

F I N A L R E P O R T
ENERGY EFFICIENCY STUDY COMMITTEE

Senator Patrick Deluhery, Co-chairperson
Representative Ralph Rosenberg, Co-chairperson

Submitted to the General Assembly
January 1990

Prepared by the Legislative Service Bureau

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AUTHORIZATION AND APPOINTMENT

The Energy Efficiency Interim Study Committee was established by the Legislative Council with the following charge:

"Study current energy efficiency efforts and the economic and environmental benefits of various energy efficiency measures. Make recommendations which encourage cooperative efforts by governmental units, utility companies, consumers, regulators, and advisory groups and which promote and implement more aggressive, cost effective, and energy efficient programs."

The following members of the General Assembly served on the Study Committee:

Senator Patrick Deluhery, Co-chairperson
Representative Ralph Rosenberg, Co-chairperson
Senator Michael Gronstal
Senator John Kibbie
Senator Alvin Miller
Senator Richard Varn
Senator Paul Pate
Senator John Soorholtz
Senator Wilmer Rensink
Representative Dennis May
Representative Paul Johnson
Representative Mary Neuhauser
Representative Robert Dvorsky
Representative Andy McKean
Representative Mary Lundby
Representative Daniel Petersen

COMMITTEE PROCEEDINGS

The Study Committee was authorized three meeting days, with the final meeting date to be held no later than November 1, 1989. The Study Committee held its three authorized meetings on August 28, 1989, September 14, 1989, and October 27, 1989.

MEETING -- AUGUST 28, 1989

The first meeting of the Study Committee was held on August 28, 1989, in Senate Room 22, of the State Capitol. Presentations were made by several persons upon the invitation of the Study Committee's Co-chairpersons.

Mr. Larry L. Bean, Administrator, of the Energy and Geological Resources Division of the Department of Natural Resources presented testimony regarding current energy usage in Iowa and prospects for future energy efficiency. Mr. Bean's testimony included recommendations expected to be included in the Department's proposed legislation for the 1990 session.

Mr. Daniel Gomez-Ibanez, Director of Wholesale Services, Wisconsin Power and Light, presented an overview of the energy efficiency programs and incentives established by Wisconsin Power and Light. Mr. Gomez-Ibanez focused on the advantages of particular programs aimed at industrial, commercial, and residential energy users, and summarized lessons learned in Wisconsin through experience, which lessons might be useful to Iowa in structuring similar programs.

Mr. Wes Birdsall, General Manager, Osage Municipal Utilities, described the energy efficiency programs implemented in Osage since 1975 and the dramatic results produced through various demand management programs, including weatherization, hook-up standards with strict enforcement, and remote load management. Mr. Birdsall noted the advantages to business expansion and attraction realized by Osage through lower energy costs and direct assistance to commercial users of energy in cost containment.

Mr. Robert Haug, Executive Director, Iowa Association of Municipal Utilities, made three suggestions on the direction which legislation should take concerning energy efficiency:

1. Strengthen energy efficiency standards for new construction.
2. Integrate statewide transmission system.
3. Protect diversity of form within the utility industry.

Mr. Jack Kegel, Director of Legal and Regulatory Affairs, Iowa Association of Municipal Utilities, presented an overview of the "Options" software package developed in part by the Association for community energy planning. Mr. Kegel emphasized the economic development and financial advantages of avoiding spending on utility costs, including the variable costs of the energy and fixed costs of expanding generating capacity.

MEETING -- SEPTEMBER 14, 1989

The second meeting of the Study Committee was held on September 14, 1989, in Senate Room 22, of the State Capitol. Presentations were made by several persons upon the invitation of the Study Committee's Co-chairpersons.

Dr. Amory Lovins, Director of the Rocky Mountain Institute, appeared to describe the potential economic benefits of increased energy efficiency and to explain the technological and regulatory means to obtain those benefits. Mr. Lovins emphasized the opportunity costs of wasted energy, in terms of lost dollars, lost jobs, and increased pollution. Mr. Lovins offered specific strategies to capture energy saving opportunities in four usage categories: electricity, heating and cooling, transportation, and agriculture.

