL	<u>\$1,235,440</u>	<u>\$3,575,075</u>
Federal Monies:		
Salary Expenditures	\$ 573,803	\$ 412,831
Operating Expenditures	361,345	135,557
Contract Expenditures	<u>3,869,824</u>	<u>3,401,413</u>
SUB-TOTAL	<u>\$4,804,972</u>	<u>\$3,949,801</u>
TOTALS	<u>\$6,040,412</u>	<u>\$7,524,876*</u>

Table 7. Disbursements Picture

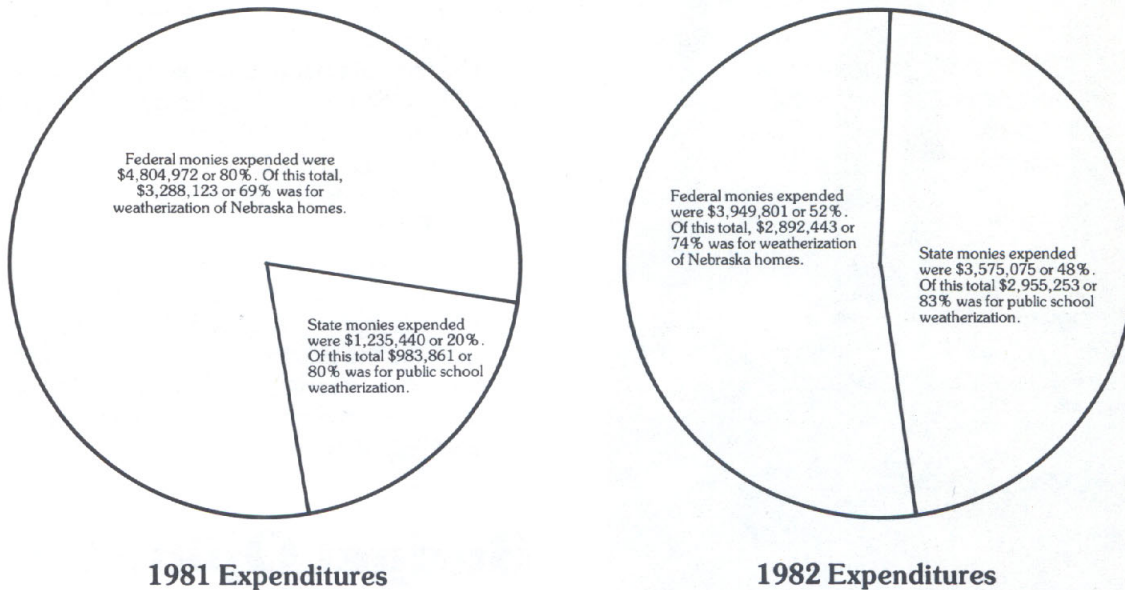


Table 8. NEO Funds

Description:	1981	1982
State Fund Types:		
General Fund	\$ 193,335	\$ 152,491
Cash Fund	1,036,382	3,372,303**
Other Funds	<u>5,723</u>	<u>50,281</u>
SUBTOTAL	<u>\$1,235,440</u>	<u>\$3,575,075</u>
Federal Fund	<u>\$4,804,972</u>	<u>\$3,949,801</u>
SUBTOTAL	<u>\$4,804,972</u>	<u>\$3,949,801</u>
TOTALS	<u>\$6,040,412</u>	<u>\$7,524,876*</u>

*December 1982 expenditures are estimated.

**Of this total \$2,955,253 was for the weatherization of public schools.

Nebraska Energy Office Employees

Director

V. B. Balok

Deputy Director

Leo Scherer

Public Information Officer

John Barrette

Intragovernmental Coordinator

Ann Brockhoff

Accounting / Personnel Division

Division Manager: Michael Wolverton
Auditor: Robert Poehler
Personnel Assistant: Barbara Rowen
Accounting Clerk/Sr.: Joyce Rempe
Office Clerk: Debbie Thomas

Secretarial Division

Administrative Secretary: Peggy Gochnour
Word Processing Specialist: Mary Ely
Secretary I: Barbara Miller
Receptionist: Claire Royal

Conservation Division

Division Manager: Larry Riegel
Transportation/Alcohol Fuels Coordinator: Robert Leavitt

Commercial / Industrial Division

Division Manager: Gary Nystedt
Conservation Coordinator: Brad Cummings

Institutions Division

Division Manager: Daniel Berlowitz
Assistant Manager: Janice Knight
Program Supervisor: Shane Myers
Lincoln-based Conservation Coordinators:
 Sim Gurewitz
 James Wiseman
Omaha-based Conservation Coordinator:
 Adelay Idler
North Platte-based Conservation Coordinator:
 Jeffrey Morgan

Extension Division

Division Manager: Gary Lay
Energy Conservation Administrator: Leonard Pewthers
Office Clerk: Gordon Ayers
Auto Efficiency Experts:
Michael Robertson
David Skomer
Energy Data Section:
Statistical Analyst II: Nikolai Rudakov
Statistical Analyst I: Betty Badberg

Interagency Division:

Division Manager: David Glaze
Technical Adviser: Kirk Conger
Interagency Program Administrator: Peter Davis
Grand Island-based Weatherization Specialist: David Harris

Student Interns:

Hugh McDermott
Tom Rolfes
Barbara Boerner
Susan Rocker

Virginia "Cuz" Johnson
Greg Dunn
Denise Vosicky



Transitional Building Blocks

Programs stressing energy information, conservation and efficiency, or research and development require a solid underpinning of energy data at the Nebraska Energy Office (NEO).

The three previous sections of this 1982 annual report of NEO activities covered information, conservation and future energy directions.

This final part provides a glimpse at the data, in tabular and graphic forms, required by the Unicameral Legislature.

Data from recent years also provides the base which highlights current shifts in the energy scene and from which potential future changes can be gleaned.

An integral part of this capability at the NEO is the computerized energy demand model, a tool for analyzing the present and future of energy matters based on statistics gathered since energy problems began developing a decade ago.

The following represents an overview of the world, national, regional and Nebraska energy pictures using the tools of technicians—numbers and computer-generated graphics.

General Energy Supply

A statistical overview of energy supplies available in the United States is of critical importance to a state such as Nebraska, an agricultural area that must import most of the fossil fuels that make up the bulk of its energy mix.

An ongoing picture of the energy supply situation at all levels is a key to spotting potential supply and price fluctuations that can impact heavily on the Nebraska economy and the well-being of the state's citizens.

Both the public and private sectors of the economy in Nebraska are affected by shifting energy realities and dynamics that relate to matters beyond the state's borders.

For those reasons, the initial table in this section deals with national energy trends. In table 9, details of the energy situation through July of 1982 are shown.

Production for the first half of 1982 was up more than four percent, with all categories but natural gas registering increases compared with the like period in 1981.

Consumption for the initial six months of 1982 was down slightly, with decreases recorded in the three major fossil fuels of petroleum, natural gas and coal. All other fuels were up significantly in consumption.

The most dramatic shift was in the area of net imports. For the first half of 1982, net energy imports dropped by almost one-third and petroleum imports dropped nearly one-quarter.

Table 9. National Energy Summary (Quadrillion (10¹⁵) Btu)

	July			Cumulative January through July				
	1982	1981	Percent Change	1982		1981		
				Daily Rate	1981	Daily Rate	Percent Change ¹	
Total Production	5.174	5.611	-7.8	38.320	0.181	36.793	0.174	+4.1
Petroleum ²	1.740	1.716	+1.4	11.921	0.056	11.863	0.056	+0.5
Natural Gas	1.529	1.664	-8.1	11.077	0.052	11.716	0.055	-5.5
Coal	1.338	1.711	-21.8	11.506	0.054	9.842	0.046	+16.9
Other ³	0.568	0.520	+9.3	3.816	0.018	3.372	0.016	+13.2
Total Consumption	5.739	6.073	-5.5	42.431	0.200	43.555	0.205	-2.6
Petroleum ⁴	2.509	2.664	-5.8	17.910	0.084	18.878	0.089	-5.1
Natural Gas	1.231	1.386	-11.2	11.370	0.054	11.848	0.056	-4.0
Coal	1.414	1.483	-4.7	9.212	0.043	9.327	0.044	-1.2
Other ⁵	0.585	0.540	+8.3	3.940	0.019	3.501	0.017	+12.5
Net Imports	0.743	0.744	0.0	4.010	0.019	5.975	0.028	-32.9
Petroleum ⁶	0.901	0.942	-4.3	5.068	0.024	6.739	0.032	-24.8
Natural Gas	0.063	0.062	+1.6	0.547	0.003	0.495	0.002	+10.5
Coal ⁷	(0.239)	(0.281)	(-15.1)	(1.729)	(0.008)	(1.388)	(0.007)	(+24.6)
Other ⁸	0.017	0.020	-16.9	0.124	0.001	0.129	0.001	-3.8

- 1 Based on daily rates.
- 2 Includes crude oil, lease condensate, and natural gas plant liquids.
- 3 Includes hydroelectric, nuclear, and geothermal power and electricity produced from wood and waste.
- 4 Includes refined petroleum products and natural gas plant liquids.
- 5 Includes hydroelectric, nuclear, and geothermal power, electricity produced from wood and waste, and net imports of electricity and coal coke.
- 6 Includes crude oil, lease condensate, refined petroleum products, unfinished oils, natural gasoline, plant condensate, and imports of crude oil for the Strategic Petroleum Reserve.
- 7 Parentheses indicate exports are greater than imports.
- 8 Includes net imports of electricity and coal coke.

NOTE: Totals may not equal sum of components due to independent rounding.
SOURCE: Monthly Energy Review.

National Oil Supply

Stocks of crude oil and petroleum products in the United States dropped from the average range early in 1982 and reached the "observed minimum" in May.

However, since then stocks of crude oil and petroleum products have climbed and near year's end had reached about half way between the observed minimum and the average range.

