Approved
Date March 7, 2001

MINUTES OF THE SENATE UTILITIES COMMITTEE.

The meeting was called to order by Chairman Senator Stan Clark at 9:30 a.m. on March 5, 2001 in Room 231-N of the Capitol.

All members were present except: Senator Wagle, excused
Senator Tyson, excused

Committee staff present: Raney Gilliland, Legislative Research
Bruce Kinzie, Revisor of Statutes
Lisa Montgomery, Revisor of Statutes
Ann McMorris, Secretary

Conferees appearing before the committee:
Joseph E. King, Architect, Lawrence
Gene E. Meyer, Kansas State University
Douglas Walter, President, Kansas Building Science Institute, Manhattan

Others attending: See attached list.

Correspondence and information on a process developed relating to the ducted wind generation of electricity were distributed to the committee. (Attachment 1)

Chairman Clark thanked Paul Johnson, Public Assistance Coalition of Kansas for arranging for speakers on Energy Conservation to appear before the committee.

ENERGY CONSERVATION PRESENTATIONS

Joseph E. King, AIA, Lawrence, Kansas is an architect specializing in building energy efficiency, renewable energy technology, resource analysis and policy and a consultant to KCC, DOE, Utilities and private business. Mr. King noted sound state energy policies are essential. He reviewed energy production, energy use, energy resources, fossil energy depletion, energy needs and energy quality. Keys to energy efficiency and potential, advancement in technology and efficiency application and cost were analyzed. (Attachment 2) Mr. King distributed a booklet called "Building for the Future - a Guide to Residential Energy Efficiency" which was prepared for Kansas Electric Utilities Research Program by Mr. King and Mark Hannifan.

Gene M. Meyer, P.E., Energy Extension Service at Kansas State University, stated that Kansas is the sixth largest producer of natural gas in the nation and the eighth largest producer of crude oil. Kansas has long been a net exporter of energy but is on track to becoming a net importer of energy. Improved performance should be addressed in all sectors: residential and commercial building, industrial processes and transportation. (Attachment 3) Mr. Meyer commented on the packet of materials "Cut Winter Costs" prepared by the KSU Engineering Extension to help homeowners respond to rapidly increasing natural gas prices. The packet can be obtained by calling Engineering Extension 1 800 KSU 8898.

Douglas Walter, President, Kansas Building Science Institute, Manhattan, spoke on the role that home energy ratings can have in achieving greater residential energy efficiency in Kansas. (Attachment 4)

Questions from the committee on various aspects of energy conservation.

Chair announced the next meeting of the committee would be on March 6, 2001.

Adjournment.

Respectfully submitted,
Ann McMorris, Secretary

Attachments - 4

SENATE UTILITIES COMMITTEE GUEST LIST

DATE: **MARCH 5, 2001**

Name	Representing
[illegible]	KCC
Doug Walter	Kansas Building Science Institute
Gene Meyer	Kansas State Univ. - Energy Extension
Jan [illegible]	KCC
Joe King	Coriolis
Shirley Allen	Bottenberg & Assoc.
Steve Hein	Hein & Weir

/

Stan Clark

From: "Dennis Clennan"
To: "Stan Clark (E-mail)" <sclark@ink.org>
Cc: "Dave Kerr (E-mail)" <kerr@senate.state.ks.us>
Sent: Friday, March 02, 2001 9:03 AM
Subject: Info from solution mining institute

Dr Ratigan and Mr Diamond had travel problems on Tuesday, Feb. 27 and consequently missed the conference call. I should be hearing sometime today from both and I will forward the info to you.

Thanks for your help.

Dennis M Clennan, PE
e-mail:dennisc@ci.hutchinson.ks.us
Tele:316-694-2644 or 316-694-1900
Fax:316-694-2673

Senate Utilities Committee
March 5, 2001
Attachment 1-1

DEREK SCHMIDT

15th District
Allen, Chautauqua,
SE Coffey, Montgomery,
Wilson and Woodson counties

KANSAS SENATE

Committee Assignments
Chairman: Agriculture
Member: Judiciary
Reapportionment
Natural Resources
Elections and Local Government
Legislative Post Audit

February 27, 2001

Honorable Stan Clark
Chairman
Committee on Utilities
State Capitol Building - 449-N

Dear Stan:

Please find enclosed separate correspondence I have received from a constituent, Mr. Melvin Isaacson of Iola, and from M. Eric Ferrell, president of the Alliance for Technology Comercialization on the Pittsburg State University campus.

As you can see, both are writing to describe a process Mr. Isaacson has developed relating to the ducted wind generation of electricity. Knowing of your committee's interest in alternative energy matters, I wanted to forward this information for your consideration.

Please let me know if I may be of further assistance.

Sincerely,

Derek

Derek Schmidt
Kansas State Senator

DS:bab
Enclosures

Thanks, Stan -

1-2

District Office
304 N. 6th Street
P.O. Box 747
Independence, Kansas 67301-0747
(316) 331-1800

Capitol Office
State Capitol, Room 143-N
Topeka, Kansas 66612-1504
(785) 296-7398
Message Only (800) 432-3924

ALLIANCE FOR TECHNOLOGY COMMERCIALIZATION, INC.
1501 S. JOPLIN ST.
SHIRK HALL
PITTSBURG, KS 66762-7560
PHONE: 316-235-4927
FAX: 316-235-4030
WWW.ATCKANSAS.COM

ferrell.
windenergy.
wpd

ALLIANCE for
TECHNOLOGY
COMMERCIALIZATION
Technology to the Marketplace

February 14, 2001

Rep. Carl D. Holmes
Kansas House of Representatives
Kansas Capitol Rm. 115-S
Topeka, KS.

RE: Ducted Wind Generator & Mr. Melvin Isaacson, Iola, KS.

Dear Representative Holmes:

I am writing enthusiastically to you in regard to the positive publicity recently regarding you and the committee promoting ***alternative energy sources*** in Kansas. First, an introduction, I am Eric Ferrell, with Alliance for Technology Commercialization (ATC), located on the campus of Pittsburg State University. I am one of the six-commercialization centers located around the state. ATC works with inventors and help them commercialize their invention or technology. We assist with business and marketing plans, patent searches, equity and debt financing assistance, marketing studies, focus groups and personnel recruitment.

I have been meeting with Mr. Melvin Isaacson, Iola, KS. for the last couple of months, regarding a ducted wind generator that he has designed. Mr. Isaacson is a retired 3M engineer from St. Paul, MN. that has spent a lifelong career dealing with fans, generators and ventilation systems. I believe that he has already filed for a patent on his design. We have been collaborating with a physics professor at Allen County Community College for the purpose of testing the mathematics as well as providing his students a real life application for physics and mathematics, using the Bernoulli equation.

We are ready to begin constructing a prototype model of the ducted wind generator. Mr Isaacson estimates the costs will not exceed $5,000. We have read all of the material from the Kansas Wind Energy Conference 2000, held last year in Manhattan. We have written to each of the corporate sponsors of the conference, soliciting a contribution for the prototype construction. The response was encouraging, but without any financial support. Based on the renewed interest for developing alternative energy resources in Kansas, could you assist us in obtaining financing for this research project.

At your convenience, could we discuss the opportunities, the challenges and the issues regarding this ***alternative energy*** project? Thank you for your consideration of this request.

