COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

AN ASSESSMENT OF KENTUCKY'S ELECTRIC GENERATION, TRANSMISSION, AND DISTRIBUTION NEEDS	)))	ADMINISTRATIVE CASE NO. 2005-00090

Submitted
TESTIMONY AND EXHIBITS

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14 June 2005

I want to thank members of the Commission for the opportunity to provide testimony in regard to critical issues surrounding Kentucky's electrical power industry.

I have lived in Kentucky for over 40 years and have worked in businesses related to energy services for over 25 years. I am a Certified Energy Manager, a Certified Business Energy Professional, a Certified Demand Side Management Professional and hold an accreditation in Leadership for Energy and Environmental Design. I am also President of the Association of Energy Engineers, an international organization with roughly 10,000 members in over 50 countries. [for brief resume see Exhibit 1]. Last week, I co-chaired the UN/AEE sponsored Conference on Climate Change, Energy Awareness and Energy Efficiency in Budapest. I am employed by ESG, a leading energy service provider that has performed over $400 million in energy service contract agreements.

Despite low electrical costs, Kentucky provides energy services companies with a target rich business environment. To the economic benefit of the Commonwealth, what we are experiencing is a renewed focus on energy conservation, energy efficiency, and demand side management solutions.

Top Issues Facing Electric Power Industry

From an economic point of view, the electric power production industry in the Commonwealth faces the need for renewal. In addition to rising costs for fuels, the costs of externalities, such as pollution, damage from greenhouse gasses, restoring coal extraction sites, medical costs from the pollution generated (which subsidize the industry and are not embedded in the product costs) are increasing dramatically. These costs are likely greater than the aggregate costs of purchasing the energy. Access to land for power plants and the ever increasing costs of transmission and maintenance to electrical systems

are problematic. These pressures threaten to increase the costs of electrical production in the future.

Too make matters for difficult for electron purveyors, *we simply don't require additional local production to meet the needs of Kentucky's population and industrial infrastructure*.

Barriers to meeting future investment in power infrastructure

The greatest barrier to future investments is the difficulty people have of perceiving what is actually possible with alternatives to supply side solutions, and the economic potential alternatives offer. A paradigm shift that involves new wave solutions is occurring in the U.S. Nothing less than an economic redirection is necessary for Kentucky to regain energy prominence. We require a renewed vision of what is possible, a reassessment of proven alternatives and a refocus of effort in applying energy conserving technologies.

The power infrastructure solutions required do not necessarily include increasing power generation. Decentralized solutions are needed with an increased role for demand side management. We need a power infrastructure that focuses on energy from conservation, improved efficiency and policies that promote local sustainability. Sustainability agendas are being adopted by most major cities, especially in the Sunbelt [2], and many major corporations, including UPS and General Electric.

These approaches, combined with alternative energy solutions, have become the No. 1 "producer" of energy in the U.S. since 1990. In fact, energy consumption in constant 2000 dollars of GDP declined from 1993 to 2003 from 11,630 BTUs to 9,440 BTUs, a 19% efficiency improvement in only 10 years.

Costs are competitive… electrical energy conservation solutions typically cost 2-3 cents per Kwh saved [3], a figure significantly less that the costs of new production. Local employment is created in the process. For example, a recent study indicated that implementing a Clean Energy Development Plan could create more that 200,000 jobs in the Midwest by 2020 and generate $20 billion in increased economic activity [4]. In addition to providing business and economic opportunities, this approach is in alignment with the Governor's Comprehensive Energy Strategy which recommends that the Commonwealth, should "require interagency cooperation to promote energy efficiency initiatives" [5].

Technologies available

Demand side management is much more than low income weatherization and air compressor demand conservation programs. There are proven technologies available that have not yet been fully exploited in Kentucky. These technologies include:

- Lighting systems (LED and Fluorescent)
- Electrical motor replacement

- Variable speed drives
- Higher SEEF ratings on package A/C equipment
- Co-Generation systems for simultaneous production of heat and power
- Greater use of digital energy management systems that can provide load shifting and demand limiting.
- Insulation and infiltration reduction
- Replacement of all single pane non-thermally broken windows with high efficiency glazing
- Land fill gas electrical generation
- Installation of 2-10 MW generators at smaller lakes throughout Kentucky
- Installing more efficient chillers and heating equipment

While Kentucky is one of the states with the least costly electricity, energy usage substantially exceeds national averages on a per capita basis. To maintain a competitive edge and keep electrical rates low, we need a stronger demand side management program… one designed to create business opportunities for energy engineers, energy managers, alternative energy production companies and energy service companies. Such programs involve broadly based agendas and typically include:

- Adoption of the International Building Energy Code
- Adoption of LEED standards that use green construction practices and incentives to promote the use of this program
- Adoption of Energy Star program by state and local governments (GE in Louisville manufactures Energy Star products)
- Adoption of a Sustainable Development Agenda at all levels of government
- Creation of a state-wide solar roofs program similar to New Jersey's program
- Expansion of rate schedule programs that provide second and third tier pricing periods of highest peak demand
- Provision of utility funded financial incentives (e.g. rebates) for demand side management projects and energy conservation schools, institutions and industry
- Funding and establishing energy conservation research centers at major universities
- Creation of a state center for energy excellence
- Accepting utility energy surcharges of 1-3% to subsidize rebate programs that encourage installation of energy saving products
- Establishing public education and advertising programs

The positive impact of implementing these policies includes keeping and creating high technology/high paying jobs in the Commonwealth. Increased employment in the state for engineering professionals, energy service providers, manufacturers and contractors who make and install energy saving technologies will also result. Since the alternative technology based solutions provide relatively benign environmental impacts, implementation will allow continued industrial expansion without the detrimental environmental impacts often associated with increased power production. The need to improve electrical transmission infrastructure will also be reduced.

EXHIBITS (Attached)

[1] Resume for Dr. Stephen A. Roosa

REFERENCED EXHIBITS (Attached)

[2] Roosa, S. A. (2005). *An Assessment of Energy and Sustainability in the Sunbelt,* submitted for publication in the Encyclopedia of Energy Engineering, 2006 edition..
[3] Carter, S. and Geller H. (2004). *Energy Efficiency*. p. 1.
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[5] Flecher, E. (2005). *Kentucky's Energy, Opportunities for Our Future – A Comprehensive Energy Strategy.*

EXHIBIT 1

Dr. Stephen A. Roosa

Dr. Stephen A. Roosa
Performance Contracting
Engineer
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Dr. Roosa is the Performance Contracting Engineer for Energy Systems Group's Louisville, Kentucky office. He is responsible for overseeing all phases of the performance engineering process, including energy studies, water studies, rate analysis, sales and project management, throughout Kentucky and Tennessee.

Dr. Roosa has extensive experience in performance contracting, lighting systems, control systems. HVAC and architectural modifications, project management and financial analysis for performance based projects for universities, school districts, medical facilities and local governments. He has over 25 years of experience in leadership and management. Since 1997, has implemented performance contracts for over 250 buildings in Kentucky, including a project that won the 1999 Federal Energy and Water Management Project Award.

Education

Ph.D. in Public and Urban Affiers in Planning and Developemnt, University of Louisville

Master of Business Administration, Webster University

Bachelor of Architecture, University of Kentucky

Professional Certifications

Certified Business Energy Professional

Certified Demand Side Management Professional

Certified Energy Manager

Certified Measurement and Verification Professional

Certified Indoor Air Quality Professional

LEED Accredited Professional

Awards

Federal Energy Water & Management Project Award, 1999

National Energy Systems Technology Award, 1991

U.S. Army Material Command, Energy Conservation Award, 1989

U.S. Department of the Defense, Citation of Achievement for Energy Management, 1988

AEE International Energy Manager of the Year, 1987

AEE Region II (Southeast), Energy Manager of the Year, 1986

AEE Bluegrass Chapter Energy Engineer of the Year, 1986

Corporate Energy Management Award (for energy projects at a Fortune 100 Company), 1985

Joint Chiefs of Staff Citation for Energy Management 1983

Professional Affiliations

President, Association of Energy Engineers (AEE), Atlanta, GA

Director, Sustainable Urban Neighborhoods, Louisville, KY

Member, Kentucky Energy Services Coalition

AN ASSESSMENT OF ENERGY AND SUSTAINABILITY POLICIES IN THE SUNBELT

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KEYWORDS: Energy Policy, Sustainability, Local Energy Policies, Sunbelt

ABSTRACT

This article focuses on evidence indicating that a positive relationship may exist between the adoption of sustainability as a local goal and the rates of local energy policy adoption in Sunbelt cities. The evidence suggests that policies responding to energy and environmental issues may provide long term solutions to achieving urban sustainability. It has been suggested that "sustainability can provide a qualitative measure of the integrality and wholeness of any given system" [1].