The Weekly Petroleum Status Report compiled by the Energy Information Administration of the U.S. Department of Energy explains "observed minimum" in this manner:

"Since the National Petroleum Council did not derive a minimum operating level for total petroleum stocks, the line labeled 'observed minimum' is based on the lowest inventory level observed during the same three-year base period that was used in the derivation of the average inventory levels. For crude oil, motor gasoline, distillate fuel oil, and residual fuel oil, the observed minimum and the minimum operating inventory are quite close."

Stocks of motor gasoline during 1982 also dipped below the average range and drew close in May to minimum operating inventory, but since then rebounded into the low end of the average range.

Stocks of distillate fuel oil in the United States were in the average range during the initial quarter of 1982, dipped out of that range and below the minimum operating level during the second quarter and recovered to a level half way between the average range and the minimum operating level as 1982 drew toward a close.

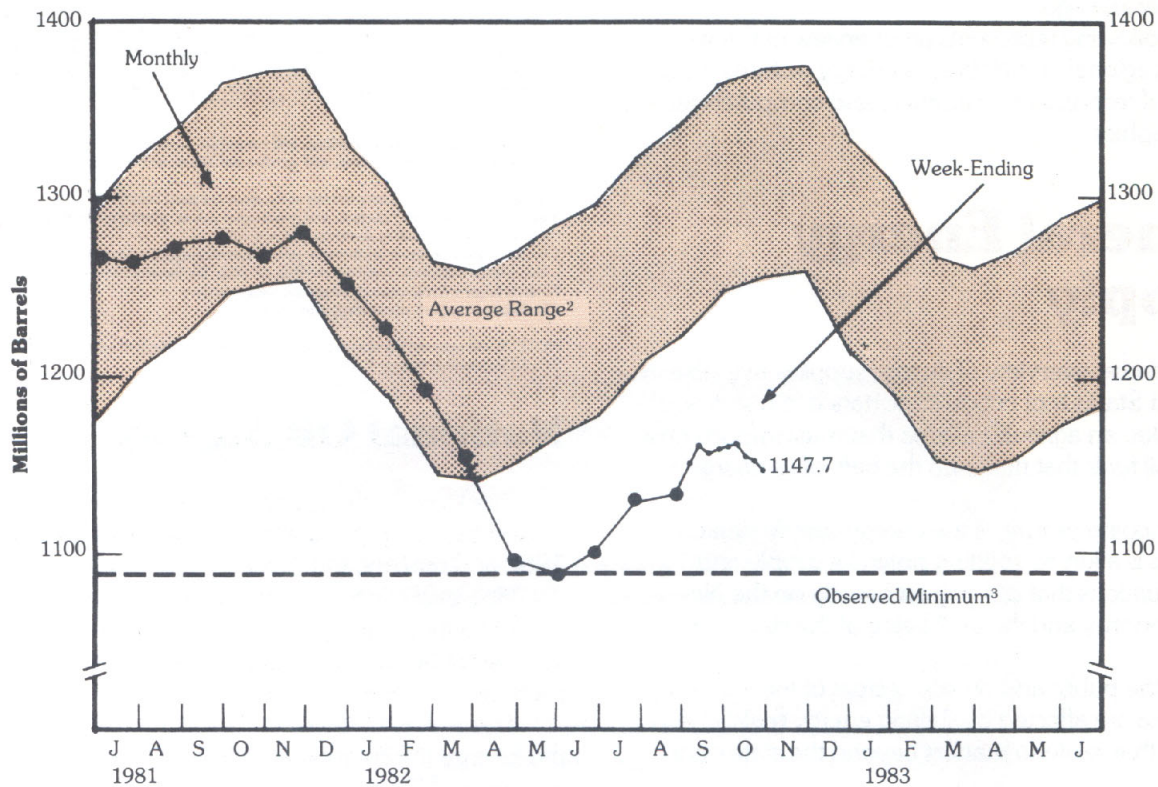
During the period when distillate fuel oil stocks were lagging, Nebraska experienced minimal impact as spot checks revealed occasional questions regarding

whether sufficient diesel fuel was on hand for farmers and others seeking supplies.

The temporary market tightening, however, resulted in no significant hardships. Supplies grew rapidly and a heavier-than-normal rainy spell during the planting season kept demand lower than usual during that period.

Despite the lower level of United States' stocks of crude oil and petroleum products, motor gasoline and distillate fuel oil during mid-1982—as reflected in tables 10, 11 and 12—Nebraska and the nation were considered in relatively safe positions regarding supply. The chief factor was adequate world supply and a shift away from over-reliance on oil from the Mideast.

Table 10. Stocks of Crude Oil¹ and Petroleum Products, U.S. Total (Millions of Barrels)



Source: Weekly Petroleum Status Report

¹ Excludes stocks held in the Strategic Petroleum Reserve and includes crude oil in transit to refineries.

² Average level, width of average range, and observed minimum are based on three years of monthly data: July 1979-June 1982. The seasonal pattern is based on seven years of monthly data: January 1975-December 1981. See Appendix B for further explanation.

³ The observed minimum for total stocks in the last three-year period, July 1979-June 1982, was 1088.4 million barrels. It occurred in May 1982. See Appendix B for further explanation.

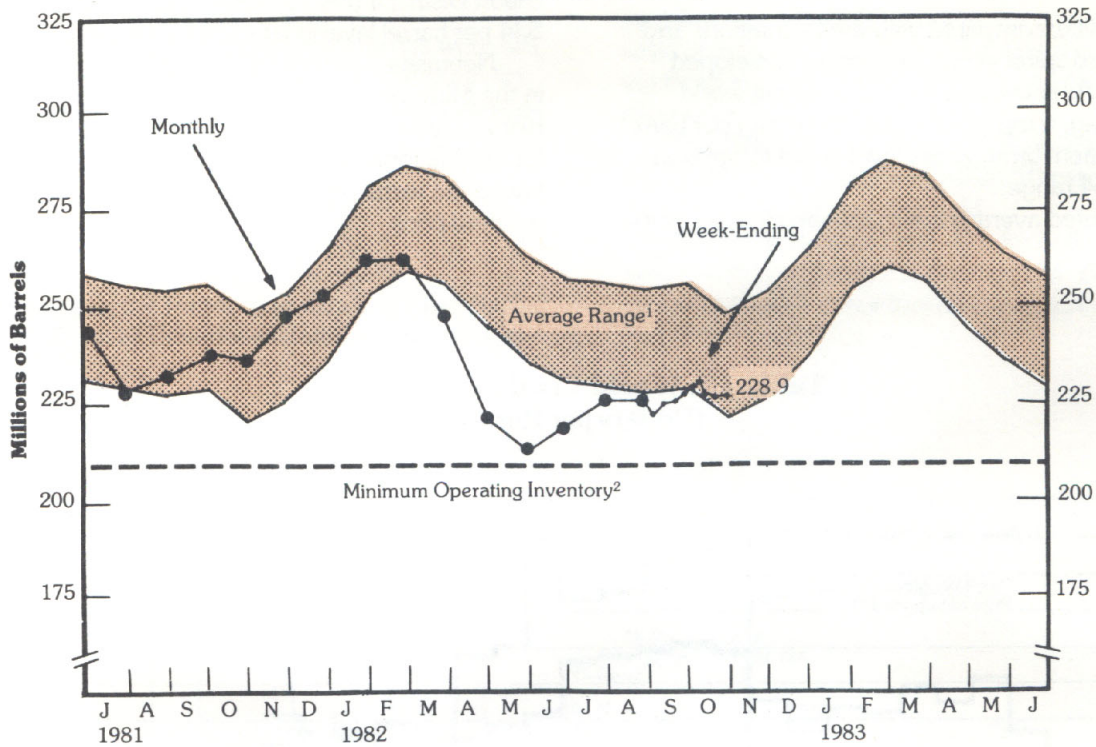
⁴ The National Petroleum Council defines the Minimum Operating Inventory as the minimum level required for routine operation. In their 1979 study, they defined this inventory level for crude oil to be 290 million barrels.

SOURCE: • Ranges and Seasonal Patterns: 1975-1980, EIA, "Petroleum Statement, Annual (Final Summary)," 1981, EIA, "Petroleum Supply Annual."

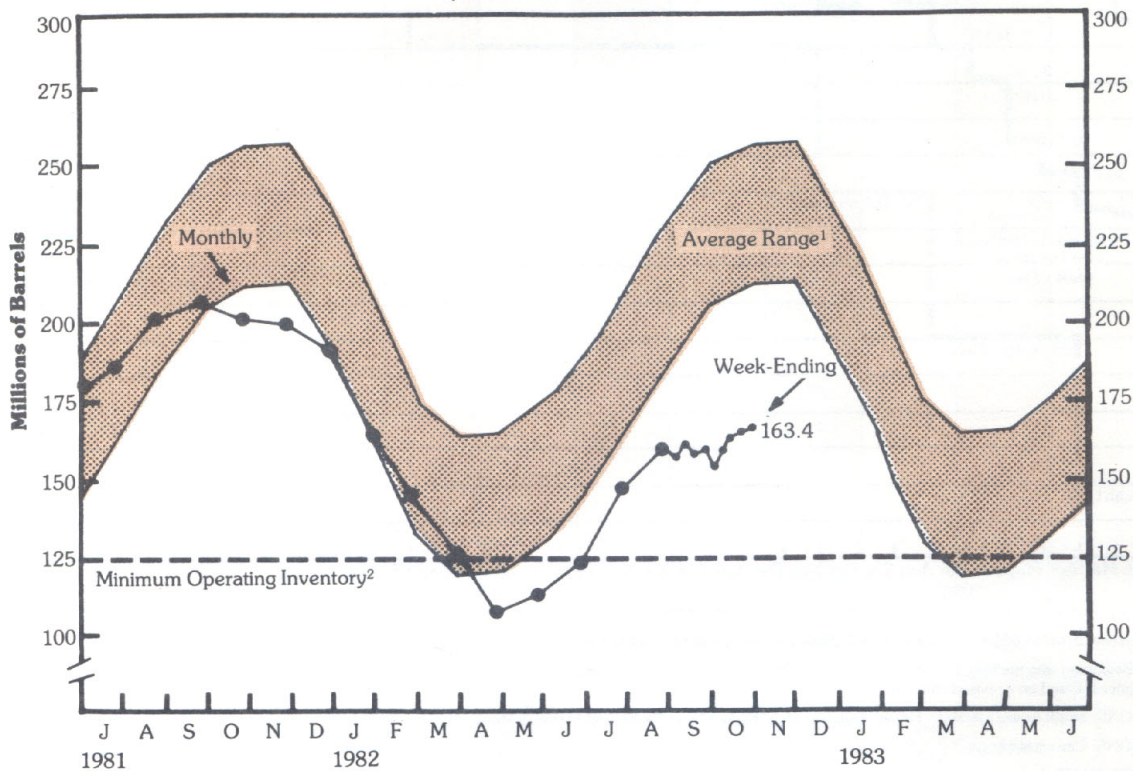
• Monthly data: 1981, EIA, "Petroleum Supply Annual," January-August 1982, EIA, "Petroleum Supply Monthly."