Sincerely,
M. Eric Ferrell

M. Eric Ferrell
President

1-3

CC: Mr. Melvin Isaacson
Representative Stan Dreher, Jr.
Senator Derek Schmidt

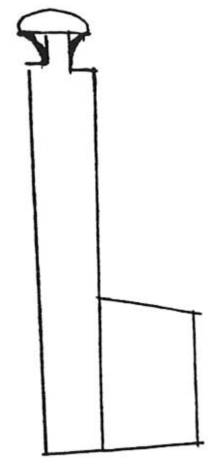
Isaacson. windenergy.wj
Iola, KS
~~Aug 23~~, 2000
Feb. 10, 2001

[redacted]

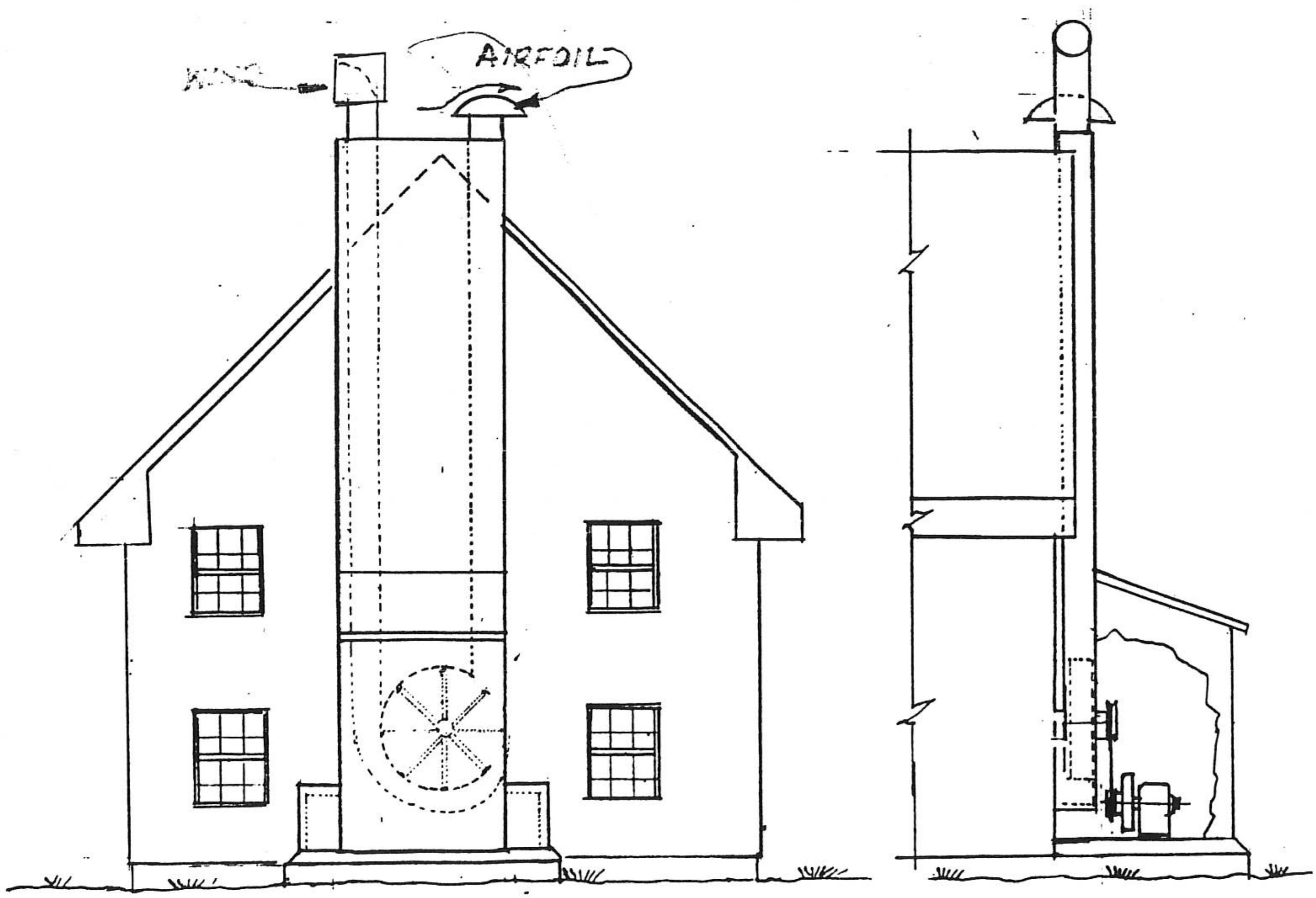
Enclosed are some data on a system for utilizing wind energy to generate electricity. The data shown are for a single house which could be used in a city or anywhere.

Sincerely,
Melvin Isaacson

MELVIN H. ISAACSON
214 S. COTTONWOOD ST.
IOLA, KANSAS 66749
phone: 316/365-5345



FREE STANDING WIND MACHINE



DUCTED WIND MACHINE
(ATTACHED TO HOUSE)