The fundamental question becomes: What evidence is there that cities with sustainability as a stated goal have higher rates of local energy policy adoption? In this article, it is discovered that cities with sustainability as a local goal are more likely to adopt certain energy related polices. It is determined that there is variability in the implementation of energy related policies in Sunbelt cities. The author concludes that Sunbelt cities with sustainability as an urban goal have higher rates of energy policy adoption when the three selected policies are studied as indicators.

INTRODUCTION

Cities have common energy concerns that impact their urban environments. Cities seeking to incorporate policies that lead to sustainability, generally consider energy policy to be a critical component of their urban agendas. These concerns are manifested in urban policies and programs designed to achieve results that include reducing energy usage with the potential of improving the environment. The purpose of this research is multifold:

- Determine which Sunbelt cities have sustainability goals;
- Provide a descriptive comparison of select energy related policies in Sunbelt cities;
- Identify the specific types of policies are being adopted and pursued.

In this article, the concept of sustainability is defined and cities with sustainability agendas are identified. The 25 largest cities in the Sunbelt (noted in the attached tables) have been selected for consideration. This research provides an assessment of the selected cities based on the energy related policies they have adopted. To provide evidence of policy adoption, three locally adoptable energy related policies are considered. The three policies considered are: 1) city operated energy efficiency programs; 2) local governmental energy program support; and 3) Energy Star^{TM} program participation.

URBAN SUSTAINABILITY

Sustainability is a broadly defined concept that has a variety of meanings. Urban sustainability refers to an idealized model of urban development that attempts to address concerns about urban growth, patterns of urban development and issues that arise as urban development occurs. According to Beatley [2], the four principles of urban sustainability include: 1) the principle of urban

management; 2) the principle of policy integration; 3) the principle of ecosystems thinking; and 4) the principle of cooperation and partnership. How cities choose to manage energy policy involves each of these principles. Energy policy requires management, needs to be integrated with other urban policies, impacts many ecosystems and requires cooperation and partnership to be successfully pursued.

For the purposes of this article, sustainable development is defined as: The ability of physical urban development and urban environmental impacts to sustain long term inhabitation by human and other indigenous species while providing: 1) an opportunity for environmentally safe, ecologically appropriate physical development; 2) efficient use of natural resources; 3) a framework which allows improvement of the human condition and equal opportunity for current and future generations; and 4) manageable urban growth. Non-sustainable urban development is the antithesis of sustainable urban development. Non-sustainable development implies growth that is environmentally unsafe, consumes resources inefficiently, degrades the human condition, is characterized by persistently unmanageable development and fails to value social equity. The energy policies cities choose to adopt are critical to the success or failure of urban sustainability programs. Inappropriate use of energy can cause substantial damage. Energy is a resource that needs to be used efficiently. Over consumption of available energy resources can cause a tragedy of the commons, preventing future use of the resource. Urban growth can be impacted by dependence on fossil fuels.

COMPARING SUNBELT CITIES AND THEIR POLICIES

Why are Sunbelt cities and their sustainability policies particularly interesting? Sunbelt cities are significant centers for urban population growth and development in the U.S., generally outpacing

their non-Sunbelt counterparts. Many of the selected cities in this broadly defined region (e.g. Las Vegas and Phoenix), are among the fastest growing cities in the United States. A few are leaders in implementing innovative policies. Many of the Sunbelt cities used in this study, including Atlanta, Austin, Phoenix, Nashville and Oklahoma City are their state capitals making them centers of state-wide decision making. With new investment and construction, Sunbelt cities have the opportunity to select from a range of newly available technologies when growing their cities. Their policies will ultimately impact not only the present design of the cities, their future energy usage and the sustainability of their urban areas.

The cornucopia of policies available to urban regimes to achieve reductions in energy use that are relevant to this study might include transportation system policies, energy management programs, organizational memberships, and policies designed to improve the environment. This examination focuses on three selected indicators: 1) city operated energy efficiency programs; 2) local government energy program support; and 3) Energy Star program participation. The selected policies require local initiative to implement and sustain. The energy related policies selected have broad applicability and are available for adoption in some form by all urban areas considered in this study. The first category of policy indicators focuses on whether or not sustainability is a local goal.

SUSTAINABLE DEVELOPMENT AS A POLICY GOAL

This indicator poses a fundamental question: Is sustainable development or urban sustainability a stated goal of the city? Ancient southwestern monuments such as Mesa Verde and Chaco Canyon provide testimony that cities in the southwest may have been abandoned as a result of environmental mismanagement and changes in local environmental conditions. Many southwestern mining towns

grew to become boomtowns, only to go bust and ultimately become ghost towns after their resources were no longer considered exploitable. Perhaps, even today, we are growing new throw-away cities. If the goal of sustainability is not an identified goal of the urban agenda, then it would seem unsurprising if it is not achieved.

The use of the language of sustainability in local policy making is a relatively recent phenomenon with variable interpretations. To consider this indicator, it must be accepted that there are multiple definitions of sustainability and that the various definitions are subject to a wide range of interpretations. Ignoring the conundrum of interpretations, this policy indicator gauges only whether or not sustainable development or sustainability has become a stated urban goal. However, the contextual interpretation of the concept of sustainability when searching databases was discriminately limited for the purposes of this article. For example, if a city's only stated "sustainable" policy is to "maintain a sustainable tax base" then the term was judged to be misapplied and discredited.

A total of seven cities (28%) have established sustainability as a primary urban goal. These cities are Jacksonville, El Paso, Long Beach, Albuquerque, Atlanta, Mesa, and Tulsa. How cities implement sustainability policies varies. In 1985, Jacksonville initiated its "Quality of Life in Jacksonville" program [3]. The pledge of Atlanta's City Council President to "create an efficient, vibrant and sustainable city" includes an energy conservation initiative that began in 2002 [4]. In Tulsa, urban sustainability is a primary administrative goal, strongly supported by the city administration. Long Beach is atypical in that its 2010 Citywide Strategic Plan identifies "becoming

a sustainable city" as a primary strategic goal. There is a statement in the *Vision of the Mesa 2025 General Plan* to support the city "as a sustainable community in the 21st century."

Seven additional cities (28%) have identified programs to support sustainable building policies, have demonstration projects underway, or have established land use requirements to promote sustainable development. San Antonio has a program to support community revitalization with a goal structure that includes "sustaining a strong urban system" [5]. The City of Tucson lists a developer driven project for the new community of Civano to develop a model sustainable community. The goal of the "Civano project is to create a new mixed use community that attains the highest feasible standards of sustainability, resource conservation and development of Arizona's most abundant energy resource –solar – so that it becomes an international model for sustainable growth" [6]. In Los Angeles and Austin sustainable building programs or guidelines have been established for new construction.

While 14 (56%) have identified sustainability as a goal or have related sustainable development policies, the remaining 11 (44%) Sunbelt cities have not established sustainability as an urban goal. It is possible to speculate that for this set of Sunbelt cities being perceived as having a local goal of "being sustainable" may be unimportant, not considered a priority, counter to the goals of the local regime, or being considered but not yet implemented. Among these cities are Houston, Dallas, Fresno and Las Vegas. Table 1 provides a summary of cities and indicates which have sustainability agendas.

Other cities in this category, including Charlotte and Fort Worth, have programs with a focused development policy effort based on a "smart growth" agenda. However, policies associated with achieving smart growth agendas are not necessarily sustainable development initiatives. Having identified cities with sustainability as a local goal, three types of energy related policies will be considered.

CITY OPERATED ENERGY EFFICIENCY PROGRAMS

Cities are owners of many and varied municipal facilities. The types of buildings owned by cities include courthouses, office buildings, educational facilities, fire and police stations, sewage treatment facilities, emergency action and preparedness centers, libraries, public health facilities, training facilities, subsidized housing, etc. These facilities collectively consume significant amounts of energy. Urban regimes and their administrators may view energy use as a matter of serious concern worthy of attention, an uncontrollable overhead expense, an unavoidable but manageable cost, of concern only if publicly scrutinized or as inconsequential.