• September 3, 1982-Current Week: Estimates based on EIA weekly data.

**Table 11. Stocks of Motor Gasoline, U.S. Total
(Millions of Barrels)**



**Table 12. Stocks of Distillate Fuel Oil, U.S. Total
(Millions of Barrels)**



Source: Weekly Petroleum Status Report

¹ Average level and width of average range are based on three years of monthly data: July 1979-June 1982. The seasonal pattern is based on six years of monthly data: January 1975-December 1976 and January 1978-December 1981.

² The National Petroleum Council defines the Minimum Operating Inventory as the minimum level required for routine operation. In their 1979 study, they defined this inventory level for motor gasoline to be 210 million barrels and for distillates 125 million barrels.

SOURCE: • Range and Seasonal Patterns 1975-1980, EIA, "Petroleum Statement, Annual (Final Summary)," 1981, EIA, "Petroleum Supply Annual."

• Monthly Data: 1981, EIA, "Petroleum Supply Annual, January-August 1982, EIA, "Petroleum Supply Monthly."

• September 3, 1982-Current Week: Estimates based on EIA weekly data.

NOTE: Motor gasoline stocks are the sum of stocks of finished motor gasoline and stocks of motor gasoline blending components.

Price Stability

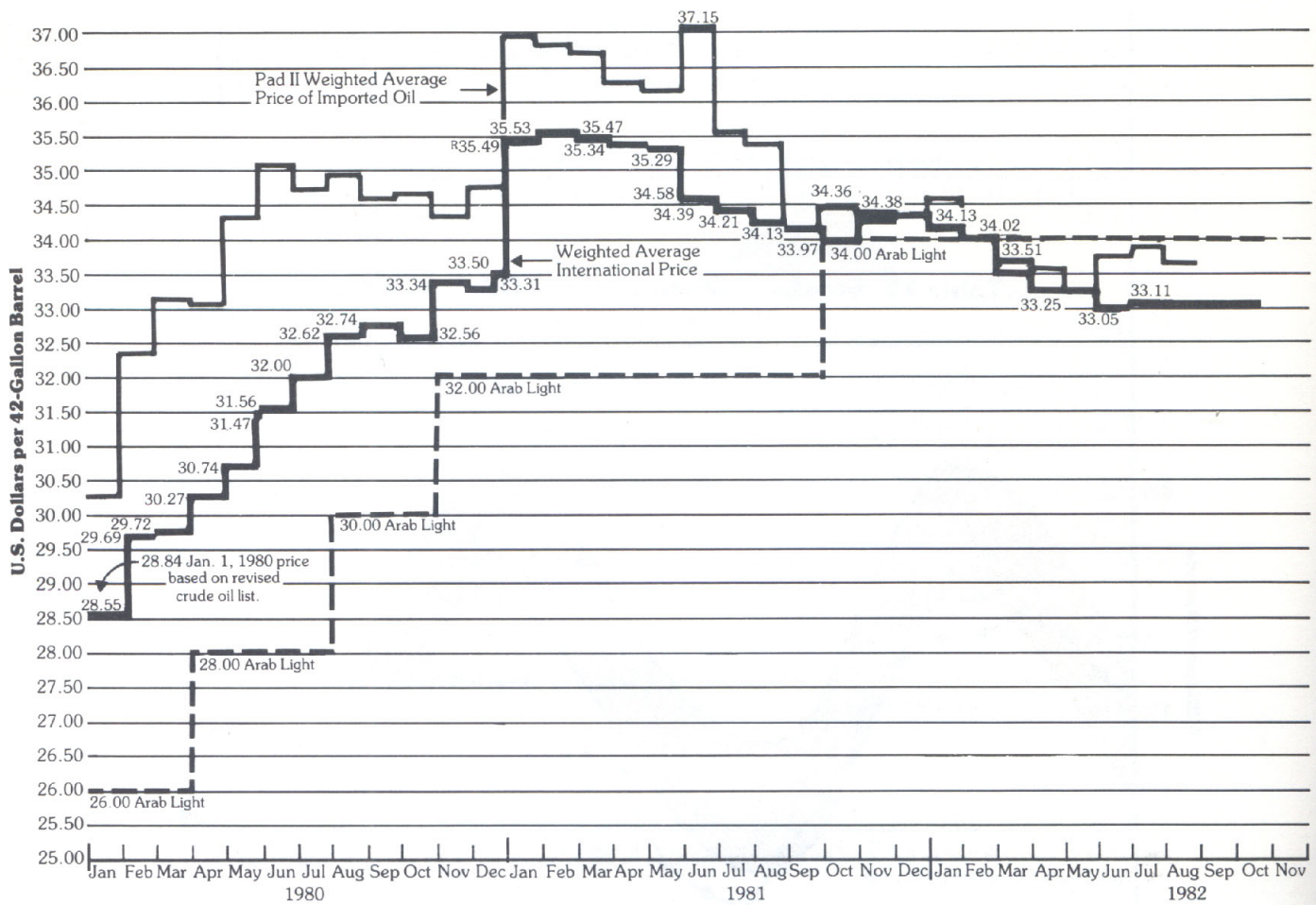
Price stability, compared with the fluctuations and general upward spiral in previous years, developed during 1982. As shown in table 13 covering world crude oil pricing, a top was reached in pricing per barrel and retrenchment brought the level down to approximately the \$34 range.

The weighted average international price, the price

for benchmark crude Arab Light, and the weighted average price of imported oil coming into Petroleum Allocation District II (PAD 2) reveal convergence near the \$34 per barrel level in late 1981 and throughout 1982.

Nebraska is part of PAD 2, which covers 15 states in the Midwest. The PAD 2 price was substantially higher during 1980 and much of 1981 than the prices for international and benchmark crude, though it followed the same pattern as the weighted average international price.

Table 13. World Crude Oil Prices¹
(Dollars per Barrel)



¹ Internationally traded oil only. Average price (FOB) weighted by estimated export volume.

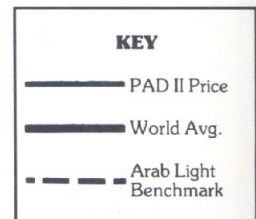
NOTE: Beginning with the May 1, 1981 issue of the Weekly Petroleum Status Report, the world crude oil price is based on a revised crude list.

ADDITIONS: Saudi Arabia's Arabian Heavy, Dubai's Fateh, Egypt's Suez Blend, and Mexico's Maya.

OMISSIONS: Canadian Heavy.

REPLACEMENTS: Iraq's Kirkuk Blend for Iraq's Basrah Light.

The above graph shows an estimated world crude oil price based on this revised list beginning January 1, 1982. An asterisk shows the January 1, 1980 price based on the revised list. All other 1980 prices represent the oil crude list before revisions.



Source: Weekly Petroleum Status Report

State Energy Supply

During 1982, Nebraska's energy supplies were similar to the national energy supply trends. Although this part of the section on data and graphics deals with supply, in some cases supply or delivery experience is virtually the same as the state's consumption.