see sheet 4

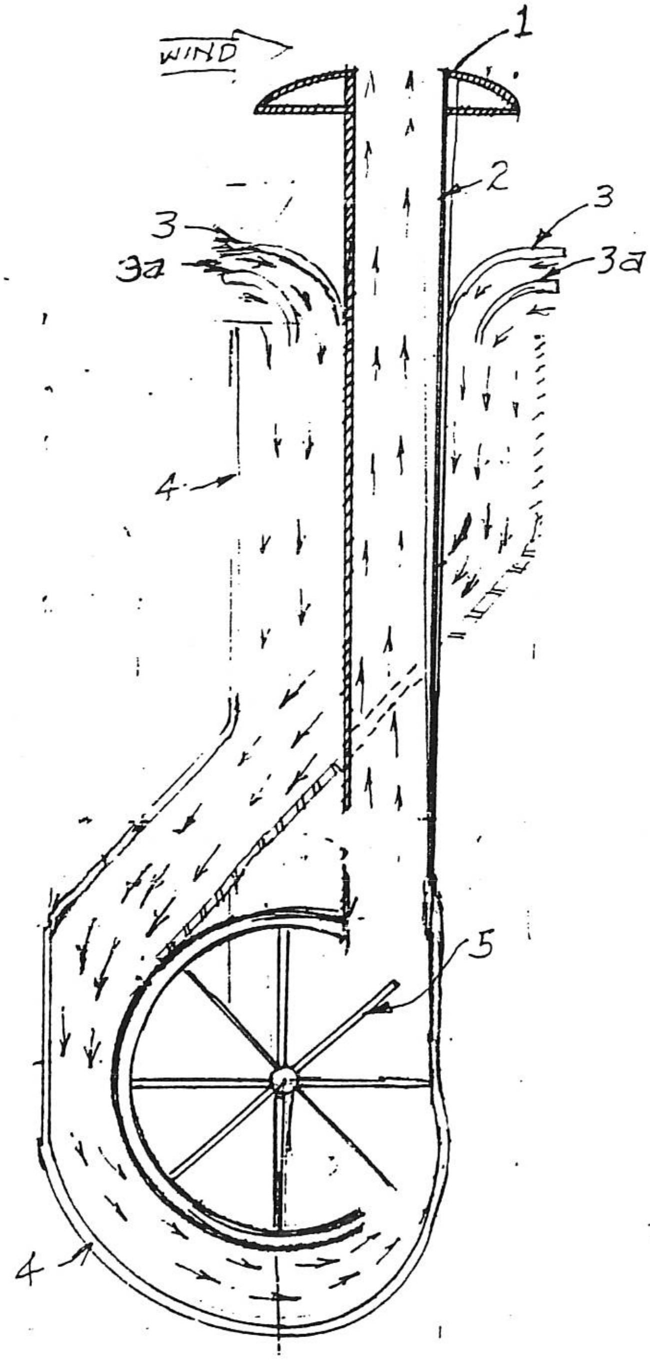


FIG. 1

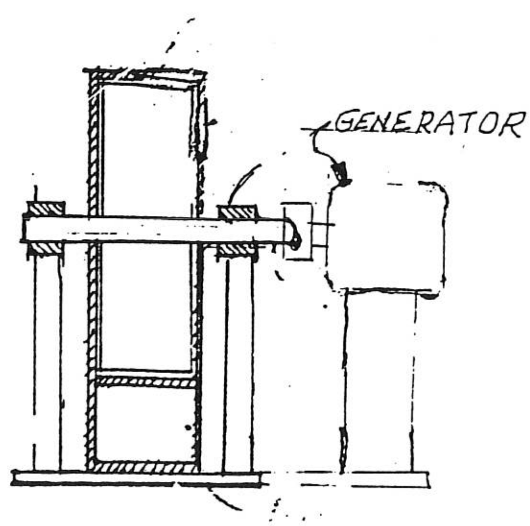


FIG. 2

1-6

Use with sheet 3

DISCLOSURE DOCUMENT
WIND POWERED GENERATING MACHINE

WIND BLOWING ACROSS ITEM 1 CREATES A VACUUM IN DUCT 2. A VACUUM IS CREATED BY THE SHAPE OF ITEM 1. THE WIND ENTERS DUCT 4 THRU OPENINGS WHICH HAVE RADIUSED WALLS, 3 AND 3a, WHICH SERVE AS STRAIGHTENING VANES. THE VELOCITY OF THE WIND CREATES PRESSURE IN DUCT 4 AND THIS PRESSURIZED AIR IS CONDUCTED TO THE BOTTOM OF FAN WHEEL 5. THE VACUUM IN DUCT 2 IS CONDUCTED TO THE TOP SIDE OF FAN WHEEL 5. THE VACUUM AND PRESSURE CAUSE WHEEL 5 TO ROTATE. THIS WHEEL FITS VERY CLOSELY WITHIN THE HOUSING SO THAT THE VACUUM AND PRESSURE ACT UPON THE FAN TO EXERT THE MAXIMUM TORQUE UPON THE FAN WHEEL WITH A MINIMUM OF LEAKAGE. A VERY SLIGHT WIND WILL CAUSE THE FAN WHEEL TO TURN AND THE SYSTEM WILL WITHSTAND HIGH WINDS.

5

July '??

Federal Wind Energy Program

Dept. of Energy

Washington, D.C. 20585

The accompanying material describes a unique type of wind-powered generator. I have applied for a patent for the "Ducted Wind-Powered Generator" and I am negotiating some points with the patent office. Meanwhile, I would like to fabricate and test the design. I am hereby requesting a grant to have this new type of generator fabricated, set up, and evaluated. I have the knowledge and expertise to accomplish this project and could have it operating in a few months.

Please let me hear from you.

Melvin H. Isaacson
214 South Cottonwood
Iola, Kansas 66749

1-8

See sketch on sheet 6

Materia from abandoned patent application

1991

DUCTED WIND-POWERED CENERATOR

An application has been made for a patent for a "Ducted Wind-Powered Generator. Enclosed is a sketch of this new type of power generator as it would appear attached to a two-story residence. The uniqueness and benefits of this new type of power generator as it would appear attached to a two-story residence. The uniqueness and benefits of this new type of power generator are listed in the patent documents, however, listed below are many of the advantages and benefits.

The benefits of the "Ducted Wind-Powered Generator" are:

1. A simple duct is elevated to intercept the wind and bring the wind down to ground level where it acts upon a wind-wheel powered generator to produce electricity.

2. A duct is elevated into the wind and the top end of the duct is terminated by a device to induce a partial vacuum in the duct.

3. The wind-wheel is acted upon by the ducted wind and the partial vacuum to rotate the wind-wheel powered generator; this push-pull force generates more power for a given velocity of wind.

4. A safe design with no exposed moving parts.

5. Quiet operation, no noise outside of the enclosure.

6. Can be used for very low as well as very high wind velocities and therefore nearly constant power generation.

7. The electrical generator is easily attached to the shaft of the wind-wheel or could be driven by belt, chain or gear drive or hydraulics.

8. Eaasily adaptable for attaching a fly-wheel for smoother operation.

9. Economical to manufacture and operate.

10. Easily balanced for vibration free operation.

11. Adaptable to single family residences or large structures.

12. Adaptable to very large generators

13. Easily adaptable to hybrid systems using diesel, gasoline, or steam engines, or any type of engine or motor.

14. Aesthetically pleasing

15. Environmentally superior

16. Saves electricity from power plants

17. Electricity could be used to generate hydrogen for hydrogen powered vehicles.

18. Excess electricity could be stored as heat in a gravel filled bin.

2

Energy for Kansas

Joseph E. King, AIA

Coriolis
architecture - energy
123 West Eighth
Lawrence, Kansas 66044

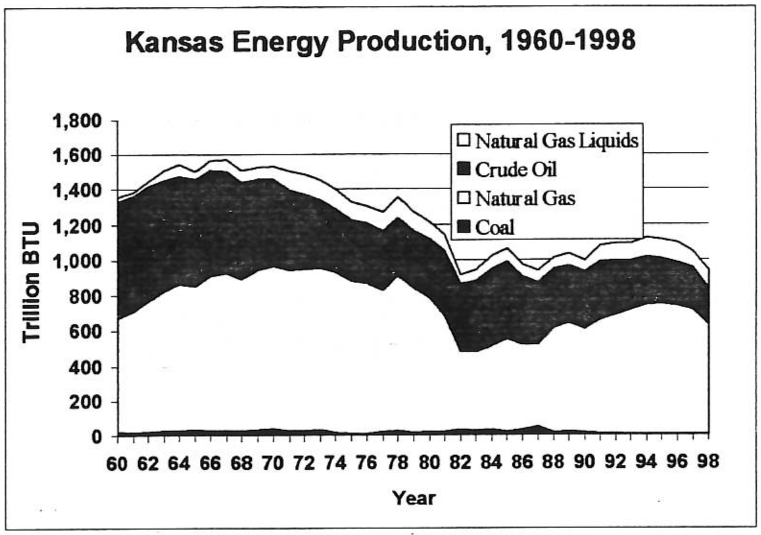
785.841.1906 jeking@idir.net

- **Architect specializing in building energy efficiency, renewable energy technology, resource analysis and policy**
- **Consultant to KCC, DOE, utilities, private business**
- **Director, Kansas Energy Office 1979-81**