The idea of civic engagement and the ethic of institutional stewardship have been linked to improving sustainability [8]. It seems logical that city governments adopting sustainable policies would be concerned with the costs and impacts of energy in their buildings and facilities. This policy indicator gauges whether or not the city government has an internal energy efficiency program. The actions taken by local administrations would likely be manifested in policies that support energy efficiency improvements such as the installation of energy saving technologies, building envelope and architectural improvements, equipment replacement, adoption of building standards among

others. In order to implement facility improvements, partnerships such as performance contracts might be considered useful [7].

This energy policy indicator provides a gauge of the importance of sustainability to local policy planners. Does the city government feel energy conservation and energy efficiency in its own buildings is important enough to warrant concerted effort? This research indicates that the administrations of most Sunbelt cities feel that energy management programs are important. In this sample of 25 Sunbelt cities, 19 (76%) have initiatives to improve energy efficiency in public buildings while only six (24%) lacked such programs. What is striking is the wide range of approaches that cities have chosen to employ. Sample efforts implemented by Sunbelt cities include:

- Having a departmental division in city government for Energy Conservation and Management (e.g. San Diego);
- Hiring a City Energy Manager and implementing recommended improvements to manage and reduce energy use;
- Establishing a written energy policy for government owned buildings;
- Requiring energy assessment surveys of city owned buildings to determine economically appropriate actions and alternatives to reduce energy use;
- Mandating the use of "Green Building" construction techniques or incorporating standards such those required by Leadership in Energy and Environmental Design (LEED) for new construction;
- Participating in packaged programs such as the U.S. Department of Energy's Rebuild America Program;

- Using energy saving performance contracts (ESPC) as a vehicle for facility improvements with third party financing, subsidized by energy savings and cost avoidance.

The most popular policy effort among the sampled cities (with seven cities participating) was found to be the adoption of the principles and requirements of the USDOE sponsored Rebuild America program. Rebuild America is a "network of community-driven voluntary partnerships that foster energy efficiency and renewable energy in commercial, government and public housing programs" that "works to overcome market barriers that inhibit the use of the best technologies" [9]. This program is geared toward policies that reduce facility energy use while lowering the costs of energy. Among those participating in Rebuild America are the four largest Sunbelt cities (Los Angeles, Houston, Phoenix and San Diego).

Phoenix has budgeted over a million dollars annually through 2005 to directly fund capital intensive energy conservation improvements. Dallas, Austin and Long Beach have adopted Green Building or LEED construction standards for city owned buildings. San Diego's Environmental Services Operations Station administration building has carports in its parking lot with rooftop photovoltaic panels which generate 91,500 Kwh per year [10].

With over two-thirds of the city below sea level, New Orleans has concerns about rising sea levels which threaten to displace its urban residents. As a result, in October 2001, New Orleans adopted a unique policy to reduce the threat of global warming. Greenhouse gas emissions have been profiled and municipal emission reduction targets have been mandated through 2015. Their research revealed that municipal buildings were responsible for approximately 35% of the CO_2 emissions

released from municipal operations. Mitigation measures, justified by energy savings, were implemented in a number of buildings including City Hall, the Court Complexes, the Public Library, Police Headquarters, the Airport and others. These measures include mechanical system upgrades, installation of energy efficient lighting systems, tree planting, installing LED new traffic signals, establishing building energy codes for city buildings and measures to reduce the urban heat island effect. Despite this epochal and precedent setting policy initiative, it is obvious that the actions of one city will not resolve the problems associated with global warming.

Atlanta's Energy Conservation Program exemplifies those programs that offer tangible and measurable financial returns. Atlanta's program included efforts to schedule policy workshops, perform utility rate assessments for over 600 municipal accounts, perform energy audits and develop an internal employee energy conservation program. Within one year after initiating the program, the city had projected savings from these initiatives of nearly $500,000 [4]. In addition, the city has established a policy goal to reduce energy consumption by an additional 10% by 2010 and has appointed an Energy Conservation Coordinator [4].

LOCAL GOVERNMENTAL PROGRAM SUPPORT

This policy indicator gauges policy support by the city government for local energy conservation, energy efficiency and alternative energy programs. This measure asks if the local governments are active in promoting energy related programs within their respective communities.

Local energy conservation efforts can be supported by citizen actions, organizational support, corporations, utilities, local governments, other governmental bodies or by other means. Local participation and involvement are central to the idea of sustainable cities [1]. Local governments

have the primary economic means and leadership infrastructure to direct the orientation of community energy policies should they desire to assume such a role.

Among the local government entities, 14 of the 25 cities in the sample offer some sort of policy or program to support energy conservation or alternative energy or to provide incentives for complementary technologies for new construction in their local communities. An approach that is used by seven cities is to provide financial incentives or support for community projects involving new building construction that incorporate green building technologies. The City of San Antonio has established the Metropolitan Partnership for Energy, a partnership of the city government and the community at large. The partnership has established an energy council, educational programs, facility and infrastructure improvements, equipment conservation measures, fleet conservation standards and procurement requirements. Tucson and Las Vegas, are among those Sunbelt cities that have adopted building code requirements for energy efficient construction.

Other cities are less committed and subsidize less extensive programs. While the City of El Paso has a program, perusal of the city budget indicates that only $7,500 is allocated annually. Fresno's energy policy provides for weatherization assistance for the homes of senior citizens. There are 11 cities among those sampled that lack any active energy conservation program, alternative energy policy, or support for similar local initiatives.

Combining the results from researching local governmental energy policies or programs, it was determined that: 1) a total of 14 cities (56%) meet the requirements of this policy measure and have

established policies or programs supported by local government; and 2) eleven cities (44%) lack policies supported by the local government.

ENERGY STAR™ PARTNER

This indicator asks whether or not the city participates as a member in the Energy Star™ program. Energy Star™ partners include manufacturers, retailers, utilities, builders, and governments among others. While partnership is voluntary, there are commitments to which members must agree. To become a partner, organizations must: 1) sign a memorandum of partnership committing the organization to continuous improvement of energy efficiency; 2) measure, track and benchmark energy performance; 3) develop and implement a plan to improve energy performance; and 4) educate staff and the public about the partnership and achievements of the program [11]. For urban governments, the opportunity as an Energy Star™ partner is to use the label to support equipment purchasing decisions, to improve energy planning strategies and to make better decisions concerning in regard to energy related facility improvements.

Energy Star™ is a voluntary labeling program started in 1992 that is cosponsored jointly by both the U. S. Environmental Protection Agency (USEPA) and the U.S. Department of Energy (USDOE). The focus of the labeling program concerns buildings and the energy consuming equipment within them. Office products, mechanical equipment, lighting systems, electronics, appliances and other products are labeled indicating that they can be promoted as being energy efficient. The Energy Star™ label has been extended to include new construction including homes, commercial structures and industrial buildings. According to its website, "through its partnerships with more than 7,000 private and public sector organizations, Energy Star™ delivers the technical information and tools

that organizations and consumers need to choose energy-efficient solutions and best management practices" [11]. Energy Star™ also offers a building energy performance rating system which has been used for over 10,000 buildings throughout the U.S. By leveraging private and governmental partnerships, Energy Star™ has proven to be among the most cost effective programs sponsored by the U.S. government.

For policy makers in other cities, meeting the partnership requirements suggests might be viewed as being too costly to support and implement. A commitment to specify energy efficient equipment might be associated with higher initial costs. A full time energy engineer might be required to baseline energy usage targets and establish goals. Partnership requirements might also be viewed as potentially intrusive for city administrations who consider it politically ill advised or otherwise undesirable to advertise their ever-increasing energy costs. City administrations agreeing to measure and track energy performance, implement a plan and improve energy performance may be subject to public scrutiny should they fail to meet objectives. As a result, some local administrators may not adopt the Energy Star™ program due to the perceived potential for political risk.

Due perhaps to these and other considerations, only 10 of the 25 sampled Sunbelt cities (40%) have become Energy Star™ partners. These cities are Los Angeles, Houston, San Diego, Dallas, Fort Worth, Tucson, Las Vegas, Albuquerque, Atlanta and Miami. Consider the case of Mesa, which is among those cities that has established sustainability as a primary urban goal, yet has not chosen to be an Energy Star™ partner. On the other hand, Las Vegas, Houston, Fort Worth and Dallas are examples of cities that have not adopted sustainability goals, but happen to be Energy Star™ partners.