Gasoline

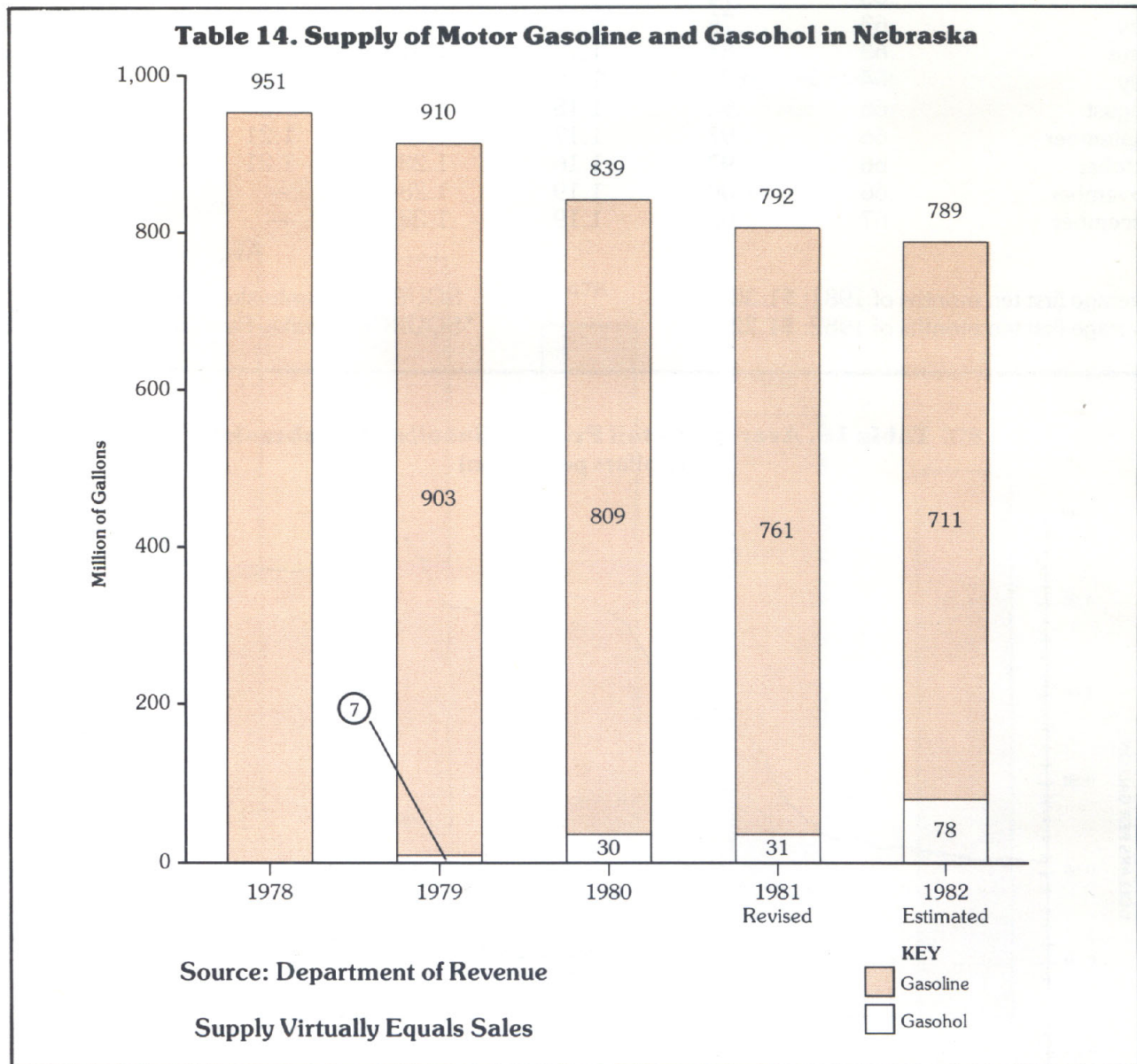
For example, the motor fuels data compiled by the state Department of Revenue is stated in terms of sup-

ply but represents virtual consumption.

As presented in table 14, the estimated supply of gasoline and gasohol represents the actual or estimated sales of those two products. The data shows an increasing trend in gasohol sales and a decreasing trend in gasoline sales.

The estimated figures for all of 1982 show gasohol has grown to comprise more than 10 percent of the amount of straight gasoline sold.

When the revised 1981 data for both these motor fuels is compared with the estimates for 1982, the decrease in overall motor fuel consumption amounts to only 3 million gallons.



The growing trend toward a tradeoff away from gasoline to gasohol is attributable to new marketing techniques for the fuel blend and to awareness among Nebraskans that it could eventually help the state's agricultural economy by providing another market for grain. Gasohol is 90 percent gasoline and 10 percent ethanol (grain alcohol).

The average retail price of gasoline in Nebraska

during 1982 opened in January at its highest level and then dipped to its lowest level of the year at the opening of the second quarter.

Fluctuating throughout the year, as shown in tables 15 and 16, the price for the first ten months of 1982 averaged approximately six percent lower than during the same period in 1981.

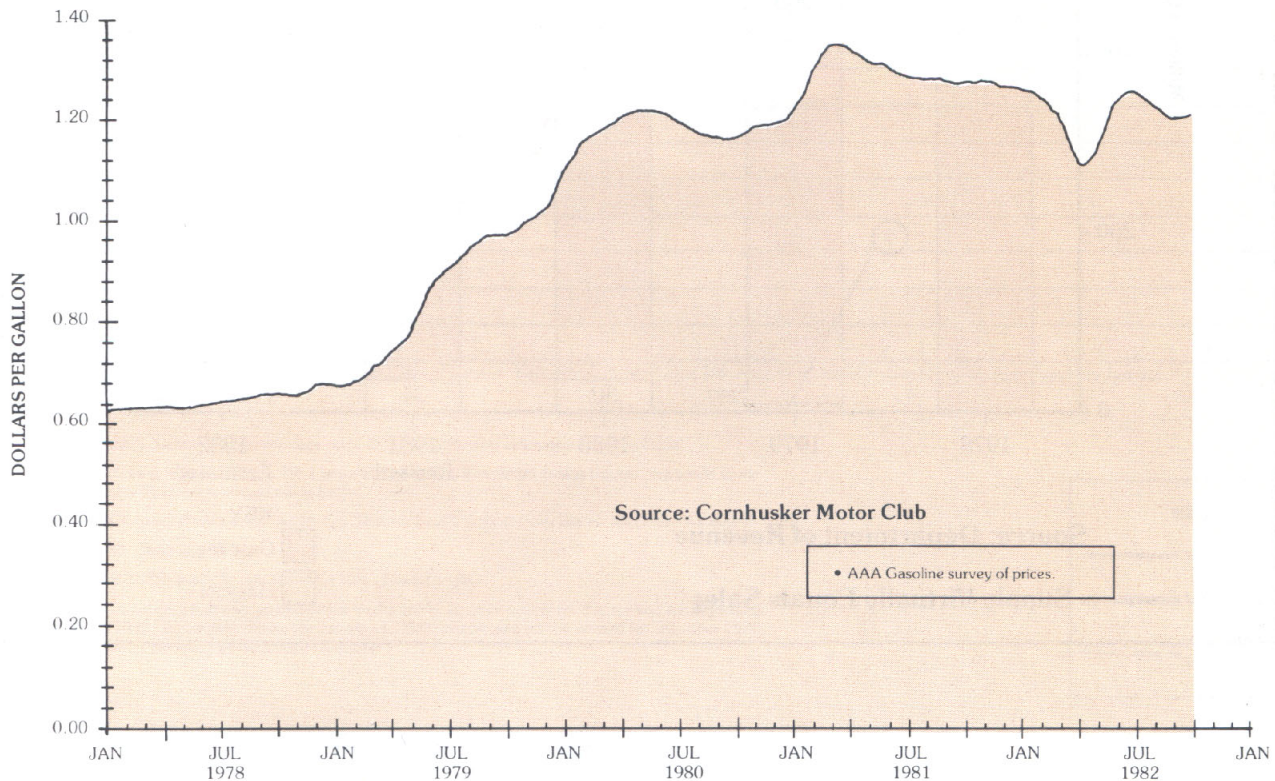
Table 15. Average Retail Price of Gasoline in Nebraska (Dollars per Gallon)

	1978	1979	1980	1981	1982	Percent of Previous Year
January	\$.63	\$.67	\$1.09*	\$1.21	\$1.27	105.0
February	.63	.68	1.15	1.28	1.26	98.4
March	.63	.71	1.18	1.35	1.22	90.4
April	.63	.74	1.21	1.35	1.12	83.0
May	.63	.79	1.22	1.32	1.14	86.4
June	.63	.87	1.22	1.31	1.23	93.9
July	.64	.90	1.20	1.29	1.26	97.7
August	.65	.94	1.18	1.29	1.24	96.1
September	.66	.97	1.17	1.28	1.21	94.5
October	.66	.97	1.16	1.28	1.21	94.5
November	.66	1.00	1.19	1.28	—	—
December	.67	1.02	1.19	1.28	—	—
					Average	93.8%

Average first ten months of 1981: \$1.30
 Average first ten months of 1982: \$1.22

SOURCE: Cornhusker Motor Club
 *SOURCE: Weekly Petroleum Status Report

Table 16. Average Retail Price of Gasoline in Nebraska (Dollars per Gallon)



Distillates

The trend in use of middle distillates in Nebraska continued downward in 1982. Middle distillate deliveries are virtually the same as the consumption level.

Nebraskans in 1978 reached their peak in consumption of the middle distillates, which include diesel, home heating oil, kerosene and similar fuels.

The 1979 consumption level in middle distillates was slightly better than the previous year. The 1980 consumption level represented even greater improvement and the 1981 experience proved even better.

The estimate of middle distillate use covering 1982 showed that Nebraskans likely would cut 39 million

more gallons, making it the fourth straight year for a drop in consumption.

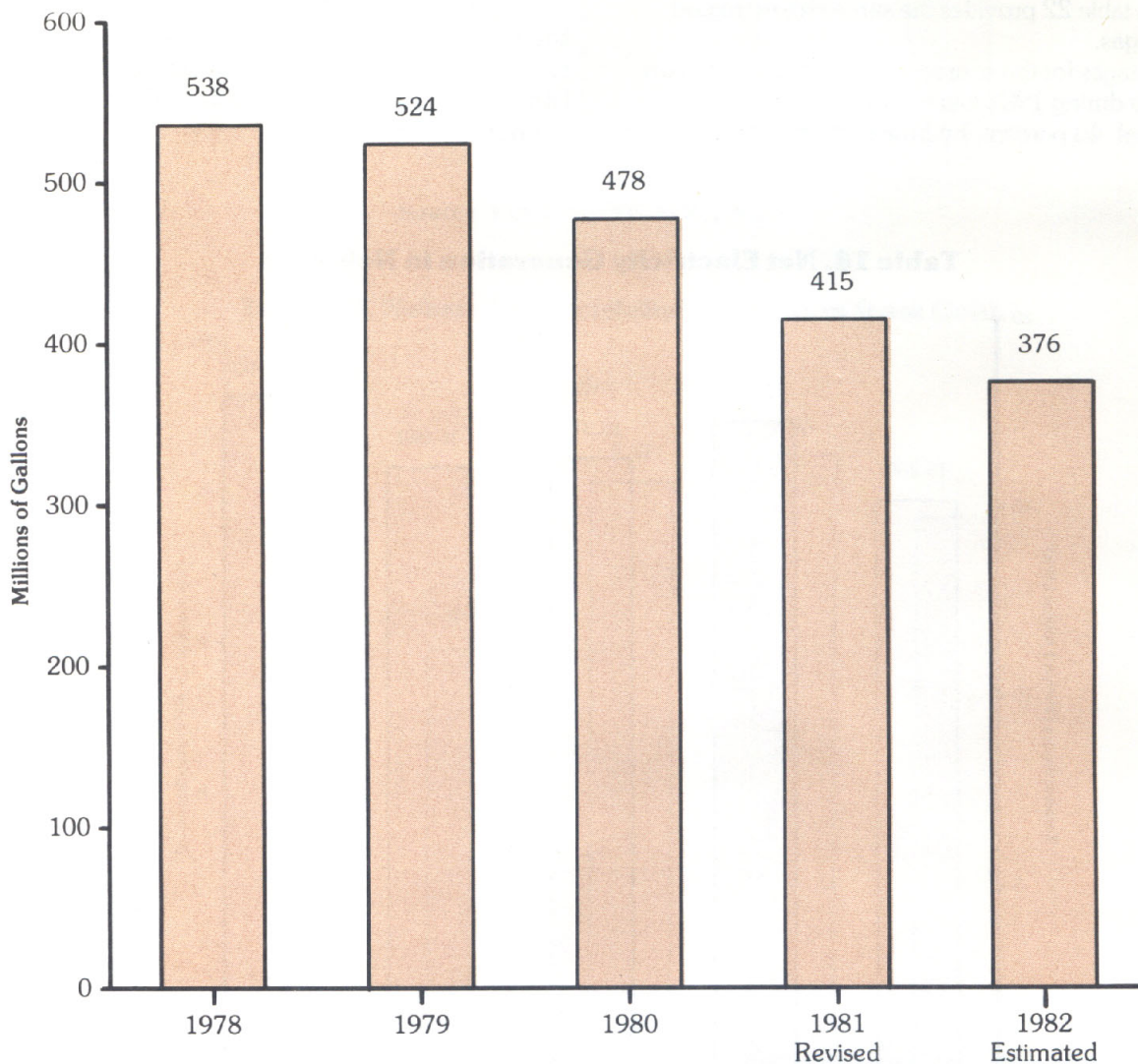
Since the 1978 peak of 538 million gallons, Nebraskans have recorded a drop in middle distillate consumption of more than 30 percent by reducing the level to 376 million gallons.