Energy for Kansas

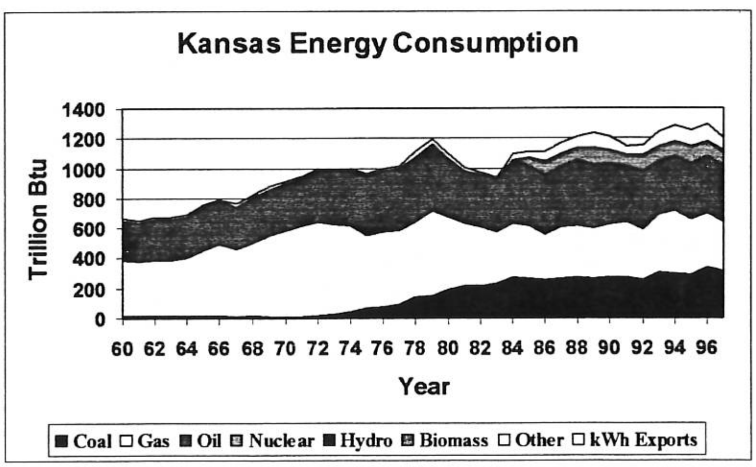
- Energy is vital to our way of life
- Kansas energy policy has long been to produce and consume Kansas resources as rapidly as possible
- The easy and cheap energy is almost gone – for Kansas and the U.S.
- Dramatic increases in energy efficiency are technically feasible and need to be a cornerstone of future energy policy
- Renewables must become an integral part of our energy system
- Sound state energy policies are essential

Kansas Energy Production



EIA State Energy Data Report

Kansas Energy Use



2-2

Kansas Energy Resources

- The Hugoton Field is declining at 10% per year and will be essentially gone in 20 years
- Kansas oil production barely exceed 30 million barrels per year – a single Saudi Arabian well produces more in six months than all wells in Kansas produce in a year

Kansas Fossil Energy Depletion

"Now, here, you see, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!"

Alice in Wonderland

2-3

Energy Needs

- We need what energy does for us, not the energy itself
- We need our buildings to be comfortable and healthy
- We need our transportation system to let us go where we want to go and delivery goods
- We need our factories to process goods, not just consume energy

Energy Quality

- Not all energy is the same
  - Electricity is the most versatile
  - Gasoline is dense and portable
  - Natural gas is relatively clean
  - Renewables can have lowest emissions and highest Energy Profit Ratio (EPR)
- We should not use high quality energy to satisfy low quality needs, such as electric resistance space heating.
- Upgrading energy to a higher quality is usually costly and inefficient.

2-4

Keys to Energy Efficiency

- Heat transfer
  - To much or to little
- Friction
  - Pipes, ducts, bearings
- Electrical losses
  - Conductors, transformers, lighting systems
- Controls
  - Supply only what is required when it is required
- Design
  - Knowledge of how things actually work applied to design

Energy Efficiency Potential

- Energy saved can be better than energy produced. It may have lower cost and lower emissions.
- Energy efficiency can be more reliable than prospecting for new fossil energy resources.
- Energy efficiency is not deprivation – it is behaving intelligently.
- The potential for energy efficiency improvements remains enormous.
- Greater energy efficiency is often a better value than a little energy efficiency – it "snowballs."

2-5

Energy Technology Advancement

- **Windows**
  - Single pane windows of U 1.1 replaced by low emissivity argon filled double pane of U 0.35
- **Appliances**
  - In 1980 a home refrigerator used 1,400 kWh/yr. Today, as a result of federal standards, you can purchase one that uses 1/3 as much.
- **Lighting**
  - Improved fluorescent and induction lamps, electronic ballasts, daylight controls and more efficient fixtures achieve better lighting with 50-75% less energy. Less lighting requires less cooling.
- Motors
  - Industrial process electric motor systems use about ¼ of all U.S. electricity. Motor energy use could be reduced by 11 to 18 percent if available cost-effective efficiency technologies and practices were implemented.
- The list goes on and and it continually gets longer.

Energy Efficiency Application

- **Bank of America building in San Francisco** reduced the cooling 40 percent. Chiller's efficiency was increased by 25 percent. The converted chiller uses 56% less electricity.
- **Ford Motor Company** plant in Buffalo, New York uses 'unglazed solar transpired collector' to heat outside air— saving Ford nearly $200,000 a year.
- **Lockheed Martin** improved ventilation system performance of its plating **Burlington, Vermont** plant. The project reduced electric and gas costs by 38 percent, improved ventilation control, and reduced plant emissions with a simple payback of 1.5 years.
- **Parker Chiropractic College** in Dallas, Texas upgraded its chiller plant and control system in 1996, reducing electricity use by 43 percent with a 3.5-year payback.

Energy Efficiency Application

- Magnetic Metals Corp. of Camden NJ, installed gas-fired infrared heating devices that cut heating expenses 47 percent with a 2-year payback. Perhaps more important, "People have more comfort and a more healthy environment."
- An integrated circuit factory outside of Manilla upgraded its lighting, heating, ventilation, and cooling system and cut the energy usage per chip by 60 percent even as production doubled.
- Top-10 semiconductor supplier STMicro- electronics, a $4 billion company with 26,000 employees and plants in Europe, Asia, and the United States found energy efficient technologies and processes more efficient, less costly, more reliable and safer." The company made its Singapore chip fabrication plant more than twice as efficient as the typical fab plant.

Energy Efficiency Application

- Siemens Solar Industries, the largest maker of solar-electric cells in the world, grows silicon ingots in Vancouver, WA. It plans to triple its crystal-growing capacity every few years. Siemens believes it can cut energy 60 to 75 percent.
- Boeing cut lighting electricity use by 90 percent in several million square feet of its facilities. The investment yielded a 50 percent financial return.
- Ortho-McNeil Pharmaceuticals reduced lighting energy 63% percent at their million square foot-facility in Raritan, NJ, saving almost four million kilowatt-hours worth $320,000 annually with an investment that paid for itself in just two and a half years.
- Elkhart General Hospital in Indiana reduced lighting electricity by more than 70 percent over 430,000 square feet, for a total annual savings of $102,000.

Residential Energy Efficiency

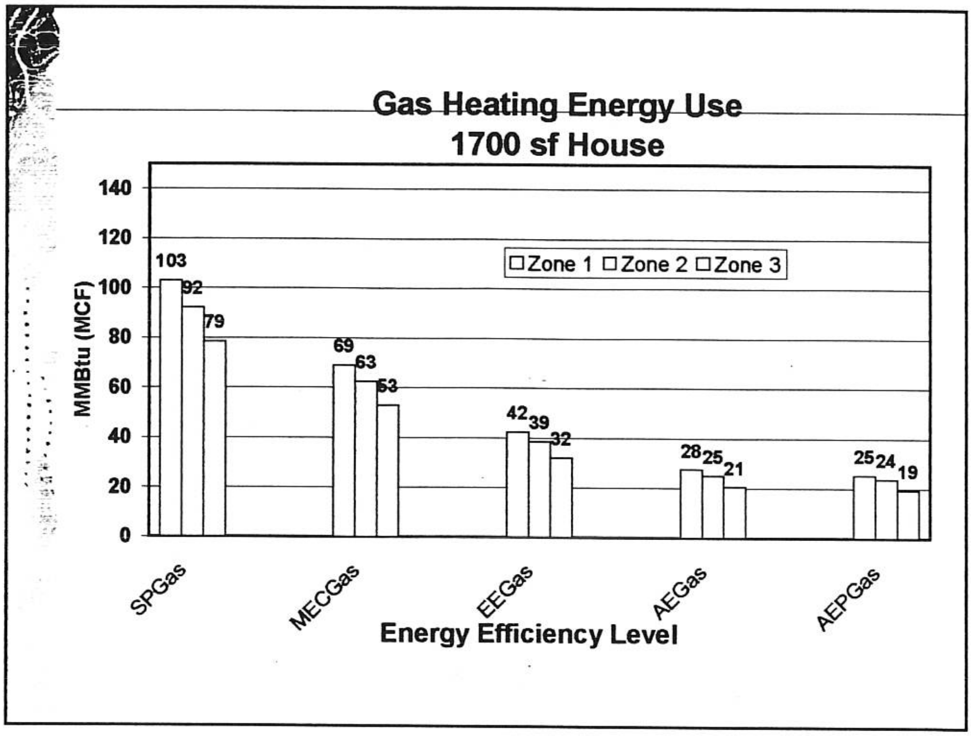
- Evaluate annual cost of ownership for varying levels of home energy efficiency
  - estimate annual heating & cooling energy cost using hourly modeling
  - compare with principal and interest for 100% of incremental cost
- Three different home sizes
  - 960 ft^2 duplex, 1700 ft^2 ranch, 2460 ft^2 two story
- Five levels of energy efficiency
  - Standard Practice, MEC Compliant, Enhanced, Advanced, Passive
- Three levels of energy cost
  - High, Medium, Low
- Three climate locations
  - Goodland = NW (1), Topeka = SW-NE (2), Parsons = SE (3)