Dr. David T. Kao, Dean and Director of the Iowa State University College of Engineering, testified that there is a need for integrating the existing technologies into a comprehensive plan for the future, with due attention to the long-term effects of new technology. Dean Kao noted there is a need for education of professionals, like engineers, to allow society to exploit its existing resources more effectively, particularly by making efficiency a formal discipline rather than an afterthought in the piecemeal approach currently too often taken in design. Dean Kao advocated adopting a total cost or life time cost approach to design, for public and private buildings and systems.

Mr. Dennis Nagel, Chairperson of the Iowa Utilities Board, testified that there is great potential for energy cost savings through energy efficiency for Iowa, but that it would require a change in the way business is done for utilities and for others in Iowa. Mr. Nagel cautioned that any governmental program proposals should also consider the risks and costs of failure if the program does not work as promised, and urged careful and ongoing review of both short-term and long-term energy savings. After a discussion with Mr. Lovins, Mr. Nagel agreed that pursuing least-cost-first policy options provides a degree of safety to public policy prescriptions.

Dr. Robert Latham, of the Iowa Utilities Association, emphasized the need for utilities to communicate available information on energy efficiency to the energy consuming public. Dr. Latham advocated the continued use of market demonstrations of energy efficient technologies to convince consumers of the value of such technologies.

Dr. Gerald Schoor, Professor and Chair of the Civil and Environmental Engineering Department at the University of Iowa, discussed his department's focus on biomass as a fuel, such as grain derived alcohol, and the impact of energy use and pollution upon global warming through the green house effect. One focus of Professor Schoor's comments and discussion with Dr. Lovins was the ideal mix of energy sources for Iowa's future.

Mr. James Merrit, the State's Consumer Advocate, opined that energy efficiency technologies are well proven, and should be moved beyond the demonstration phase stage to implementation. He expressed concern whether the state should mandate specific programs, or should encourage a more diverse approach by specifying energy efficiency performance targets and allowing each utility to chose the mix of technologies or programs which would achieve the specified savings in its own market. Mr. Merrit agreed with earlier testimony from Mr. Lovins and others that utilities must be rewarded for energy efficiency through the profit incentive, by decoupling profits from the amount of energy sold and tying profits instead to the amount of energy saved.

Mr. Larry Bean, Administrator of the Division of Energy and Geological Resources of the Iowa Department of Natural Resources discussed the necessity to quantify externalities (costs borne by society, but not internalized in the market price of a product, such as the cost of pollution) in order to judge competitive strategies on a least cost per unit of energy output basis. Mr. Bean also discussed the necessity for retraining certain professionals, such as engineers, in the science of energy efficiency, and questioned whether the state should incorporate this approach as a mandatory continuing education requirement for licensure.

Dr. Theodore Smith, Professor of Mechanical Engineering at the University of Iowa testified about the specific savings available to Iowa through upgrading existing buildings. Professor Smith also discussed specific roles which the Regents' universities could fulfill in the state's pursuit of energy efficiency policies.

Dr. Howard Shapiro, of the Department of Mechanical Engineering at Iowa State University discussed energy efficiency in buildings in general and discussed in detail the newly created Center for the Advancement of Refrigeration and Air Conditioning established at ISU. The Center is developing substitutes for chlorinated fluorocarbons, such as freon, currently used as refrigerants in air conditioners and refrigerators and implicated in the damage to the ozone layer and global warming.

Dr. Jim Cain, an energy specialist with Iowa State University's Extension Service, discussed energy standards contained in current building codes, and possible changes in standards and enforcement of the state building codes to require greater energy efficiency, especially in newly constructed buildings.

Dr. Tom Greiner, of the Department of Agricultural Engineering at Iowa State University, discussed the problems of indoor air quality in "tight" energy efficient homes and possible solutions, such as air to air heat exchangers. Dr. Greiner discussed several common indoor pollutants, but especially CO2 and radon.