Research and statistical personnel at the NEO attributed the record to a combination of minimal economic activity, a greater awareness of energy efficiency and favorable weather conditions.

Despite the record, data personnel caution that such favorable weather conditions are unlikely to continue indefinitely and the room for further conservation gains is growing smaller each year.

The middle distillate experience in Nebraska is outlined in table 17.

Table 17. Middle Distillate Deliveries in Nebraska



Source: EIA-25 Reports

Electricity

Generation of electricity in Nebraska during 1982 retained its strong nuclear base. Nuclear accounted for approximately half of all electricity produced in the state for the second time in recent years.

As shown in table 18, net electricity generation in the state exceeded 17 terawatt-hours (17 billion kilowatt-hours) in 1979 and again in 1982. The 1982 figure is an estimate.

As shown in table 19, it was in 1979 and again in 1982 that approximately half the state's electricity production was attributable to nuclear plants.

In table 20, graphics show the use of coal to generate electricity decreased somewhat in 1982, compared with the two previous years. However, coal remained in second place and with the availability of plentiful supplies in nearby states is likely to hold that position in years to come.

Table 21 depicts the radical decreases in recent years of oil as a fuel source to generate electricity in the state, while table 22 provides the same picture regarding natural gas.

Percentages for the sources of electricity production in Nebraska during 1982 were as follows: nuclear, 50 percent; coal, 43 percent; hydroelectric, 6 percent; pe-

troleum and natural gas, less than one percent each.

Electricity sales to ultimate consumers showed very little increase during the first ten months of 1982 compared with the corresponding period of 1981.

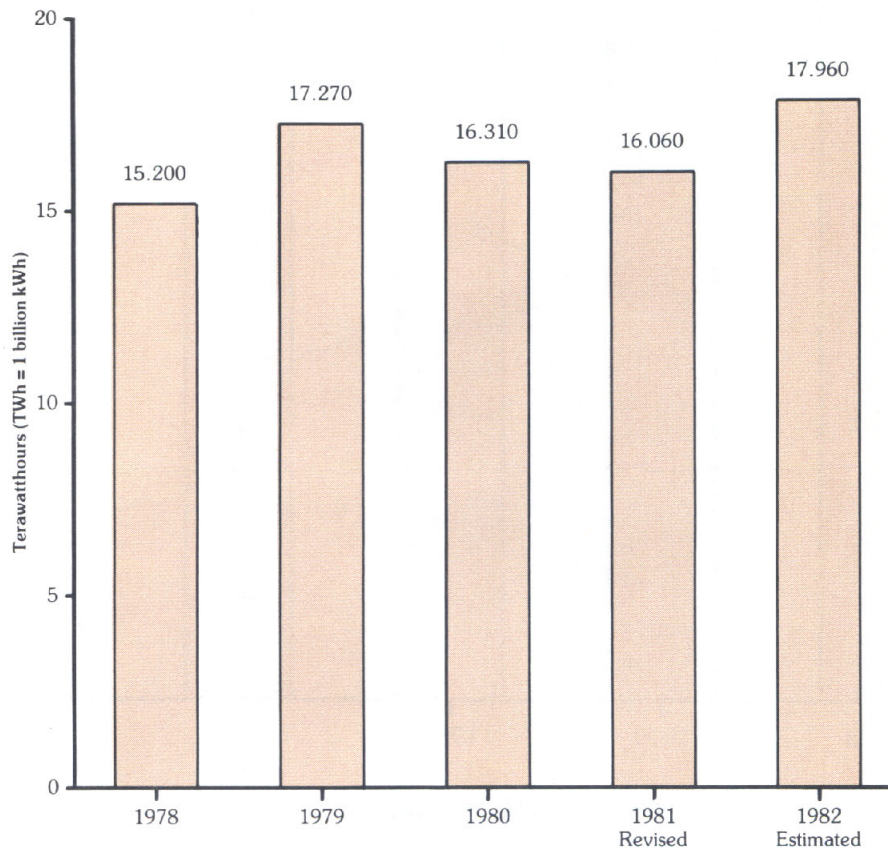
The apparent reasons were a low level of economic activity and favorable weather conditions. During the 1982 cooling season, 12 percent fewer cooling degree days were recorded. Summer consumption was substantially lower than in previous years. This was only partially compensated for by increased first quarter sales.

The National Weather Service expects Nebraska to have a cooler than normal winter. The weather outlook and the possibility of somewhat improved economic activity may point toward a substantial increase in electrical demand in Nebraska during 1983. The state's electric utilities are well prepared to meet the demand.

Sales of electricity to Nebraska's ultimate consumers are shown in table 23, which covers activity of the state's three major electrical suppliers—Nebraska Public Power District, Omaha Public Power District and Lincoln Electric System.

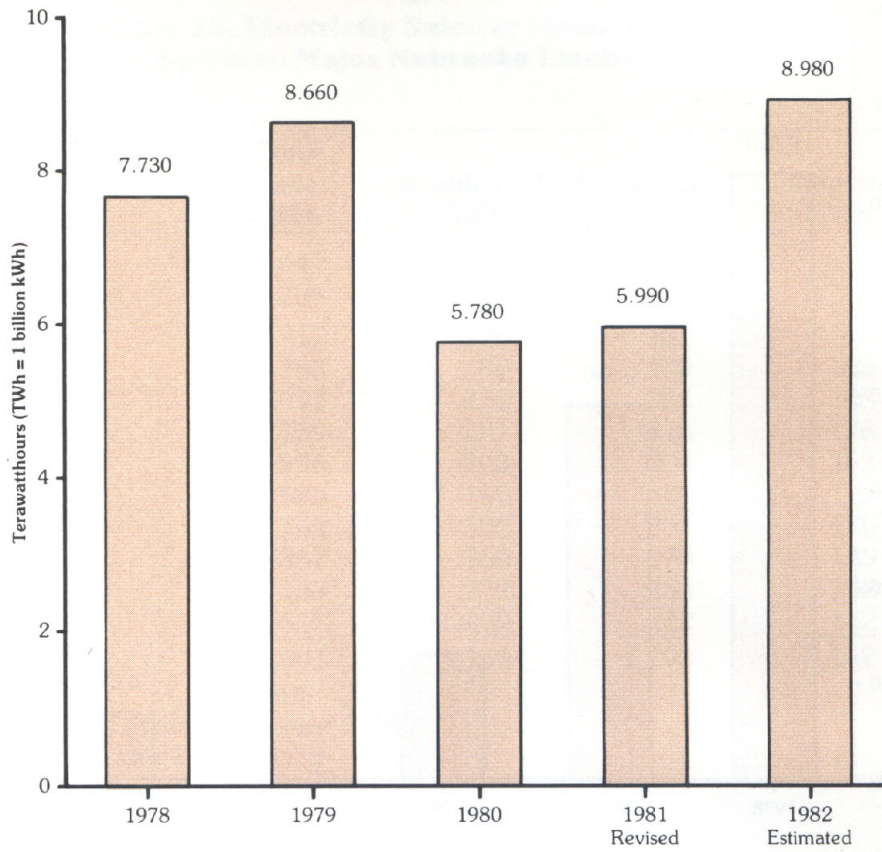
Electricity generation and the fuels used are outlined in table 24, which covers those facets of the Nebraska Public Power District, the Omaha Public Power District, the Lincoln Electric System, Grand Island and Fremont.