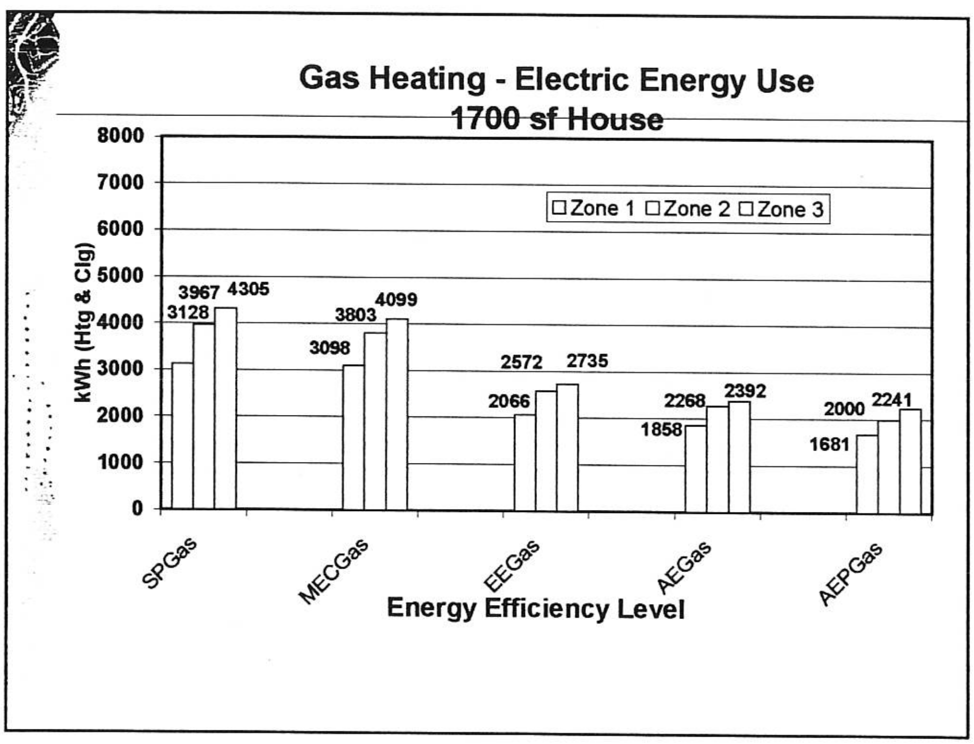
Energy Cost (utility rates)

Energy Cost ($/million Btus for heat, $/kWh for other winter electricity use and cooling)

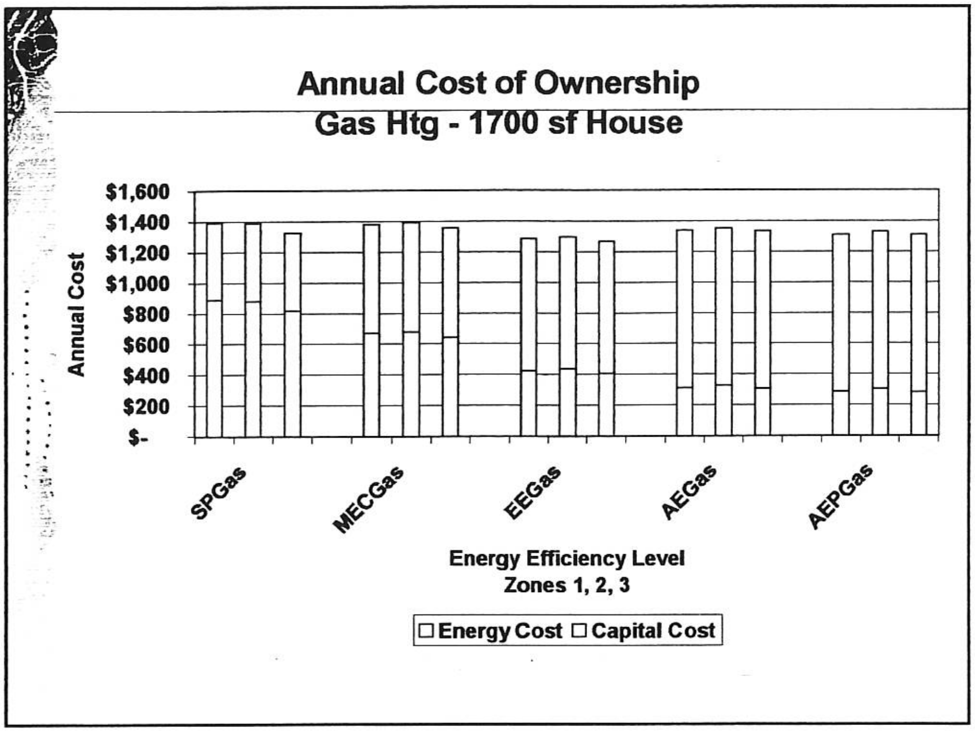
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Natural Gas												
	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00	$ 6.00
(w/tax)	$ 6.36	$ 6.36	$ 6.36	$ 6.36	$ 6.36	$ 6.36	$ 6.36	$ 6.36	$ 6.36	$ 6.36	$ 6.36	$ 6.36
Electricity (w/ natural gas heat - medium cost)												
	$ 0.070	$ 0.070	$ 0.070	$ 0.070	$ 0.070	$ 0.080	$ 0.080	$ 0.080	$ 0.080	$ 0.070	$ 0.070	$ 0.070
(w/tax)	$ 0.074	$ 0.074	$ 0.074	$ 0.074	$ 0.074	$ 0.085	$ 0.085	$ 0.085	$ 0.085	$ 0.074	$ 0.074	$ 0.074
Electricity - Heat Pump												
Winter	$ 0.070	$ 0.070	$ 0.070	$ 0.070	$ 0.070	$ 0.080	$ 0.080	$ 0.080	$ 0.080	$ 0.070	$ 0.070	$ 0.070
(w/tax)	$ 0.074	$ 0.074	$ 0.074	$ 0.074	$ 0.074	$ 0.085	$ 0.085	$ 0.085	$ 0.085	$ 0.074	$ 0.074	$ 0.074