Table 2 provides a summary of selected the selected policy indicators and identifies which Sunbelt cities have adopted each of the policies considered in this assessment.

FINDINGS

To determine if cities with sustainability as a local goal tend to adopt more energy related policies, the Sunbelt cities are considered in two groups. It was stated that 14 (56%) of the Sunbelt cities have identified sustainability as a goal or have related sustainable development policies. These cities have adopted an average of 2.07 of the three energy related policies that were considered. The remaining 11 (44%) Sunbelt cities have not established sustainability as an urban goal. These cities have adopted an average of only 1.18 of the three selected policies.

There are five cities that have adopted sustainability as a local goal (Los Angeles, San Diego, Tucson, Albuquerque and Atlanta) and have also adopted all three of the considered energy related policies. In addition, there are two cities that have not adopted sustainability as a local goal (Houston and Las Vegas) that have adopted all three of the considered policies. Far more cities from the sample that have adopted sustainability as a local goal have adopted all three energy related policies. Alternatively, three cities that have not adopted sustainability as a local goal, have not chosen to adopt any of the three considered policies (Charolette, Virginia Beach and Oklahoma City).

This evidence suggests that cities that have identified sustainability as a goal or have implemented related sustainable development policies are more likely to adopt energy related policies than those that do not.

CONCLUSION

In this research, it was found that the majority of Sunbelt cities have adopted sustainability as an urban goal. It was also determined that Sunbelt cities vary in their approaches to implementing energy related policies. In addition, three specific locally adoptable, energy related policies were considered in detail: 1) city operated energy efficiency programs; 2) local governmental energy program support; and 3) Energy Star™ program participation. These policies are qualitative indications of the types of programs being pursued by the 25 sampled Sunbelt cities.

The specific energy related policies adopted by each city were discussed in detail and the sorts of policies in effect were identified. Evidence that in many Sunbelt cities, policies are in effect to manage and reduce urban energy use was provided. While these policies can be categorized as indicators of energy policy, local policy efforts, and organizational memberships, it is clear that there are variations in the themes of how these policies are locally defined and placed into practice.

Also notable are the examples of cities that use energy policy and energy conservation goals in their agendas as a means of achieving sustainability. Atlanta's program includes an internal energy conservation initiative. Tucson is developing a sustainable community based on use of solar energy. Mesa has created a planning agenda based on sustainability and is among those that have established an energy conservation program for city owned buildings.

It was discovered that the sampled Sunbelt cities vary broadly in their selection and application of policies. Certain cities, including Atlanta, Los Angeles and San Diego aggressively pursue

multifaceted policies and focused their resources and agendas accordingly. On the other hand, most Sunbelt cities are more selective and limit in their policy choices. Cities such as Charolette, Virginia Beach and Oklahoma City are among those that tend not to adopt energy related local policies.

Finally, it was determined that cities that have identified sustainability as a goal or have related sustainable development policies, have substantially higher energy policy adoption rates than those that do not, when three select energy related policies are used for comparative purposes. This suggests a positive relationship between the adoption of sustainability as a local governmental goal and the implementation of local energy related policies in Sunbelt cities. This research suggests that cities with sustainability as a local goal are more likely to adopt certain energy related policies. Individuals and organizations seeking ways to get energy related policies adopted by local governments in the Sunbelt might benefit by promoting sustainability as an urban goal.

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ABOUT THE AUTHOR

Dr. Stephen A. Roosa, currently serves as the President of the Association of Energy Engineers. He is an Energy Engineer with Energy Systems Group, with offices in Louisville, Kentucky. Dr. Roosa received a Bachelor of Architecture degree from the University of Kentucky and a Master of Business Administration (MBA) from Webster University. He holds a Ph.D. from the University of Louisville College of Business and Public Administration in the field Planning and Urban Development. He is an AEE Certified Energy Manager (1986), Indoor Air Quality Professional (1998), Certified Measurement & Verification Professional (2003), Certified Business Energy Professional (2005), and a Certified Demand Side Management Professional (2005). Dr. Roosa is also a LEED Accredited Professional.

Table 1 – Sustainability as a Local Policy

Sunbelt City	Sustainability as a Local Policy Goal
Los Angeles, California	Yes, sustainable building program
Houston, Texas	No
Phoenix, Arizona	Yes, found in land use plan
San Diego, California	Yes, goal of Environmental Service Department
Dallas, Texas	No
San Antonio, Texas	Yes, specific program goal
Jacksonville, Florida	Yes
Austin, Texas	Yes, established sustainable building guidelines
Memphis, Tennessee	No
Nashville/Davidson, Tennessee	No, excluded in planning mission statement
El Paso, Texas	Yes, included as goal in city mission statement
Charlotte, North Carolina	No, focus is on "smart growth"
Fort Worth, Texas	No, focus is on "smart growth"
Oklahoma City, Oklahoma	No
Tucson, Arizona	Yes, Adopted Sustainable Energy Code
New Orleans, Louisiana	No, stated as goal of utility
Las Vegas, Nevada	No
Long Beach, California	Yes, sustainability is the primary urban goal
Albuquerque, New Mexico	Yes, Sustainable Community Development
Fresno, California	No, excluded as goal in planning mission
Virginia Beach, Virginia	No, excluded from vision statement
Atlanta, Georgia	Yes, administrative goal of Mayor's office
Mesa, Arizona	Yes, included in General Plan for 2025
Tulsa, Oklahoma	Yes, administrative goal of Mayor's office
Miami, Florida	Yes

Table 2
Energy Policy Indicators

Sunbelt City	Policies For City Buildings	Sponsored by Local Government	U.S. DoE Energy Star Partner	Total Policies
Los Angeles, California	Yes	Green Building Initiative, Green LA	Yes	3
Houston, Texas	Yes	Rebuild America, LEED Program	Yes	3
Phoenix, Arizona	Yes	Yes, capital improvement projects	No	2
San Diego, California	Yes	Green Building, Rebuild America	Yes	3
Dallas, Texas	Yes	None	Yes	2
San Antonio, Texas	Yes	Metro Partnership for Energy	No	2
Jacksonville, Florida	Yes	None	No	1
Austin, Texas	Yes	Green Building Program	No	2
Memphis, Tennessee	Yes	None	No	1
Nashville/Davidson, Tennessee	Yes	None	No	1
El Paso, Texas	No	Yes	No	1
Charlotte, North Carolina	No	None	No	0
Fort Worth, Texas	Yes	None	Yes	2
Oklahoma City, Oklahoma	No	None	No	0
Tucson, Arizona	Yes	Model Energy Code (1994)	Yes	3
New Orleans, Louisiana	Yes	None	No	1
Las Vegas, Nevada	Yes	Adopted Model Energy Code	Yes	3
Long Beach, California	Yes	Yes	No	2
Albuquerque, New Mexico	Yes	Yes, included in 1994 strategic plan	Yes	3
Fresno, California	No	Senior Citizen Weatherization	No	1
Virginia Beach, Virginia	No	None	No	0
Atlanta, Georgia	Yes	Yes	Yes	3
Mesa, Arizona	Yes	None	No	1
Tulsa, Oklahoma	Yes	None	No	1
Miami, Florida	No	Green Building Program	Yes	2

ENERGY EFFICIENCY
Public Policy Issues and Recommendations

Authors: Howard Geller, Southwest Energy Efficiency Project
and Sheryl Carter, Natural Resources Defense Council

The West's economy operates with significant untapped energy efficiency potential. Exploiting this potential would generate hundreds of millions of dollars in direct cost savings to ratepayers and dramatically increase the productivity of the economy, while offering considerable health and environmental benefits. These efficiency gains can be realized through the promotion of public policy to develop market infrastructure, establish standards, and create financing mechanisms.

Increasing the energy efficiency of appliances, lighting products, heating and cooling systems, new buildings, factories, vehicles, and other devices yields a number of benefits including:

saving consumers and businesses money;
enhancing the reliability of the power grid and natural gas supply systems;
reducing oil and natural gas imports;
cutting local and regional polluting emissions;
restraining the growth of climate changing emissions;
saving precious water resources;
keeping money in local economies while adding jobs; and
improving economic productivity and competitiveness.