MEETING -- OCTOBER 27, 1989

The third and final meeting of the Study Committee was held on October 27, 1989, in Senate Room 22, of the State Capitol. Presentations were made by several persons upon the invitation of the Study Committee's Co-chairpersons.

Mr. Tom Nielson, of Les Wat Lighting in Audubon, Iowa, discussed the retail marketing and availability of high technology, high efficiency fluorescent lighting systems discussed by several previous speakers.

Mr. Jerry McCreary, of General Electric's Lighting Division, discussed the wholesale availability and marketing of the high efficiency lighting products manufactured by General Electric. In particular, he discussed the market barriers to adoption of lower life time cost compact fluorescent bulbs because of their higher initial purchase cost compared to less efficient, shorter lived incandescent bulbs.

Mr. Jim White, of Sun Bilt Homes, Inc., described available highly energy efficient home building technology and techniques, explained why most homes are not built to minimize life time costs, and recommended more stringent energy efficiency standards and enforcement for the state's building code.

Mr. John Lewis and Dr. Robert Latham representing the Iowa Utility Association advocated the continued use of integrated resources planning to minimize energy costs and capital costs for utilities in the state. The Association's representatives stressed the need for any state program to be customer-centered and market sensitive, and warned against simply mandating an end, without consideration of the market impact. They recommended that the state minimize disincentives to utility participation, including specific financial rewards to utilities for energy savings.

Dr. Ken Madden and Dr. Ravindra Datta of the University of Iowa Ethanol Project described the results of specific research projects using ethanol fuel for vehicles and discussed the benefits to Iowa in encouraging the use of ethanol. The advantages for ethanol described include retained energy dollars, new jobs for an Iowa

energy industry, increased market for Iowa agricultural products by creating a new use market, and less pollution from cleaner burning alcohol.

Mr. Lee Liu, Chairman and President of Iowa Electric, described the programs operated by Iowa Electric to reduce commercial and residential energy consumption through adoption of energy efficient methods. Mr. Liu described the role incentives, loans, rebates, and other programs could play in encouraging energy efficiency by offsetting the initially higher cost typically demanded when consumers purchase energy efficient products or techniques.

Dr. Dennis Keeney, the Director of the Leopold Center for Sustainable Agriculture at Iowa State University, described the energy savings and environmental benefits available through reducing the use of petrochemical intensive farming practices, and increasing reliance upon sustainable agricultural practices. Dr. Keeney described the research projects, goals, and organization of the Leopold Center and its origins in the Iowa Groundwater Quality Act of 1987.

Mr. David Whitson, of Morgan Systems Corporation, presented a synopsis of the Energy Efficiency Options Study prepared by Morgan Systems as a consultant to the Iowa Utilities Board.

RECOMMENDATIONS

The Study Committee asked by consensus that the policy options derived from witnesses testimony and prepared by the Legislative Service Bureau, be prepared in bill form to the extent possible and accepted the options as recommendations for consideration by the entire General Assembly during its next session. A copy of the Possible Policy Options is attached for reference. After continued discussion, the Study Committee included some additional recommendations reflected in the attachment.

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POSSIBLE POLICY OPTIONS FOR
PROPOSED RECOMMENDATIONS OF THE
ENERGY EFFICIENCY INTERIM STUDY COMMITTEE
(Derived from testimony of witnesses before the Committee)