2-8

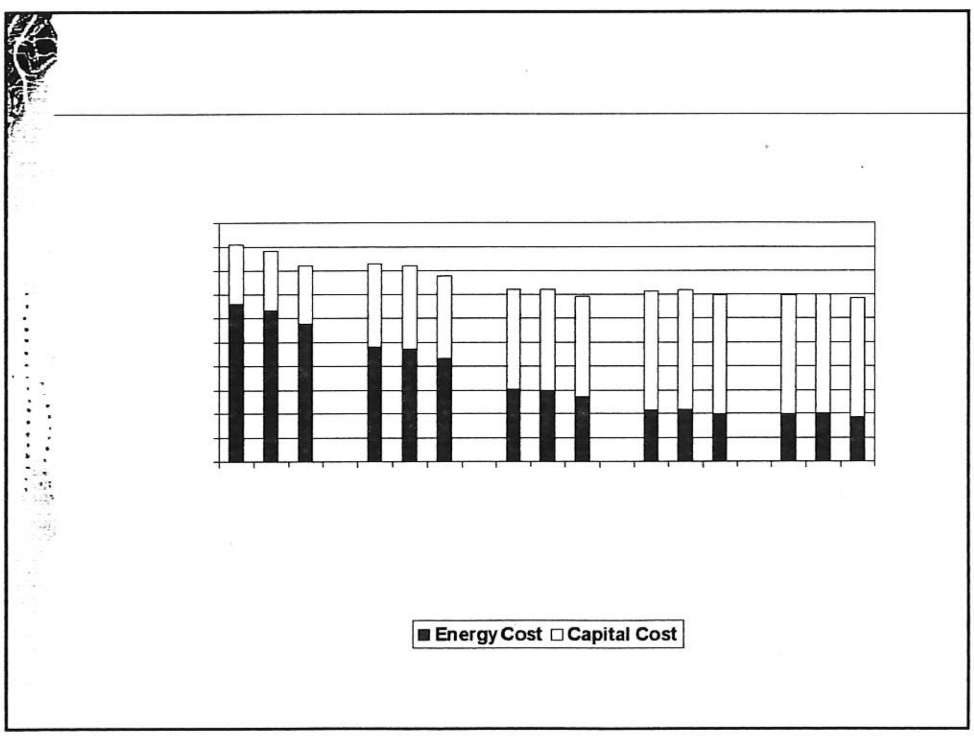

Gas Heating Energy Use
1700 sf House
MMBtu (MCF)
140
120
100
80
60
40
20
0
□Zone 1 □Zone 2 □Zone 3
103
92
79
69
63
53
42
39
32
28
25
21
25
24
19
SPGas
MECGas
EEGas
AEGas
AEPGas
Energy Efficiency Level


Gas Heating - Electric Energy Use
1700 sf House
kWh (Htg & Clg)
8000
7000
6000
5000
4000
3000
2000
1000
0
□Zone 1 □Zone 2 □Zone 3
3128
3967
4305
3098
3803
4099
2066
2572
2735
1858
2268
2392
1681
2000
2241
SPGas
MECGas
EEGas
AEGas
AEPGas
Energy Efficiency Level

2-9



Annual Cost of Ownership
Gas Htg - 1700 sf House
$1,600
$1,400
$1,200
$1,000
$800
$600
$400
$200
$-
Annual Cost
SPGas
MECGas
EEGas
AEGas
AEPGas
Energy Efficiency Level
Zones 1, 2, 3
Energy Cost
Capital Cost



Energy Cost
Capital Cost

Conclusion

- For the new home buyer, the annual cost of ownership for a balanced package of energy upgrades is almost always equal to or less than the cost of a set of less energy efficient measures. The better value home uses as little as one fourth the natural gas and half the electricity of the typical home built today in Kansas.

Capturing Energy Efficiency Potential

- If advanced efficiency homes cost less to own aren't they becoming the norm?
  - NO. Changing building practices is not easy.

Aren't market forces moving us toward greater efficiency?

- Yes, at a very slow pace.
  - We remain preoccupied with first cost.
  - Most people think this winter's gas price spike was a one time market aberration.

2-11

Ruthless Objectivity

- "There's a sucker born every minute." P. T. Barnum
- Lot's of people have the invention or gimmick to solve our energy problems – and make them rich (they hope). Be skeptical of them all.
- Measure and verify all claims, including energy efficiency. Don't waste time and money subsidizing "solutions" that contribute little.
- Energy production, conventional or renewable, must have a high ratio between yield and input (EPR).

Ruthless Objectivity

- If you must drill a deep well to produce oil with lots of injected water or gas under pressure and pump it with electricity your EPR will likely be low.
- As we deplete fossil resources it will take increasing amounts of energy to produce what is left and the EPR will fall.
- Renewable energy systems that do not have high EPRs should not be subsidized.

EPRs: < 1 It is not a renewable

< 5 Marginal

5 – 10 Worth pursuing

> 10 Check your numbers

Start Early and Proceed Deliberately

- There is no one solution to our future energy needs. Our sources and uses are too diverse.
- Do not make small plans – this is not a small problem.
- The longer we wait the more difficult it will be.
- Developing renewable resources benefits greatly from some fossil fuel (no renewable technology has an infinite energy profit ratio). The more depleted fossil fuels are when we finally turn aggressively to renewables the more difficult it will be.

Focus on Load Reduction Before Plant Construction

State	KWe/ cap/ Rank	MWh/ cap/ Rank	ACF	MWH (1,000) Flow	'98 DSM Savings
Kansas	3.78/14	15.76/22	.46	-24.9	0.00
Missouri	3.01/28	13.83/25	.52	-18.7	0.06
Iowa	3.04/26	13.35/27	.50	+1.8	1.76
Nebraska	3.51/17	17.34/17	.56	-19.7	0.06
Colorado	1.92/46	9.79/39	.58	10.4	1.26
Oklahoma	4.03/10	16.83/19	.48	-12.6	0.23

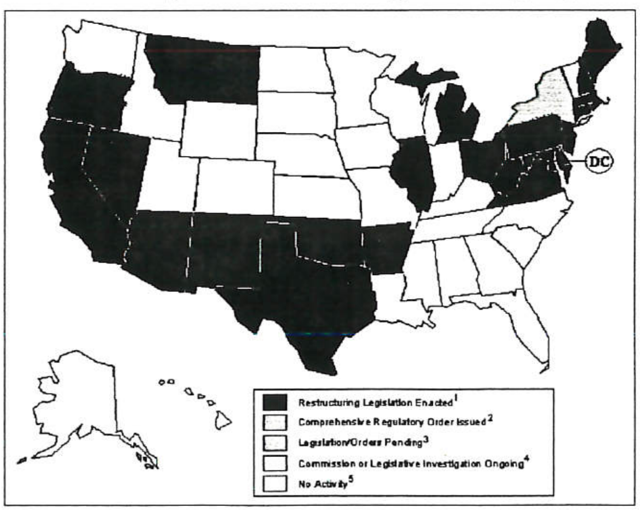
2-13

Energy Policy and Efficiency

- Kansas built a lot of electrical generating capacity in 1975-1985. In response to higher rates we were told we should consume more to distribute cost.
- Kansas completely skipped the Demand Side Management (DSM) effort the occurred in most states the past two decades. DSM savings in 1998 ranged from a high of 9.2 percent in Washington State (due to nearly two decades of significant activity) to a low of nearly zero in Kansas (ACEEE).
- Efficiency has never been an integral part of our thinking or policy. Production and generation have strong advocates – efficiency does not.