Saving energy through energy efficiency improvements costs much less than supplying energy from new power plants and associated transmission and distribution facilities. For example, saving electricity typically costs 2 to 3 cents per kWh saved, two to three times less than the delivered cost of electricity from new power plants (Nadel and Kushler 2000; Geller 2003). And this comparison does not include the costs from pollutant emissions or other "externalities" associated with conventional energy supply.

Improving the energy efficiency of homes and businesses will lead to a net increase in jobs due to the labor required to manufacture, sell and install energy efficiency measures, as well as the shift in expenditures away from energy supply (which is not labor intensive) to other more labor-intensive sectors of the economy. For example, it is estimated that steadily increasing the efficiency of electricity use in six southwest states (AZ, CO, NM, NV, UT and WY) could lead to a net increase of 20,000 jobs in the region by 2010 and 58,000 jobs by 2020 (SWEEP 2002).

Increasing the efficiency of electricity use is especially important in rapidly growing, arid western states. End-use efficiency improvements reduce water consumption by power plants, reduce emissions that are contributing to urban air quality problems, and reduce emissions that are causing haze and deteriorating visibility in our region's national parks and wilderness areas. Increasing the efficiency of electricity use also would reduce the strain on the electricity grid and thus increase the reliability of electricity supply.

Commissioned by the Energy Foundation April, 2004

During the 2001 California energy crisis, state and utility energy efficiency programs contributed to critically-needed reductions in energy use. Relative to 2000, electricity consumption fell about 6% and peak demand declined by nearly 8%, after adjustment for economic growth and weather conditions. These energy savings were the main reason California did not experience further costly power outages during the summer of 2001. This experience demonstrated that expanding energy efficiency programs can be an effective strategy for addressing a short-term electricity supply-demand imbalance, in addition to the other benefits (NRDC and SVMG 2003).

In short, improving energy efficiency is a win-win strategy for our economy, environment, and security. But a number of market flaws and barriers limit the investment in energy efficiency measures in the "real world." These market flaws and barriers include:

> Energy prices do not reflect the full costs to society associated with energy production and use;
> Households and businesses may not be aware of energy savings opportunities;
> Households and businesses make many purchase in a hurry without considering lifecycle cost;
> In some cases, those making construction and purchase decisions are not responsible for paying energy bills, e.g., in rental property; and
> Energy represents a relatively small fraction of total costs for most businesses, meaning that increasing energy efficiency is not a high priority.

In spite of these market barriers and flaws, energy efficiency improvements have already made a major contribution. In 2002, the United States used 44% less energy per unit of GDP than in 1973 (EIA 2003). Some of this decline was due to structural changes such as the shift towards a service economy, but much of it was due to real energy efficiency measures (Schipper, Howarth, and Geller 1990; Murtishaw and Schipper 2001). However, there is still tremendous potential for cost-effective energy efficiency improvements throughout the U.S. economy (Interlaboratory Working Group 2000; Geller 2003).

Utility and/or State Efficiency Programs

Many electric and gas utilities operate programs to expand the adoption of cost-effective energy efficiency measures. Comprehensive programs include promotion, education and training, technical assistance, financing, and/or rebates for households as well as businesses. In effect, all customers are given the opportunity to participate. Utilities implement these efficiency programs in most states, while in a few cases implementation is done by state agencies or third party program administrators. All of these approaches can work as long as adequate funding and oversight is provided

Energy efficiency programs in leading states such as California, Connecticut, Minnesota and Wisconsin reduced electricity use by 5-7% in 2000 as a result of their cumulative

efforts (York and Kushler 2002). Furthermore, the top states or utilities, ranging from the investor-owned utilities in Connecticut to Xcel Energy in Minnesota to the statewide program in Vermont, are saving on the order of 1% of electricity use annually. And some states and utilities in the West, including the state of California and municipal utilities in Austin, TX and Fort Collins, CO, are embracing a goal of reducing electricity use and peak demand by 1% per year or more through energy efficiency programs.

In response to restructuring and to stem resulting reductions in energy efficiency investments, a small surcharge on all electricity and/or natural gas sales, also known as a public benefits charge, has become the primary source of funding for utility and state energy efficiency programs since the mid-1990s. About 20 states have adopted a small electricity surcharge to fund energy efficiency programs and other public benefit activities. In the leading states, the energy efficiency surcharge ranges from 2 to 3 percent of utility revenues (Kushler and Witte 2001).

Total funding for utility and other state-based energy efficiency programs is on the rise. Funding for electricity conservation efforts increased from about $0.9 billion in 1997 to $1.1 billion in 2000, mainly due to adoption of public benefit charges (York and Kushler 2002). Funding is continuing to increase as more states and utilities seek the broad energy and economic benefits offered by greater energy efficiency. Funding also is increasing as more states and utilities consider energy efficiency as a critical resource in strategic planning. In 2003, it is estimated that funding for utility and state-based energy efficiency programs reached about $1.45 billion nationwide (ACEEE 2003). California recently increased funding by investor-owned utilities for energy efficiency progams to over $400 million per year in 2004 and 2005, nearly doubling the projected energy savings compared to levels achieved in previous years and avoiding the equivalent of another large power plant each year.

But the support and funding for energy efficiency programs is still very uneven. Leading states including California are investing over $10 per capita in cost-effective energy efficiency programs, while a number of states invest less than $1 per capita (York and Kushler 2002). Arizona and New Mexico (and their utilities) are included in the latter category.[1]

States and utilities that are operating minimal energy efficiency programs are wasting energy, paying unnecessarily high energy bills, and diminishing electric system reliability at the local and regional level. These states and utilities are also producing more pollution than would be the case if they had stronger energy efficiency programs, thereby adversely affecting regional and national efforts to reduce air pollution including greenhouse gas emissions.

Codes and Standards

[1] Colorado and Nevada also spent less than $1 per capita on utility energy efficiency programs as of 2000, but newer initiatives subsequently increased funding above this threshold.

State-of-the-art building energy codes reduce electricity use, peak electric demand, and natural gas use in new homes and commercial buildings by 15-30 percent on average. Codes are a very cost-effective way to reduce energy use and lower energy bills over the lifetime of a building. As of the end of 2003, about 24 states had adopted a state-of-the-art code, defined as the 2000 or more recent version of the International Energy Conservation Code (IECC). Some western states including California, Idaho, Oregon, Utah, and Washington had done this, but other western states had not (BCAP 2003).

In order to achieve maximum energy and economic savings, architects and builders need to understand how to comply with codes in a cost-effective manner. Also, builders need to control the quality of their buildings and code officials need to rigorously enforce the codes. If these actions are taken, state-of-the-art building energy codes could reduce overall electricity and natural gas use in the region 4-8% by 2020 (SWEEP 2002).

Building energy codes establish a floor on energy efficiency; they do not "push the envelope." It is possible to reduce energy consumption by 30-50% relative to code requirements, and do so cost effectively, by combining efficiency measures through an integrated design approach. This potential is not speculative—it is already being achieved in thousands of new homes and some commercial buildings recently built in the western U.S. (Kinney, Geller and Ruzzin 2003). But the vast majority of new homes and commercial buildings fall far short of this optimal performance.

National appliance efficiency standards have greatly reduced the energy consumption of major products such as refrigerators, clothes washers, air conditioners, and furnaces, while increasing performance and reducing product cost. It is technically and economically feasible to extend efficiency standards to numerous other products such as TV set top boxes, torchiere light fixtures, ceiling fans, transformers, exit signs, and ice makers. But the federal government is unlikely to do this on a timely basis because it is fully occupied maintaining, reviewing and updating the national standards that already exist.

Because of this situation, states (e.g., California and Maryland) have begun to adopt efficiency standards on these other products. The state standards prohibit the sale of non-complying inefficient products in the state after a reasonable phase-in period. Model legislation has been introduced in a number of other states to copy what California and Maryland have done (ASAP 2004). It is estimated that the model state standards would reduce electricity use in Colorado by about 1% in 2010 and 1.5% in 2020, for example.

Recommendations

For the reasons given above, all western utilities and states should pursue "best practice" with respect to state and/or utility energy efficiency programs. Best practice means reducing electricity use, peak electric demand, and natural gas use by at least 1% per year as a result of state and/or utility programs, relative to forecasted energy use without these programs. Best practice also means adopting a utility bill surcharge or other funding mechanism and investing at least 2% of utility revenues on energy efficiency programs.