- I. HIGH PRIORITIES (Items with high opportunity costs in the form of long product life cycles, if not done right when new, significant potential savings become a lost opportunity for several years):
- A. Motor vehicles.
 - B. Buildings, housing stock, and other capital goods.
 - 1. restructure architectural and other building professionals' contracts to reward energy efficient designs by valuing life cycle cost instead of construction cost as the basis for payment.
 - 2. Rebate program for builders to reward builders for energy efficiency, improved profits as an incentive, leaves room for builder to "sell" energy efficiency as an advantage to buyer. Example, cost of energy efficient components \$3,000, but will result in lower operating expenses for buyer and society, pay builder a \$5,000 rebate as reward.
 - 3. Home energy efficiency point system, required rating disclosure to customers along with estimated cost of operation.
 - 4. Consideration of operating costs in mortgages, with higher purchase price allowed for lower operating costs.
 - 5. Sliding scale hookup fees, with lower fees for higher energy efficiency, maybe in conjunction with rating plan.
 - 6. State or utility offer design support, especially for large buildings, with free computer aided design and analysis for energy efficiency.
 - C. Heavy household appliances.
 - D. Industrial machinery.
- II. MOTOR VEHICLES.
- A. Improve Iowa's AMPG (Average Miles Per Gallons) by:
 - 1. State fleet purchases.
 - 2. State sliding scale gas guzzler tax.
 - 3. State rebates or incentives for high MPG vehicles.
 - 4. State sliding scale rebates or incentives for high MPG vehicles funded by sliding scale gas guzzler tax for low MPG vehicles. CA and MA have programs like this with rebate proportional to U.S. content in vehicle. Remove old, large inefficient vehicles from resale market by also tying rebate to car traded in?
 - 5. Programs targeted at removing the oldest and worst polluters from the road, for instance by requiring an air pollution test for vehicles upon transfer of title, or requiring vehicles older than ten years be scrapped as a condition of receiving a state rebate on its replacement.
 - B. Reduce carbon monoxide emissions and other motor vehicle

pollution by:

1. State motor vehicle clean air standards.
2. Programs targeted at removing the oldest and worst polluters from the road.
3. Require or encourage the use of cleaner burning fuels such as ethanol and methanol (alternative fuels programs).
4. Traffic light synchronization program.
5. Intermodal transportation program is an existing revolving loan program to enable freight to be transferred from an energy-intensive mode or means of handling and transporting to a more efficient means.
6. Replacing private motor vehicles with public transit where possible, including possible intercity bullet train service.

III. COMMERCIAL ENERGY USE.

- A. High intensity expert on-site energy audit and loan program for upgrades.
- B. Cook book oriented, low intensity energy audit and rebate program for small low-end users.
 1. Wisconsin "Bright Ideas Program", small commercial rebates for energy efficient lighting upgrades.
 2. DNR estimates potential annual savings in excess of \$50 Million.
 3. Encourage adoption of daylight control devices to reduce artificial light intensity when natural sunlight is sufficient.

IV. INDUSTRIAL ENERGY USE.

- A. Heavy machinery and process related improvements.
 1. Wisconsin's "Bright Idea" program focuses upon the upgrading of capital goods by permitting the utility to purchase upgraded equipment, with the customer paying back the cost of that equipment plus a permitted level of interest, provided that the customer's total monthly bill for energy and improvement loan charges is less than the prior level of energy usage would have provided. Improvements all have a 3-5 year payback period, but the savings in the form of immediately lower monthly utility charges appear on the customer's books much faster.
 2. Electrical motor replacement and improvement can reduce consumption for industrial electrical motors by 15%. Correct sizing of high efficiency induction motors important.
 3. Industrial modernization grants.
- B. HVAC.
 1. Aerial thermograms to be taken and made available to businesses. (Shows total heat loss through infra red photography).

2. Ground level thermograms of individual buildings. (Shows specific points of heat loss, air infiltration etc. . . .)

V. RESIDENTIAL ENERGY USE.

A. Residential lighting.

1. Develop market infrastructure for distribution and sale of existing high efficiency lighting technologies including compact fluorescent bulbs.
2. Rebate program for purchasing high efficiency lighting, to overcome initial cost barrier despite substantial long term savings.
3. Loan program for purchasing high efficiency lighting.

B. Home appliances.

1. Home appliance rebate program with premiums of \$50-\$100 per energy efficient appliance purchased instead of a competitive inefficient product, conditioned upon disposal of the old energy efficient appliance being replaced. (Wisconsin program model).