Responding to Energy Challenge

Electric Utility Restructuring Activity by State



EIA – 2/2001

Responding to Energy Challenge

System Benefit Charges, $Million

State	R&D	EE	LI	RE	Mills/KWH	Total
Arizona	TBD	8.0	3.9	16.0	1.4	28.0
California	62.0	218+	81.0	135	3.0	496+
Connecticut	In RE	87.0	8.7	22.0	4.0	117.7
Delaware		1.5	0.8	0.3	0.3	2.6
D of C	TBD	TBD	TBD	TBD	0.8	8.0
Illinois		3.0	75.0	5.0	0.7	83.0
Maine		17.2	5.5		2.3	22.7
Maryland		13.0	34.0		0.6+	47.0
Massachu-setts		130.0	In EE	30.0	160.0	3.7

Responding to Energy Challenge

System Benefit Charges, $Million

State	R&D	EE	LI	RE	Mills/KWH	Total
Montana		8.9	3.3	1.8	1.1	14.0
Nevada	TBD	TBD	TBD	TBD	TBD	TBD
New Hampshire		TBD	13.0		TBD	TBD
New Jersey		87.5	10.1	30.0	1.96	127+
New Mexico			0.5+	4.0	0.3	5+
New York	14.0	54.0	10.0	In R&D	0.3	78.0
Ohio		15.0	100.0		0.8	115.0
Oregon		31.5	19.0	9.5	1.9	60.0
Pennsylvania		11.0	85.0	2.0	0.8	98.0

2-15

Responding to Energy Challenge

System Benefit Charges, $Million

State	R&D	EE	LI	RE	Mills/KWH	Total
Rhode Island		14.00	In Rates	2.5	2.6	14.5
Texas		TBD	TBD		TBD	TBD
Vermont		13.1	TBD	TBD	TBD	TBD
Wisconsin	1.1	62.0	45.3	2.8	2.2	111.2

R&D – Research and Development, EE – Energy Efficiency, LI – Low Income Assistance, RE – Renewable Energy, TBD – to be decided

- **At least 22 states have enacted system benefit charges ranging from 0.3 to 4.0 mills per kiloWatt-hour. The biggest target is support for energy efficiency programs.**

Meeting the Energy Challenge

Renewable Portfolio Standards

State	MW or %	Year	Comments
Arizona	1.1%	2007	Half must be solar
Colorado			PSC mandate
Conn.	13%	2009	Limit hydro portion of renewables
Maine	30%	?	Facilities must be 100 MW or less
Maryland			PSC report required
Mass.	4%	2009	1% per year thereafter
Nevada	1%	2009	Half to be new solar
New Jersey	4%	2012	Incremental requirements
New Mexico			Suppliers must offer renewables

Meeting the Energy Challenge

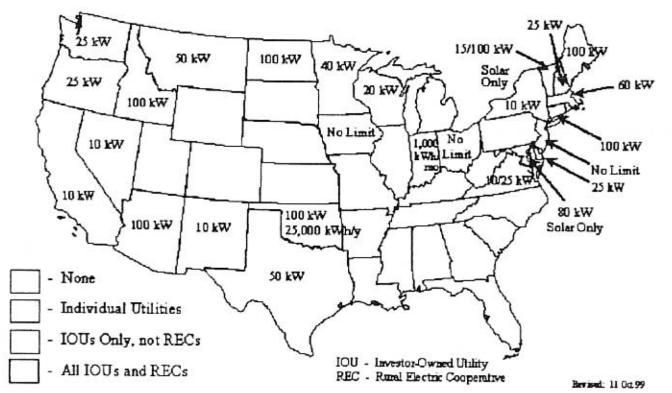
Renewable Portfolio Standards

State	MW or %	Year	Comments
Penn.			Case by case
Texas	2000	2009	400 MW by 2003
Vermont	4%	2007	Up to 15%
Wisconsin	2.2%	2011	Incremental
Minnesota			
Iowa			

Responding to Energy Challenge

Scope of Net Metering By State

with capacity limits and solar-only states noted



NREL 2001

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Pursue Strategies That Achieve Performance

- Good opportunities
  - Incentives or mandates based on performance
  - Encourage emergence of new enterprises
    (buggy builders didn't invent automobiles)
  - Public education about energy options
  - Research and development that focuses on Kansas

Pursue Strategies That Achieve Performance

- Poor opportunities
  - Energy codes that are not enforced
  - Programs with broad goals and no funding
- Bad Ideas
  - Subsidizing energy consumption
  - Monopolies that profit from energy consumption
  - Incentives based solely on purchase price
  - Renewable energy systems with low EPRs

Big Issues Not Addressed

- Urban sprawl is energy intensive
- Railroads are far more energy efficient than trucks
- Our agricultural system is dependent on fossil energy
- Global warming – it is very real, and the Europeans will likely force us to participate in efforts to counter it

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Utilities Committee
Kansas Senate
Written Testimony of Gene M. Meyer, P.E.
Energy Extension Service at Kansas State University
March 5, 2001

Kansas has been blessed with abundant natural resources. Kansas is the sixth largest producer of natural gas in the nation[1]. The Hugoton field has long been a supplier of natural gas not only for Kansas but also for the Midwest. While better known for its grain production, Kansas is the eighth largest producer of crude oil. To meet its own energy requirements, Kansas relies primarily on petroleum, natural gas, and coal---almost in equal shares. Most of the power generated at electric utilities in Kansas comes from coal and nuclear power but there is an increasing trend towards the use of natural gas for electric generation.

While these resources have served Kansas well, they are not inexhaustible. Oil and gas production, while up slightly in 2000 over 1999 totals, are down significantly over earlier highs. Oil production is only about one third of the production in the 1950's and 60's and natural gas production is about half of the peak production in the 1970's. Kansas, long a net exporter of energy, is on track to become a net importer of energy. Higher prices will spur new exploration and improved production techniques will help recover more from existing reserves, but there is a limit. Alternative energy including wind and solar can contribute to the production and need to be developed to replace diminishing fossil fuels.

However, we as a state must begin to consider the demand side of the energy picture. Reducing the demand for energy is more effective and persistent in solving Kansas' energy problem than producing more energy. Improving the performance of our energy consuming systems can have a major impact on the demand for energy and the balance of energy imports and exports in Kansas.

Improved performance should be addressed in all sectors: residential and commercial buildings, industrial processes, and transportation. My professional experience is with residential and commercial buildings and I will limit the remainder of my comments to these issues.

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[1] U.S. Department of Energy, Energy Information Administration

Residential and commercial energy use account for about 19 and 17 percent respectively of Kansas's annual energy use. In the residential sector, there is great opportunity for reducing the cost and energy use of both new and existing homes. If new homes built in Kansas were designed and constructed to minimum energy code requirements rather than standard practice, heating energy would be reduced over 25 percent and cooling energy by nearly 17 percent. If new, commonly available high performance heating and cooling systems were used in combination with these model energy code requirements, saving increases to 35 percent heating and 30 percent cooling energy. These opportunities do not reflect the use of expensive cutting edge technology but rather common, well-understood construction techniques and materials.

Many of the features impacting energy performance will persist throughout the life of the home. Failure to build an energy-efficient home will doom that home to lower performance for its life, even if some improvements are made at later times. Some features like high-performance windows, while only marginally more expensive during initial construction, are generally too expensive to retrofit and are seldom replaced. Failure to build high-performance housing represents a lost opportunity.

Other approaches such as Home Energy Ratings, EPA Energy Star, and KC Smart Builders allow the homebuilder and homeowner to go beyond these minimum requirements and achieve even greater savings.

Energy reduction opportunities exist in almost all existing homes too. There are simple low- or no-cost approaches such as thermostat control, use of passive solar opportunities, and equipment clean and tune-ups that can have significant benefit. In many cases, additional insulation, air sealing, and high-performance equipment are cost-effective retrofits. Savings from five to thirty percent or more are possible. A packet of energy conservation and educational materials, prepared in response to this year's anticipated high natural gas prices, has been widely distributed to help Kansan's conserve.