And best practice mean including energy efficiency as a strategic resource in utility resource planning, with energy efficiency pursued to its full cost effective potential.

In the area of new buildings, all states and municipalities should upgrade to state-of-the-art building energy codes, meaning the latest version of the International Energy Conservation Code (IECC). States and municipalities should undertake training and technical assistance efforts once new codes are adopted, as well as rigorously enforce energy codes. In addition, states and utilities should promote the construction of new buildings that significantly exceed minimum code requirements. Last but not least, western states should adopt the cost-effective appliance efficiency standards that California and Maryland have recently adopted.

Conclusion

By implementing comprehensive, well-funded cost-effective energy efficiency programs and adopting state-of-the-art building energy codes as well as new appliance efficiency standards, western states could reduce electricity and natural gas use by at least 7% in 2010 and 20% in 2020, relative to projected energy consumption levels without these efficiency efforts. Achieving this amount of energy savings will significantly reduce load growth, meaning the most costly and controversial new plants could be avoided, while providing economic and environmental benefits to citizens and businesses throughout the west.

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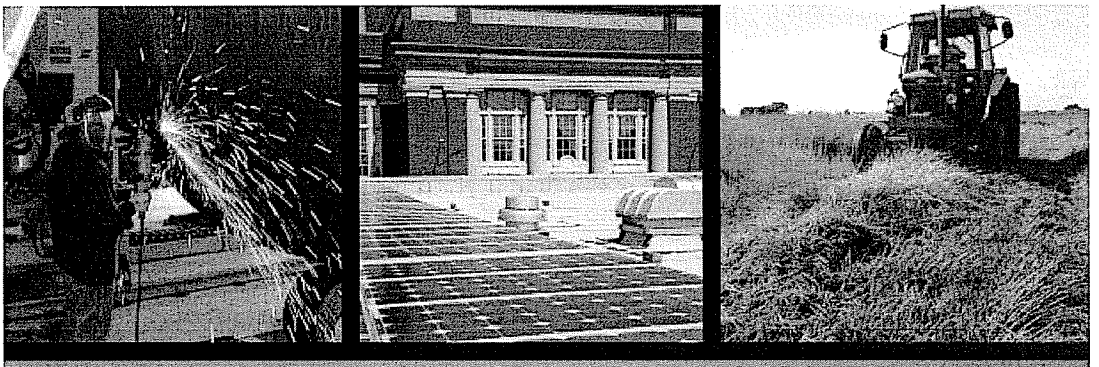

Job Jolt

The Economic Impacts of *Repowering the Midwest: The Clean Energy Development Plan for the Heartland*

An Economic Study by the Regional Economics Applications Laboratory for the Environmental Law & Policy Center

»Citizens Action Coalition of Indiana »Dakota Resource Council »Iowa RENEW
»Izaak Walton League of America »Minnesotans for an Energy-Efficient Economy
»RENEW Wisconsin »Union of Concerned Scientists

Job Jolt

The Economic Impacts of Repowering the Midwest:

The Clean Energy Development Plan for the Heartland

... with clean, renewable and efficient energy

Executive Summary

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Introduction | Overview: Clean Energy = More Good Jobs

Implementing the *Repowering the Midwest* Clean Energy Development Plan would create more than **200,000** new jobs across the 10-state Midwest region by 2020, up to **$5.5 billion** in additional worker income, and up to **$20 billion** in increased economic activity

Repowering the Midwest's Clean Energy Development Plan promotes modern, energy efficient technologies and development of renewable energy resources, especially wind power and biomass energy This plan contrasts with a business-as-usual scenario, which relies almost entirely on polluting coal and nuclear power plants for electricty generation

This huge resulting *Job Jolt* is the central finding of a comprehensive study of the economic impacts of phasing in more clean energy efficient technologies and renewable energy development across the Midwest and Great Plains The Regional Economics Applications Laboratory (REAL), a nationally renowned research center of the University of Illinois, used its modeling techniques to determine the economic impacts of implementing the clean energy development plan proposed by the Environmental Law & Policy Center (ELPC) and its Midwest partners

Repowering the Midwest: The Clean Energy Development Plan for the Heartland is a blueprint for producing economically and environmentally sound power by unleashing the Midwest's homegrown clean energy potential It calls for a gradual reduction of overreliance on some of the Midwest's oldest and most polluting coal and nuclear generating plants that currently account for 95 percent of the region's electricity generation — and for a gradual increase in using modern clean energy technologies

To achieve this, the Clean Energy Development Plan calls for:

[1] Implementing cost-effective energy efficiency technologies to level off the region's overall electricity demand These energy efficiency technologies, ranging from efficient lighting and ballasts to Energy Star® appliances to state-of-the-art industrial motors, can save business and residential consumers money On average, these new technologies cost 2 3¢ per kilowatt-hour, or less, which is below the cost of generating, transmitting and distributing electricity from coal, gas or nuclear plants

[2] Diversifying the region's over-dependence on coal and nuclear plants by developing more renewable energy generating technologies: wind and solar power, and biomass energy locked inside agricultural crops, such as switchgrass and cornhusks The environmental and public health advantages of this conversion are evident Pollutants from coal plants are major contributors to smog, acid rain and global warming Nuclear plants produce highly radioactive wastes and impose extraordinary costs for storage and disposal However, these old technologies continue to hold a near-monopoly over the Midwest power market Why?

One reason is the widespread myth that developing clean energy resources would be too expensive and cost jobs.

REAL finds that nearly the opposite is true. A partial switch to cleaner, smarter energy—as detailed in *Repowering the Midwest*—would energize the Midwest economy with hundreds of thousands of new jobs and billions of dollars in new income and economic activity.

The magnitude of these job and dollar gains is enormous. New jobs resulting from implementing the Clean Energy Development Plan would be more than twice the total employment in the Midwest electric utility industry.

The economic impacts from implementing the Clean Energy Development Plan would be distributed throughout the Midwest and Great Plains in both metropolitan and rural areas, and in every sector of the regional economy from manufacturing to construction to farming.

For example:

- Jobs manufacturing and installing modern commercial lighting and efficient ballasts, and Energy Star®-rated appliances
- Jobs manufacturing and assembling wind turbines and solar panels
- New sources of farm income from wind turbine leases and growing and processing biomass energy crops

This job gain and economic growth greatly outweigh the projected loss of jobs and income in the electric utility industry caused by reducing demand for power from coal and nuclear plants

A partial switch to cleaner, smart energy efficiency and renewable energy would energize the Midwest economy with hundreds of thousands of new jobs...

Summary of Regionwide Economic Impacts of Repowering the Midwest

Clean Energy	Net Job Growth		Increased Annual Economic Output	
	2010	2020	2010	2020
Energy Efficiency	83,900	140,900	$7.1 Billion	$12.7 Billion
Renewable Energy	36,800	68,400	$3.7 Billion	$6.7 Billion
Total	**120,700**	**209,300**	**$10.8 Billion**	**$19.4 Billion**

Source: Regional Economics Applications Laboratory

Reasonable Assumptions | Achievable Vision:
The Midwest Clean Energy Development Plan

Repowering the Midwest calls on both the public and private sectors to embark on a 20-year phase-in of more energy efficient technologies and renewable energy resources Implementation strategies include Energy Efficiency Investment Funds created in each state, energy efficiency building codes, and renewable portfolio standards that require electric utilities make renewable energy a reasonable share of their power supply that is delivered to consumers

Central to the report are the two ambitious and achievable implementation targets specified by *Repowering the Midwest*'s Clean Energy Development Plan:

[1] Energy Efficiency By **2010**, electricity consumers in all sectors—industrial, commercial and residential—would improve efficiency and reduce power demand by **17 percent** below the projected business-as-usual rate of consumption By **2020**, the difference would be a **28 percent** reduction These reductions would be more than enough to achieve a flattening-out of Midwest electricity demand at current levels

[2] Clean Renewable Energy Development. By **2010**, electric utilities would supply a more diverse fuel mix to consumers in which **8 percent** of electricity is generated by cleaner renewable energy technologies including wind power, biomass energy, and solar power By **2020**, this clean renewable energy would increase to **22 percent** of electricity supplied to consumers Moreover, developing and implementing efficient natural gas uses in appropriate locations, especially Combined Heat and Power (CHP), district energy systems and fuel cells,