C. Heating, Ventilation, Air Conditioning (HVAC).

1. Tree planting program for sun shade and wind protection.
2. Service connection conditioned upon meeting minimum insulation and weatherization standards, enforcement through: 1) building inspectors; 2) utility inspectors; 3) good faith certification of builders or homeowners (current system); or 4) builders to provide results of blower door test performed by independent energy consultant.
3. Building code changes to require higher levels of insulation and weatherization (reduced air infiltration), for new construction and remodeling.
4. Continue Weatherization Programs operated by the Department of Human Rights, Division of Community Action Agencies, targeted to low-income elderly and handicapped persons.
5. Aerial thermograms (infra red scans of all homes) to be made available to homeowners.
6. Ground level thermograms of individual homes.
7. Energy audits with a hand-held infrared scanner and blower door.
8. Installation of water heater jackets.
9. Low volume shower heads reduce use volume of hot water used.

VI. GOVERNMENTAL ENERGY SAVING PROGRAMS.

A. Local Government.

1. High pressure sodium street light conversion (payback 4-5 year range).
2. Use of "Options" software developed by the Iowa Association of Municipal Utilities to promote

community-wide energy planning to encourage economic development.

3. Traffic light synchronization program.

B. State Government.

1. Continue the Institutional Conservation Program for Schools and Hospitals.

2. Continue the Energy Extension Service.

3. Continue the State Energy Conservation program.

4. State of Iowa Facilities Improvement Corporation.

5. School Energy Bank, and other financing programs for hospitals, local government, and non-profit buildings.

6. DNR estimates \$50 Million annual savings if school buildings improved, with a 6 year payback.

7. DNR estimates \$300 Million investment necessary to complete the improvement of public buildings to reasonable levels of efficiency.

8. Reduce governmental energy use through life-cycle, cost-based purchasing.

VII. PROGRAM FUNDING DEVICES.

A. Wisconsin Conservation Escrow Account, funded by a fixed percentage surcharge on rate payments.

B. Discontinue "pilot" or "demonstration" projects of proven technology.

C. Oil overcharge moneys.

VIII. DEMAND SIDE MANAGEMENT.

A. Cost based rate setting.

B. Load management (Osage model remote control devices).

C. Free test meters to locate inefficient appliances.

D. Aerial thermograms (infra red scans of all homes and business).

E. Ground level thermograms of individual buildings.

F. Energy audits with hand-held infra-red scanner and blower door.

G. Peakload covenants.

IX. SUPPLY SIDE MANAGEMENT.

A. Integrated planning requirement to assure that least costly means of meeting demand and implemented first.

B. Externalities considered (environmental/social) for each plan proposal for a generating facility.

C. Promote statewide integration of the electrical transmission system.

D. Protect diversity within the utility industry, by permitting local utilities flexibility in the nature of programs adopted.

X. ELECTRICAL GENERATION OPTIONS.

A. Solar cells.

B. Water driven generators.

C. Wind driven generators.

- D. Nuclear plants.
- E. Coal fired generators.
- F. Natural gas fired generators.
- G. Cost avoidance of new generating capacity by demand side management.

XI. FINANCIAL INCENTIVES FOR UTILITIES TO PROMOTE ENERGY EFFICIENCY.

- A. Reform utility regulation to foster investment in end-use efficiency and cogeneration systems.
- B. Decouple profits from sales of megawatts, incentive to encourage savings in the form of profits from savings.
- C. Need to reward utilities for megawatts of unused electricity.
- D. Competitive bidding for megawatts of unused electricity.
- E. Industrial modernization grants.
- F. Arbitrage between cost of megawatts and megawatts (megawatts of unused electricity).
- G. Negawatt/Megawatt spot, futures, and option markets.
- H. Peakload covenants.
- I. Wisconsin type bonus program for utilities based on number of megawatts saved.
- J. Grade utilities on a curve, with yearly comparisons of average bill per household and bill per customer employees, with incremental increase and decrease in proportion to yearly usage, reward high performers with greater permitted profits, create competitive atmosphere for savings.