Table 18. Net Electricity Generation in Nebraska



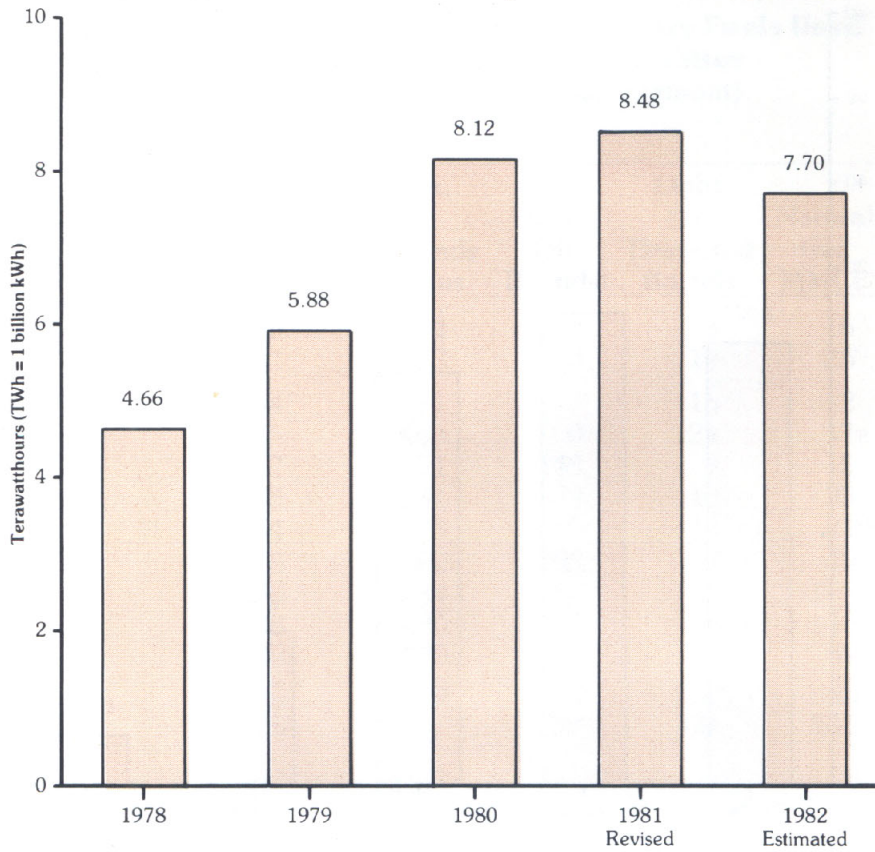
Source: EIA-759 (FPC-4) Reports

Table 19. Nebraska Nuclear Electricity Production



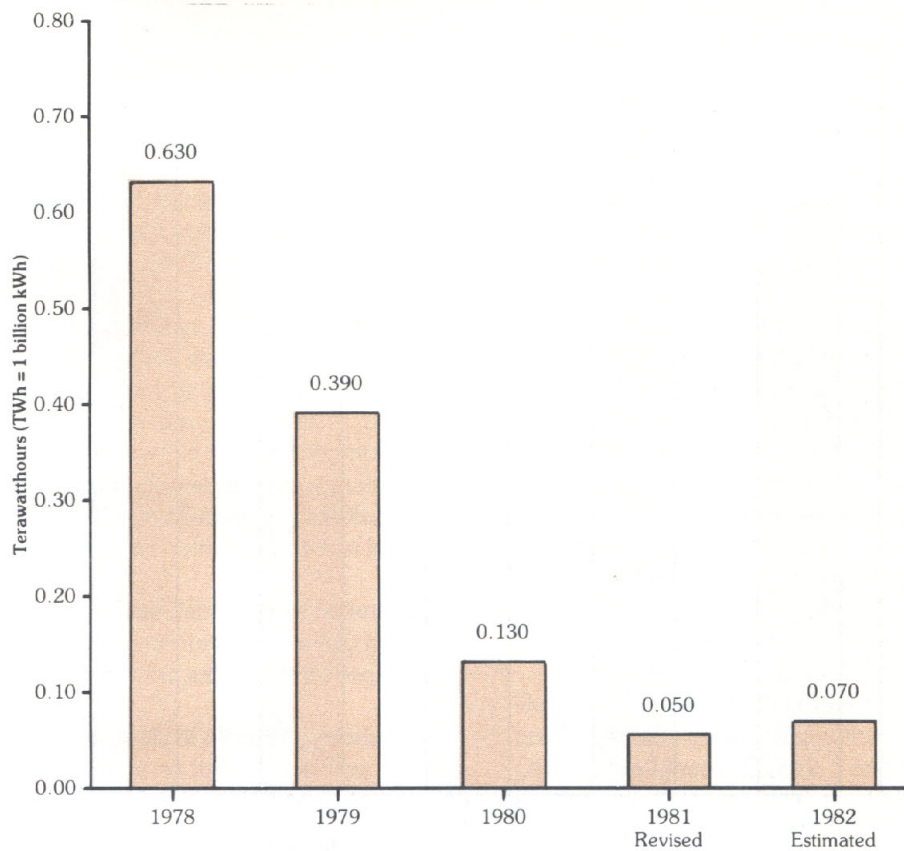
Source: EIA-759 (FPC-4) Reports

Table 20. Nebraska Electricity Production from Coal



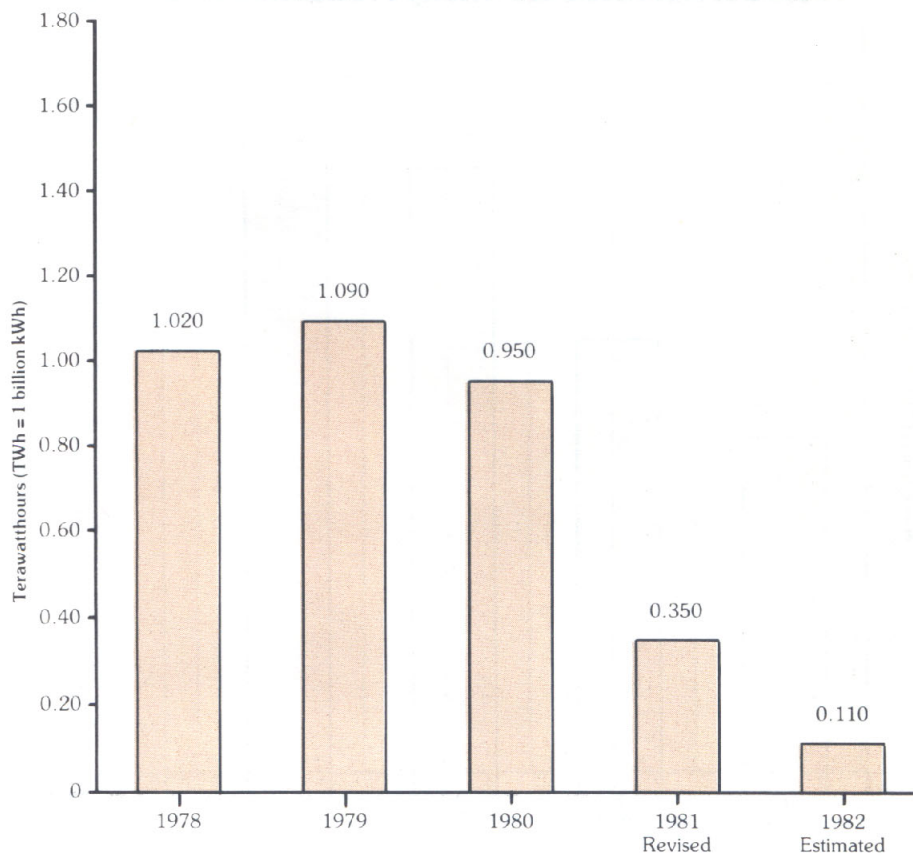
Source: EIA-759 (FPC-4) Reports

Table 21. Nebraska Electricity Production from Oil



Source: EIA-759 (FPC-4) Reports

Table 22. Nebraska Electricity Generation from Gas



Source: EIA-759 (FPC-4) Reports

**Table 23. Electricity Sales to Ultimate Consumers
by Three Major Nebraska Electric Utilities**

Year	Month	Total Sale GWh	Residential GWh	Commerical GWh	Industry GWh	Public Use GWh
1981	November	647	211	213	193	29
	December	704	269	234	172	30
1982	January	817	336	265	185	32
	February	763	309	239	185	30
	March	691	255	224	183	29
	April	709	231	214	176	29
	May	596	203	202	163	27
	June	593	190	205	172	26
	July	764	302	254	180	28
	August	852	360	273	189	31
	September	753	272	258	192	32
	October	612	200	212	172	28
	TOTAL	8,501	3,138	2,793	2,162	351

1 million kilowatthours = 1 gigawatthour = 1GWh
SOURCE: EIA-759 Reporting Forms

**Table 24. Electricity Generation and Primary Fuels Used
by Five Major Nebraska Electric Utilities
(OPPD, NPPD, LES, Grand Island, Fremont)**

Year	Month	Net Generation GWh*	Bitum. Coal Thousands Sh. Tons	Heavy Oil Barrels	Light Oil Thousand Barrels	Natural Gas MMCF	Generated by Nuclear Stations GWh*
1981	November	1,040	364	0	8	16	386
	December	1,371	433	43	12	25	642
1982	January	1,854	571	0	15	12	893
	February	1,575	463	0	24	17	783
	March	1,377	291	148	8	15	844
	April	1,283	231	39	10	33	846
	May	1,184	293	0	10	21	668
	June	975	382	38	7	13	340
	July	1,645	734	52	13	163	680
	August	1,728	520	0	6	115	820
	September	1,428	330	0	3	59	786
	October	1,312	355	0	5	56	700
	TOTAL	16,775	4,967	320	121	545	8,388

*1 million kilowatt hours = 1 gigawatthour = 1 GWH
SOURCE: EIA 759 Reporting Forms

Oil and Gas

Oil production was up during the opening three quarters of 1982, compared with the same nine months of 1981. More than 5.1 million barrels of oil were produced in Nebraska January-September of 1982, compared with fewer than 5 million for the same months of 1981.

However, the number of exploratory and development drilling permits issued in the state dropped, compared with the number issued during 1981.

The percentages, as revealed in table 25, are a 4 percent increase in oil production, a 32 percent drop in the number of exploratory drilling permits and a 52 percent decrease in the number of development drilling permits.

Nebraska natural gas consumption is contrasted in table 26 with the price in the United States for that product at the wellhead.

Consumption declines continued during 1982, as has been the case in recent years, as the price of natural gas at the wellhead has escalated.