Figure 1: Business As Usual Case
Source: Repowering the Midwest

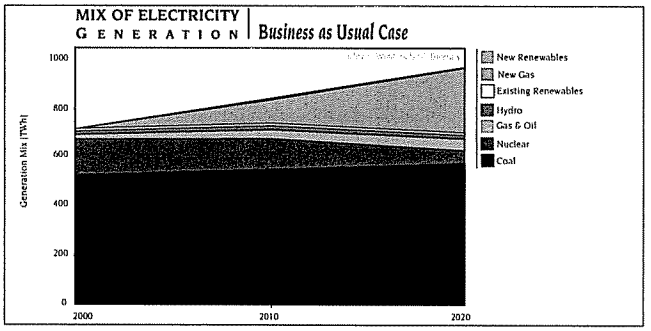
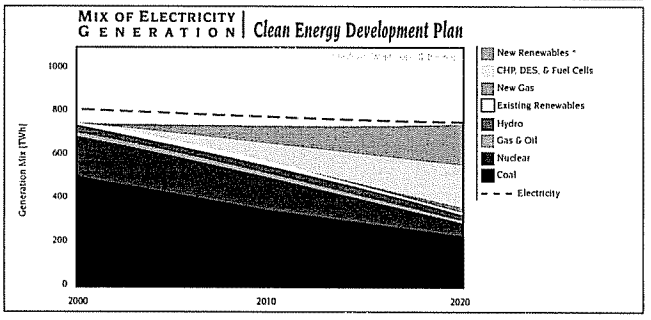
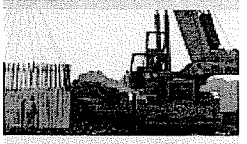


Figure 2: Clean Energy Development Plan
Source: Repowering the Midwest





would boost the cleaner energy component of the electricity supply to **18 percent by 2010 and to 46 percent by 2020**.

The environmental and health benefits of phasing out some of the oldest, most polluting coal plants alone would justify the Clean Energy Development Plan. Compared to a business-as-usual future (95 percent coal and nuclear), the reasonable shift outlined in *Repowering the Midwest* would reduce:

- Acid rain-causing sulfur dioxide emissions (SO_2) by 56 percent.
- Smog-causing nitrogen oxide emissions (NOx) by 71 percent.
- Global warming-causing carbon dioxide emissions (CO_2) by 51 percent.
- Emissions of particulates, mercury and other heavy metals.

These pollution reductions would lead to a significant reduction in asthma, respiratory ailments and other public health problems. The catastrophic risks of a nuclear power plant accident and the volume of radioactive nuclear wastes would also be reduced as some older nuclear plants are retired.

Another benefit would be better electricity reliability. Increased energy efficiency will ease the strain on transmission and distribution systems.

But what of the economic impacts? Would the expense of this clean energy transition punch a hole in family budgets and crimp the competitiveness of Midwest businesses? What about jobs, especially if some of the older coal plants are retired? To get answers, ELPC and its Midwest partners asked REAL to run the numbers.

	2010		2020	
Generation Type	Installed Capacity (MW)	% of Regional Electric Generation	Installed Capacity (MW)	% of Regional Electric Generation
Wind Turbines	6,698	3.0	24,510	11.3
CHP-Biomass	2,949	3.2	6,003	6.8
Biomass Co-Firing	1,350	1.4	4,307	3.1
Photovoltaics	161	0.0	482	0.1
Biomass Gasification	75	0.1	575	0.6
Total Renewables	11,733	8.0	36,377	21.9
CHP-Natural Gas	5,650	6.5	12,230	13.8
District Energy Systems	3,228	3.6	6,446	7.1
Fuel Cells	282	0.3	3,257	3.6
Total Efficient Natural Gas	9,155	10.4	21,933	24.5
TOTAL	20,888 MW	18.3 %	58,310 MW	46.4 %

Figure 3: New Clean Energy Generation Capacity Included in Clean Energy Development Plan
Source: Repowering the Midwest

By 2020, clean renewable energy would increase to 22 percent of electricity supplied to consumers in the Midwest and Great Plains.

Empirical Method | Emphatic Result:
REAL Models *The Repowering the Midwest Clean Energy Development Plan*

The economic impacts of implementing the Clean Energy Development Plan were estimated using regional econometric input-output models developed by REAL to forecast the local impacts of changing economic conditions and policies. Since 1989, REAL has developed, and continually refined, a portfolio of models covering metropolitan regions and states across the Midwest. Using primarily U.S. Census data, REAL's dynamic models track employment, income and output data across 53 industrial sectors, factoring in 13 demand variables (consumption, investment, government expenditures, etc.) and eight demographic variables (age, sex, migration, etc). Previous REAL studies have examined a broad range of economic phenomena, from the *Impact of the Monet Exhibition at the Art Institute of Chicago* to the *Impact of Electricity Deregulation on the Chicago Economy*. To evaluate the *Repowering the Midwest* impacts, REAL conducted two discrete studies involving 10 individual states: Illinois, Indiana, Iowa, Michigan, Minnesota, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin. The two studies evaluated the key components of the Clean Energy Development Plan put forward in *Repowering the Midwest*:

- *Energy Efficiency Impacts for the Midwest* measures the changes in employment, income and economic output that would result from investments in energy efficiency that save up to 17 percent of electricity use by 2010 (versus business-as-usual) and 28 percent by 2020.
- *Renewable Energy Impacts for the Midwest* measures the changes in employment, income and economic output that would result from a program of clean energy development (wind, solar, biomass) in which 8 percent of Midwest electricity would be generated from renewable energy by 2010 and 22 percent by 2020. And, with efficient natural gas uses, 18% by 2010 and 46% by 2020.

A summary of the combined impacts of achieving these two goals is provided in Figure 4.

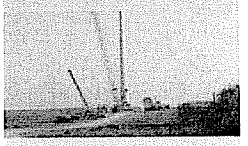
Energy Efficiency Implementation Impacts

The results of REAL's study indicate that the energy efficiency measures outlined in *Repowering the Midwest*'s Clean Energy Development Plan will generate as many as 84,000 jobs by 2010 (over and above a business-as-usual baseline) rising to 141,000 jobs by 2020. These jobs will generate local income — direct and indirect — of up to $1.8 billion by 2010 rising to $3.2 billion in the year 2020. The plan will increase Midwest economic output by as much as $7.1 billion by 2010 rising to $12.7 billion by 2020.

Many of the largest beneficiaries of a conversion to energy efficiency are manufacturers already located in the Midwest. More workers will be needed, for example, to make triple-glazed windows for Andersen Windows, smart thermostats for Honeywell and Johnson Controls, energy efficient lighting equipment for Osram Sylvania, and Energy Star® appliances for Whirlpool.

Clean Energy	Net Job Growth		Increased Annual Economic Output	
	2010	2020	2010	2020
Energy Efficiency	83,900	140,900	$7.1 Billion	$12.7 Billion
Renewable Energy	36,800	68,400	$3.7 Billion	$6.7 Billion
Total	**120,700**	**209,300**	**$10.8 Billion**	**$19.4 Billion**

Figure 4: Summary of Region-wide Economic Impacts of *Repowering the Midwest*
Source: Regional Economics Applications Laboratory



Venture Lighting
Solon, Ohio

Venture Lighting, a division of Advanced Lighting Technologies, is a leading developer and manufacturer of energy efficient metal halide lighting systems. Metal halide can replace fluorescent tubes in indoor applications and sodium vapor in outdoor ones. It reduces energy consumption, reduces maintenance and improves the quality of lighting. The company employs 295 people at its Solon, Ohio facility.

Each state in the region has different manufacturing capabilities and, thus, different economic impacts from implementing the energy efficiency plan. Highly industrialized states such as Illinois, Indiana, Michigan and Ohio achieve the most substantial job gains from increased use of clean energy efficiency technologies. The REAL model incorporates these variables to compute the average state-by-state impacts described in Figure 5.

Energy efficiency installations will create new jobs in nearly all economic sectors – the largest gains are in trade (39 percent), professional and personal services (24 percent) and manufacturing (20 percent), as shown in Figure 6. These gains are partially eroded by a loss of jobs in the utility sector as demand for electricity flattens out.

Highly industrialized states such as Illinois, Indiana, Michigan and Ohio achieve the most substantial job gains from increased use of clean energy efficiency technologies.