The Kansas Weatherization Assistance Program has adopted basic building science approaches for use in low-income home weatherization program with real savings. Heating energy cost savings from national weatherization efforts have averaged over 23 percent, often 25-30 percent. This is significant when you consider the weatherization housing stock often represents some of the poorest housing available. .

Commercial buildings, both new and existing, have opportunities for considerable savings. Kansas statute presently requires new commercial buildings be built to comply with the 1989 version of *ASHRAE Standard 90.1, Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings*. While buildings built to this standard will typically use less than other buildings, the standard has been upgraded in 1999 and reflects current technology and design. Currently, local communities are considering upgrading existing building codes and many are considering the adoption of International Energy Conservation Code. Local or state adoption of the International Energy Conservation Code would provide a major advancement in building energy codes and foster higher performance buildings.

A recent survey of commercial building energy use found a wide variation in energy use intensity. Small commercial offices built to comply with *ASHRAE Standard 90.1* are expected to have energy use intensities in the range of 60-80 thousand Btus per square foot of building floor area per year (MBtu/year/ft^2). Buildings in the survey have energy intensities ranging from 35 MBtu/year/ft^2 to highs over 140 MBtu/year/ft^2. If the poor performing buildings performed at the expected level, the total building energy savings would have exceed 40 percent. Again, the technology and design practices do not reflect state-of-the-art design but rather commonly available equipment and building practices. Using higher performance equipment in conjunction with integrated design of the building envelope and mechanical systems would result in even lower energy use and greater savings. Doing it right at the time of initial construction can make a significant difference.

For those buildings already out there, conservation strategies do work. Lighting is often a major energy consumer in commercial buildings. Recent developments in fluorescent lighting technology have reduced the electric consumption of lighting and demand by over 40 percent over 1985 technology. Reduced lighting energy also reduces summer cooling requirements. Improved controls, high-performance equipment, energy efficient drives and motors, and in many cases, building insulation will provide added savings.

Energy-efficient design of our new buildings and retrofit of existing buildings not only reduces energy cost to the owner, but it reduces demand on existing electric generation and natural gas production equipment, it delays the need for new electric generation, reduces the draw-down of our natural gas supplies, and reduces our import of western coal.

During the 1980's, many utilities had demand-side management programs aimed at reducing the energy intensity of their customers. Reducing the demand for energy was viewed as the cheapest source of new capacity. These programs aggressively sought to upgrade their customer's energy consuming equipment and encouraged quality construction. These activities were considered to be part of the delivery of goods and services by many regulating authorities and were encouraged. Kansas' utilities, while not the leaders in this area, did provide customer service aimed at reducing energy use. During that same time, our office provided no-cost technical assistance to the residential and commercial building owners.

In the mid 1990's, anticipating a major restructuring of the utility market, utilities began cutting these programs. There are still good examples of customer service groups in Kansas, but there are far fewer.

There is a direct relationship between the effort and resources devoted to improved efficiency and the resulting savings. The state of Washington, after nearly two decades of significant demand side activity, has electric savings of almost ten percent of sales. Kansas has not fared so well. In a scorecard developed by the American Council for an Energy-Efficient Economy, Kansas ranked 42 overall on utility energy efficiency programs. But the time is still at hand.

Conservation has long been recognized as a vital part of the energy supply and demand picture. Reduced demand for energy through energy conservation in new and existing buildings is not only cost effective for the building owner, it also reduces the strain on generation and transmission systems, delays the construction of new generation plants, and slows the depletion of our natural resources. In the end, the cheapest energy is the energy that is not used.

UTILITIES COMMITTEE
KANSAS SENATE
WRITTEN TESTIMONY OF DOUGLAS WALTER, PRESIDENT
KANSAS BUILDING SCIENCE INSTITUTE, MANHATTAN, KS
March 5, 2001

I am here today to speak briefly to the role that home energy ratings can have in achieving greater residential energy efficiency in Kansas.

I have been involved in studying, teaching and writing about building energy efficiency for more than 20 years. For the first sixteen years, I did this as a residential energy specialist at Kansas State University. Four years ago, I founded a private training institute – the Kansas Building Science Institute based in Manhattan – to provide accredited training for a new industry that is transforming the way building energy efficiency is promoted to consumers as well as to builders and the building trades. This new industry is the home energy ratings industry.

A home energy rating is a uniform method of determining and rating the energy performance of residential buildings. The rating provides a numerical score on a 100-point scale that provides a simple way to compare the energy efficiency of one home to another. The rating also predicts the cost to heat, cool and operate a house on an annual basis. This makes it possible to accurately predict the energy and dollar savings that will result from efficiency improvements to a house.

The well-documented validity of the energy savings predicted by home energy ratings has led to their adoption by major national mortgage underwriters to grant more favorable lending guidelines for homes that meet certain efficiency standards.

The success of home energy ratings is due to several important factors:

- The rigorous standards for certification required of individual energy raters.
- The rigorous standards for accreditation required of organizations that conduct or oversee energy ratings, including requirements for quality assurance and permanent archiving of all energy ratings.
- The rigorous standards for software that is used to produce energy rating reports.
- The on-site verification of efficiency features and performance testing of the air leakage of all buildings that receive energy ratings.

The requirement for on-site verification and performance testing may well be one of the most important aspects of a home energy rating. Virtually every new homebuyer will tell you they believe they are purchasing an energy-efficient home. Certainly no builder believes he or she has built a home that is not well-insulated or tightly constructed. Nor does the HVAC contractor believe he or she has installed leaky ducts or over-sized heating and air conditioning equipment. And no seller of an existing home is likely to admit to its energy flaws. Yet we know that many homes, both new and existing, suffer from these and other deficiencies that waste energy and compromise comfort and livability.

A home energy rating reveals the actual energy performance of a home – whether flawed or exemplary. But, it doesn't stop there. It provides a basis for determining those improvements that will produce the greatest energy savings for the least cost. By accurately predicting the value of energy savings, measures can be ranked by the savings they will produce relative to their cost to install.

Perhaps some of you have wondered whether you could justify the cost of a more efficient furnace or air conditioner, an additional layer of insulation in the attic, or the installation of high-performance windows. Perhaps you've wondered exactly how leaky your house is or where the air is coming from that leaks through your house. These are all questions that are easily and accurately answered by a home energy rating and performance test.

If I could leave you with one impression, it's how far my industry – the building performance industry – has come in the past 20 years. As just one example, our state's weatherization assistance program for low-income families began to adopt the equivalent of a home energy rating and performance test about ten years ago. Inspectors were required to become certified after extensive training, and sophisticated diagnostic tools were incorporated into the inspection protocol for homes receiving weatherization assistance. As a result of these changes, measured energy savings more than doubled from just under 10 percent annual savings to more than 20 percent. This greatly increased savings was achieved at little added cost by simply investing in measures that were shown to produce more energy savings, and dispensing with those that either saved little energy or were too costly for the savings they produced. Home energy ratings have brought this same level of sophistication and quality to the private sector.

I commend you for including home energy ratings as the verification instrument for the tax incentives you are proposing to promote investments in residential energy efficiency. The use of energy ratings will have two important benefits: it will assure that the state's investment in energy efficiency will produce the desired reduction in energy use; and it will help to develop an industry and consumer awareness of that industry that will continue to generate sound investments in energy efficiency long after the sunset of these incentives.

Thank you.