Table 25. Nebraska Oil Production and Exploration

	Oil Production in Barrels				Drilling Permits							
	1980	1981	1982	**	Exploratory			Development				
					1980	1981	1982	**	1980	1981	1982	**
January	502,703	554,180	560,334	101	45	27	26	96	21	27	23	85
February	480,512	503,868	532,073	106	21	22	22	100	27	29	15	52
March	516,836	565,799	605,026	107	20	16	27	169	25	22	17	77
April	486,000	559,925	591,723	106	19	23	18	78	30	56	7	13
May	540,000	553,556	594,224	107	27	15	15	100	28	40	13	33
June	509,397	548,195	568,019	104	17	50	13	26	32	30	20	67
July	504,840	547,937	586,941	107	14	27	13	48	33	44	22	50
August	547,833	578,214	580,348	100	13	39	15	38	16	20	12	60
September	534,617	559,887	556,491	99	34	23	18	78	22	24	11	46
October	539,889	580,388	—	—	41	34	20	59	32	24	12	50
November	502,264	541,312	—	—	34	41	—	—	30	26	—	—
December	529,079	571,699	—	—	24	37	—	—	27	32	—	—
TOTALS	6,193,970	6,664,930	5,175,179	104	309	354	187	68	323	374	152	48
* Annual Summary	6,239,652	6,671,313	—	—	309	354	—	—	311	374	—	—

* Annual

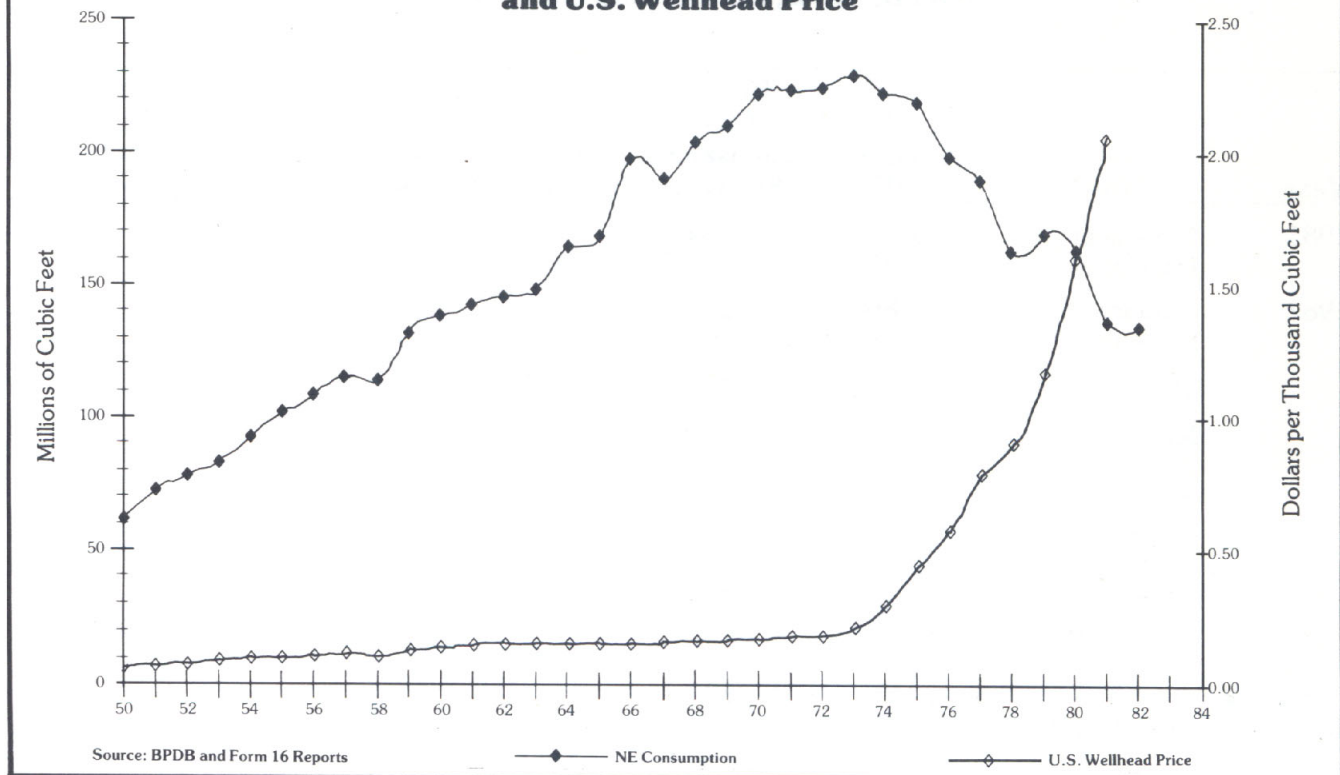
Summary

NOTES: * Annual summary data is compiled after corrections and is considered more reliable.

** Percent for corresponding period of previous year.

182F SOURCE: Nebraska Oil and Gas Conservation Commission

Table 26. Nebraska Natural Gas Consumption and U.S. Wellhead Price



Source: BPDB and Form 16 Reports

—◆— NE Consumption

—○— U.S. Wellhead Price

State Energy Consumption

Preliminary estimates of overall energy consumption in Nebraska during 1982 are outlined in table 27. The table shows the percentage of each fuel type used in the state, with natural gas remaining the fuel most used. However, the 25 percent share for natural gas was down slightly from 1980 and 1981 levels.

Coal, motor gasoline and nuclear were the next three most-used energy sources in the state, in that or-

der. Natural gas, coal, motor gasoline and nuclear accounted for approximately 85 percent of the state's energy consumption, according to the preliminary estimates of 1982 energy use.

In table 28, use of energy in the state is traced by fuel type and consuming sector for the past seven years. Final totals show preliminary 1982 figures are up compared with the revised 1981 figures, but still below levels recorded in every previous year but 1977.

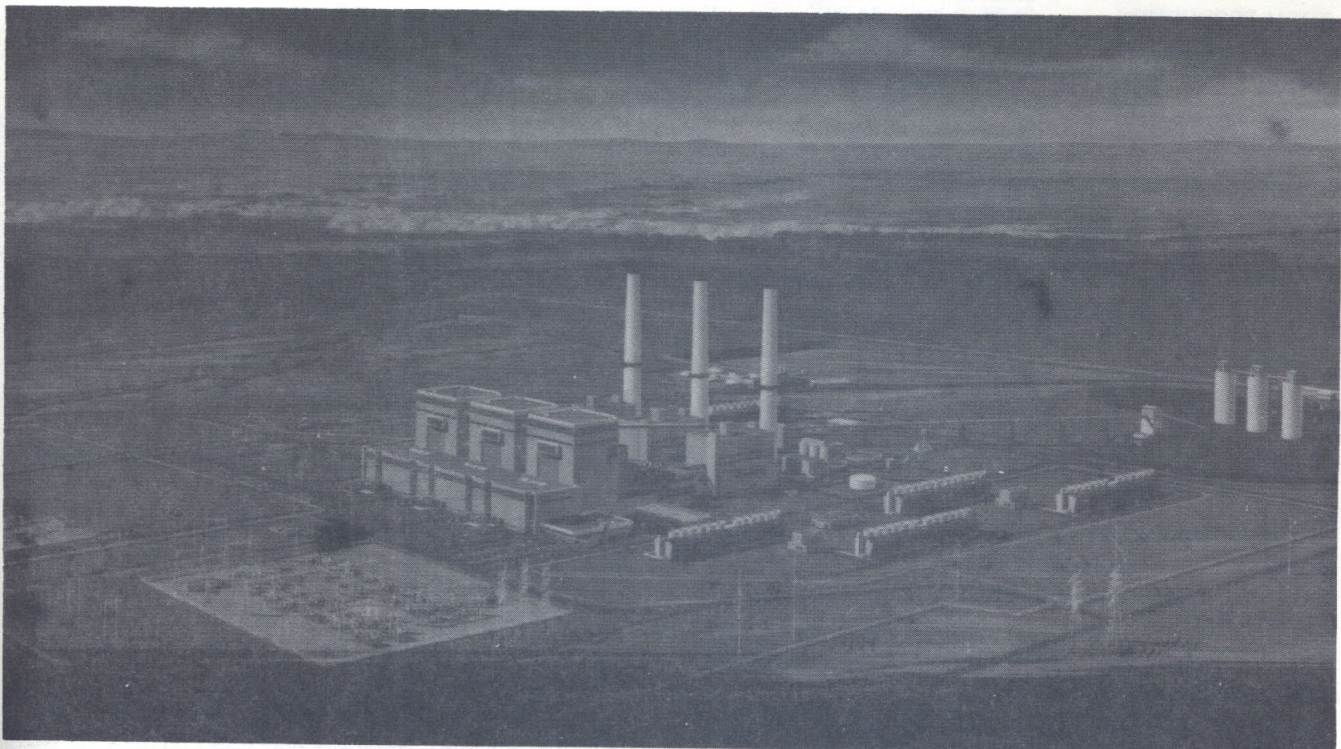
The 1982 preliminary data indicates Nebraskans used 533.8 trillion British thermal units (Btus) of energy, compared with 511.6 trillion Btus in 1981.