XII. FINANCIAL INCENTIVES FOR CONSUMERS TO ADOPT ENERGY EFFICIENCY.

- A. Give away improvements.
- B. Technological enhancements promoted.
- C. Payback rebates.
- D. Equipment leasing with low cost financing.

XIII. HUMAN RESOURCE TRAINING.

- A. Utility personal.
 - 1. CEO and other management level personnel should receive training in program options and benefits.
- B. State government.
 - 1. Establish a "Center for Excellence in Energy Efficiency" at a state university.
 - 2. Exemplary retrofits, starting with the lighting in the Capitol.
 - 3. Require that energy expenditures be shown as a line item in each agency budget.
 - 4. Install incentives for efficient behavior, example in WA if employee recommends a source of energy efficiency, employee and boss both get a bonus. The savings from reductions in expenditures for energy efficiency will pay for the bonuses, deposit some in a kitty to buy future energy efficiency improvements for that agency, and return balance to general fund.

- C. Consumers.
 - 1. Public service ads promoting energy efficiency.
 - 2. Newsletter with information on conservation.

XIV. GLOBAL WARMING AND ENVIRONMENTAL CONCERNS.

- A. Lighting changes, if it is assumed all the incandescent lights in U.S. (2.8 billion) were to be replaced, energy for lighting needs could be reduced by 76% and would reduce the need to burn 149 billion tons of coal and eliminated 596 billion lbs of CO₂ (source: Energy Conservation Digest, June 12, 1989, pg. 112, supplied by DNR, using Amory Lovin's conversion factor of 1/100 for Iowa's approximate proportional share of national consumption, Iowa figures can be generated.)
- B. Continue Iowa Groundwater Protection Plan, including:
 - 1. landfill alternatives.
 - 2. integrated farm management.
 - 3. demonstration projects.
 - 4. monitoring activities.
- C. Integrate alternative fuels with land stewardship, need to use alternative fuels for making farms more efficient.
- D. Tax pollutants and shift proceeds to those who reduce pollution as a reward, make pollution reduction a profit center.
- E. Energy efficiency will reduce injections of CO₂ and other hydrocarbon burning byproducts which cause greenhouse effect or damage to ozone layer.
- F. Sustain existing and encourage development of more forests. Example of utility which maintains a forest in S. America to compensate for added pollution from new plant.
- G. Eliminate CFCs, alternatives being rapidly developed.

XV. RECOMMENDATIONS ADDED AT THIRD MEETING OF STUDY COMMITTEE AFTER DISCUSSION.

- A. Establish a library of energy saving devices, with the library to be mobile if possible, to be used as a consumer education tool. The mobile library would tour the state to demonstrate energy saving devices to consumers.
- B. Change the licensing examination and education requirements for those individuals involved in building within the state, both private and public, to assure that they are aware of the availability of energy efficient alternatives.
- C. Conduct a program for the creation of "Energy Efficient Days" for education of the public, similar to the current "Toxic Waste Cleanup Day".
- D. In cooperation with major builders in the state of Iowa that perform work on public projects, whether the Capitol complex, Regents' institutions, or other governmental bodies, determine what kind of requirements, if any, the State currently imposes to assure construction of energy efficient structures. Investigate the possibility of requiring major remodeling

projects and new construction projects for public entities to meet specified energy efficiency standards.

- E. Add all nonprofit organizations to the School Energy Bank Program.
- F. Expand the Affordable Energy Project and have an added requirement that those persons receiving federal and state moneys under the project have residences that are energy efficient.



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Project and new construction projects for public buildings
that received energy efficiency standards.
and all projects are subject to the Energy Code
requirements.
The project was approved by the project and will be a
requirement that these persons, including federal and state
agencies under the project, are required to be
compliant.