Table 27. Preliminary Estimates of 1982 Nebraska Energy Consumption by Fuel Type and Consuming Sector (Trillion = 10¹² Btu)

Fuel Type	Conversion Factor	Electric Utilities	Residential	Commerce	Industry	Agriculture	Transportation	Total	%
Coal	22.56 x 10 ⁶ Btu/t	114.3	—	0.4	6.9	—	—	121.6	22.8
Natural Gas	0.994 x 10 ⁶ Btu/mcf	2.4	58.1	33.6	30.3	9.8	—	134.2	25.1
Motor Gasoline	0.12495 x 10 ⁶ Btu/gal	—	—	—	—	4.4	94.2	98.6	18.5
Aviation Fuel	0.1334 x 10 ⁶ Btu/gal	—	—	—	—	—	4.0	4.0	0.7
Propane, LP Gas	0.0955 x 10 ⁶ Btu/gal	—	4.1	2.7	1.2	8.2	—	16.2	3.0
Middle Distillates	0.1387 x 10 ⁶ Btu/gal	0.5	2.6	6.3	5.4	19.9	17.4	52.1	9.8
Nuclear	—	95.7	—	—	—	—	—	95.7	17.9
Hydro	—	11.4	—	—	—	—	—	11.4	2.1
Electricity Sales	3413 Btu/kWh	(45.7)	19.4	13.2	8.9	4.2	—	NA	—
TOTAL	—	178.6*	84.2	56.2	52.7	46.5	115.6	533.8	100.0
%	—	33.5	15.8	10.5	9.9	8.7	21.7	100.0	—

NOTES: Sum of components may not equal total due to independent rounding.
 In order to get physical units, divide the Btu by the corresponding conversion factor.
 *Generation and transmission losses equal total energy used for generation excluding electricity sales.

Nebraska Energy Office, December, 1982



Artist's rendering of the Laramie River Station in Wyoming, which provides electricity from the coal-fired unit to the Lincoln Electric System, areas in the Nebraska Panhandle and other regions among western states. (Photo courtesy of Lincoln Electric System.)

Table 28. Utilization of Energy in Nebraska

Source	1976	1977	1978	1979	1980	1981 (Revised)	1982 (Prelim.)
Natural Gas (billion cubic feet)							
Residential	53.4	52.9	48.2	53.5	60.0	61.5	60.8
Commercial	38.2	37.5	32.0	31.8	36.6	32.5	33.2
Industrial	58.8	60.4	51.2	50.1	35.5	32.4	30.0
Other (Agr.)	0.1	9.5	8.7	11.7	10.4	11.2	9.7
Electric Utility	17.4	15.6	12.8	14.0	11.7	5.2	1.3
TOTAL NATURAL GAS	168.0	175.9	152.9	161.1	154.2	142.8	135.0
Middle Distillates (million gallons)							
Aviation Fuel	37.6	42.8	46.0	42.4	41.1	34.3	30.3
No. 1 Fuel Oils	14.1	51.6	36.8	42.6	30.7	21.5	19.5
No. 2 Heating Oils	271.7	188.5	191.0	201.9	177.2	156.8	142.0
Diesel Fuel	155.2	294.2	309.9	316.2	270.4	236.5	214.3
TOTAL DISTILLATES	478.6	577.1	583.7	603.1	519.4	449.1	406.1
Propane (LPGas) (million gallons)							
Residential/Commercial	156.1	138.8	141.5	121.9	84.3	67.6	89.4
Internal Combustion	26.3	19.3	17.9	15.4	35.2	28.1	37.2
Industrial	18.3	25.9	19.9	17.2	7.5	9.5	12.5
Other	73.4	65.1	50.3	43.4	33.0	23.0	30.4
TOTAL PROPANE	274.1	249.1	229.6	197.9	160.0	128.2	169.5
Gasoline (million gallons)							
Agricultural	91.7	35.1	24.0	35.2	30.4	31.0	34.0
Transportation	828.6	899.3	927.2	868.1	808.3	761.5	754.5
TOTAL GASOLINE	920.3	934.4	951.2	903.4	839.0	792.5	788.5
Coal (million short tons)							
Commercial	—	0.03	0.01	0.01	—	0.016	0.019
Industrial	—	0.28	0.55	0.55	0.42	0.305	0.305
Electric Utility	—	1.82	2.90	3.46	5.05	4.995	5.068
TOTAL COAL	2.27	2.12	3.46	4.02	5.47	5.316	5.392
Electricity Production (GWh = million kWh)							
Hydrostations	1,276	1,221	1,187	1,246	1,335	1,197	1,096
Nuclear	5,824	7,452	7,725	8,658	5,783	5,990	8,980
Coal	3,919	4,493	4,664	6,027	8,123	8,481	7,705
Natural Gas	1,599	1,293	994	1,088	947	352	108
Petroleum	673	425	631	398	126	46	72
TOTAL PRODUCTION	13,291	14,884	15,201	17,417	16,314	16,065	17,960
Electric Sales to Ultimate Consumers (GWh = million kWh)							
—	—	12,404	13,339	13,357	13,708	13,331	13,384
Annual Energy (trillion = 10¹² Btu)							
507.7	547.9	560.3	571.8	540.1	511.6	533.8	

NOTES: When reporting data is not available, it is estimated using an appropriate method. Sum of components may not equal totals due to independent rounding.
Prepared by Nebraska Energy Office, December, 1982.

Energy Demand Model

Design and implementation of an energy demand model for the state was handled by the NEO in 1981 and 1982. This task was mandated by Legislative Bill 954 of 1980.

The model is intended to calculate and forecast energy use in Nebraska, depending on economic, weather and other conditions. Calculations can be done all together or separately for each sector of the state's economy.

Modelling efforts of this type consist of finding prevailing trends for all elements of energy use, developing linear regression equations, using forecasts of various research firms, or forecasting the independent variables in regression and other equations.

Chase Econometrics Associates, Inc., Evans Econometrics, Inc., and Energy Economics Research, Inc. are the main sources of forecasted variables for the NEO model. Attention was given to checking the statistical validity of regression equations and the operation of the model as a whole.

State-specific historical data is used whenever such data can be found. Regional and national data are used when state-specific data are unavailable.

These sector models are operational: agricultural, residential and transportation, manufacturing and commercial. These model sectors have been described in quarterly reports. The electric utility model is unfinished. It will be completed and the model will undergo further development and refinement in the future.

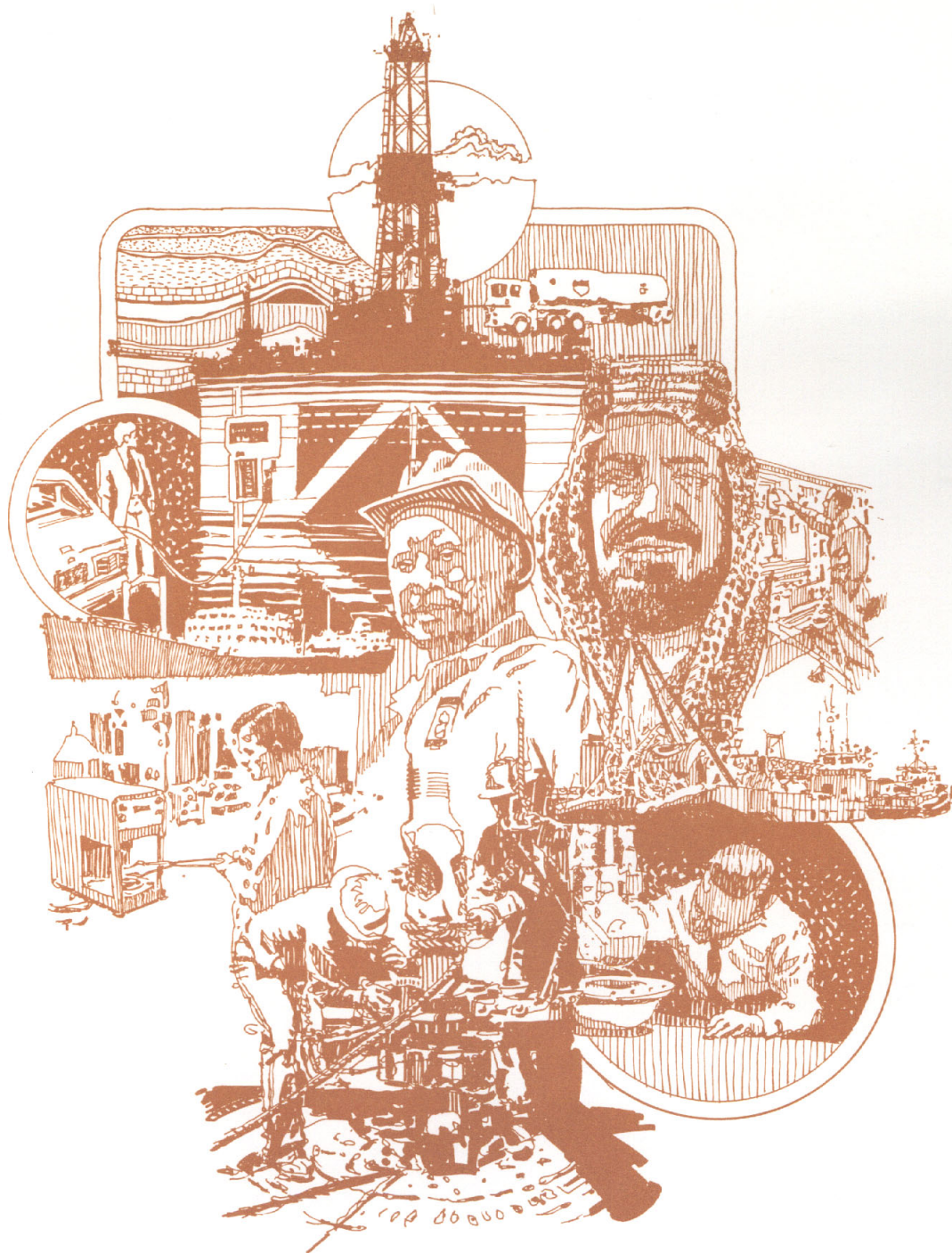
Sector models produce tables showing energy use in British thermal units (Btus) and physical units for six types of major fuels: natural gas, electricity, gasoline, middle distillates, propane and coal.

Energy use by each sector is further subdivided by end use, SIC code or in some other manner. The resi-

dential, agricultural, manufacturing and commercial models also have cost tables showing expenditures by fuel type and sector subdivision.

Many independent variables (conditions) can be changed before calculations are made in order to determine the energy use and cost under various sets of conditions. The calculated values can then be compared with similar values under any other set of conditions.

The model is a set of equations. It is a tool to compare different options. All output must be analyzed and interpreted. Expert judgment is required for new conditions to be entered and for interpretation of the model's output.





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Help Conserve the Good Life of Nebraska