Energy Efficiency Impacts

State	Net New Employment		Increased Annual Economic Output	
	2010	2020	2010	2020
IL	26,000	43,400	$2.6 Billion	$4.6 Billion
IN	8,800	15,500	$7 Billion	$1.2 Billion
IA	3,700	6,800	$200 Million	$300 Million
MI	16,100	29,100	$1.3 Billion	$2.4 Billion
MN	4,000	8,200	$200 Million	$400 Million
NE	1,500	2,900	0	$100 Million
ND	400	900	0	0
OH	18,900	25,500	$2 Billion	$3.4 Billion
SD	600	1,200	0	0
WI	3,900	7,400	$100 Million	$2.7 Billion
Total Region	**83,900**	**140,900**	**$7.1 Billion**	**$12.7 Billion**

Figure 5: Energy Efficiency: Summary of Economic Impacts by State
Source: Regional Economics Applications Laboratory. Represents impacts of Clean Energy Development Plan versus the Business-As-Usual baseline projections for Employment and Economic Growth

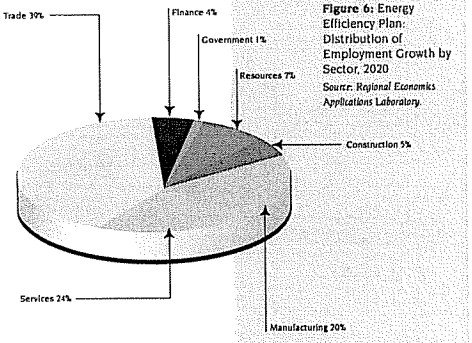


Figure 6: Energy Efficiency Plan: Distribution of Employment Growth by Sector, 2020
Source: Regional Economics Applications Laboratory.

Renewable Energy Development Impacts

REAL's study shows that implementing the renewable energy component of the Clean Energy Development Plan in *Repowering the Midwest* will generate 25,000 - 41,000 new jobs by 2010, and 58,000 - 74,000 jobs by 2020. These jobs will generate local income of $700 million - $1.3 billion in 2010, rising to $1.7 billion - $2.3 billion in 2020. Implementation also will increase annual Midwest economic output by $2.3 billion - $4.0 billion in 2010, and by $5.5 billion - $7.3 billion in 2020 as described in Figure 7.

Because business-as-usual electricity generation in the Midwest is predominantly dependent on imported fuels—such as western coal transported by rail car from Wyoming—its partial replacement will not produce significant job losses in the Midwest. Renewable energy will create new jobs—both directly and indirectly—in all major economic sectors. As shown in Figure 8, by 2020, the manufacturing sector will account for 17 percent of the job gains, construction for 15 percent, services for 33 percent, and agriculture for 12 percent. Many of these jobs and economic gains will be located in rural areas where they will provide a valuable boost to local economies.

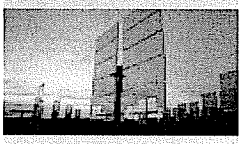
Companies benefiting from increased investment in renewable energy will include small-but-growing businesses such as Energy Maintenance Service, Inc — see company profile on page 9 — which installs and maintains wind power equipment across the Midwest from its new facility in Howard, South Dakota. This facility has delivered a tonic to a town that lost 13 percent of its population during the 1990s. What's more, every time an Energy Maintenance Service repair crew eats at a restaurant or sleeps at a motel, or the company purchases a new truck or tool, some local Midwest business benefits, eventually enough to hire more help.

Construction and operation of wind power machines will account for 28 percent of the new jobs and biomass energy for 17 percent of the new jobs by 2020. As Figure 9 shows, a large number of jobs are also created by increasing the efficiency of new environmentally preferable uses of natural gas. New clean burning Combined Heat and Power (CHP) installations will create fully 27 percent of the new jobs, and district

Renewable Energy Impacts

State	Net New Employment		Increased Annual Economic Output	
	2010	2020	2010	2020
IL	8,700	13,500	$1 Billion	$1.5 Billion
IN	3,500	6,500	$300 Million	$600 Million
IA	2,400	5,700	$300 Million	$600 Million
MI	4,100	9,100	$400 Million	$1 Billion
MN	3,900	6,400	$400 Million	$700 Million
NE	1,500	2,600	$200 Million	$300 Million
ND	1,000	2,100	$100 Million	$200 Million
OH	7,200	13,500	$600 Million	$1 Billion
SD	1,300	2,600	$100 Million	$200 Million
WI	3,200	6,400	$300 Million	$600 Million
Total Region	**36,800**	**68,400**	**$3.7 Billion**	**$6.7 Billion**

Figure 7: Renewable/Clean Energy: Summary of Economic Impacts by State
Source: Regional Economics Applications Laboratory



Energy Maintenance Service, Inc.
Gary, South Dakota

Founded in 1998 by renewable energy entrepreneur Joe Kolbach, Energy Maintenance Service employs 35 people installing and maintaining wind turbines of all sizes and types, for both commercial and residential customers throughout the country. The company has benefited from state and federal incentives as well as renewable portfolio standard policies which have created a positive climate for wind power development.

Though headquartered in South Dakota, the company's crews are constantly on the road throughout North America. Every day the crews spend in the field, they are benefiting local economies through spending on motels, food and supplies.

energy systems — where a group of buildings is served by a single boiler/generator — will deliver 14 percent This cleaner modern CHP will mostly displace power that would otherwise be generated by more polluting coal plants State-by-state breakouts for jobs and economic output are presented in Figure 7 on page 8

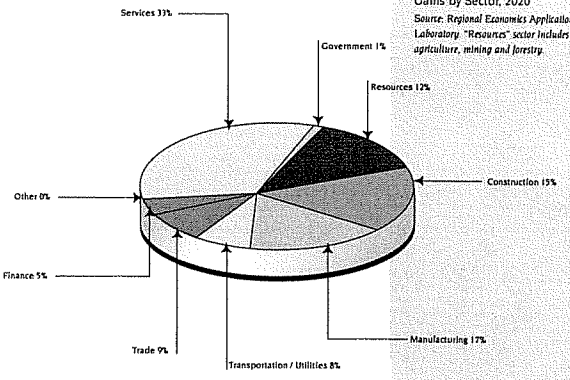


Figure 8: Renewable and Clean Energy: Distribution of Employment Gains by Sector, 2020
Source: Regional Economics Applications Laboratory. "Resources" sector includes agriculture, mining and forestry.

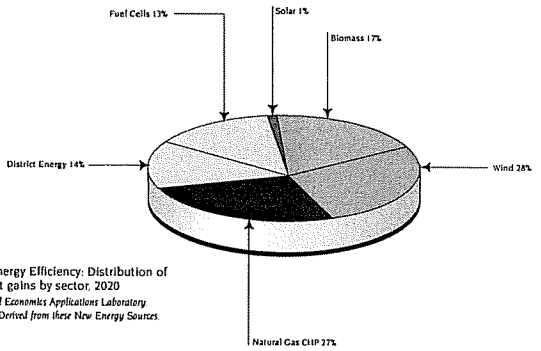


Figure 9: Energy Efficiency: Distribution of Employment gains by sector, 2020
Source: Regional Economics Applications Laboratory. Represents Jobs Derived from these New Energy Sources.

Implementing the renewable energy development plan will generate 25,000 - 41,000 new jobs by 2010 and 58,000 - 74,000 new jobs by 2020.

Conclusion: It's Time to Act

The Midwest needs a strategic clean energy development plan that implements smart policies and practices to capture readily achievable environmental, public health, employment and economic growth benefits The Environmental Law & Policy Center and its Midwestern partners set forth a detailed plan to accomplish this goal in *Repowering the Midwest:The Clean Energy Development Plan for the Heartland* (www repowermidwest org)

The environmental quality and public health benefits of *Repowering the Midwest* have never been seriously disputed. This analysis by REAL substantiates the job gains and economic benefits of putting the Clean Energy Development Plan in *Repowering the Midwest* into action.

Rather than impose an economic burden, the phase-in of more clean energy efficiency and renewable energy technologies would produce a Job Jolt of more than **200,000** new jobs, **$5.5 billion** in new household income and close to **$20 billion** in additional annual economic output by 2020

The energy choices facing the Midwest have never been more clear Should the region stay chained to its over-reliance on aging coal and nuclear power plants, many of them built in the 1950s, 1960s and 1970s, now past their intended lives? Or is it time to diversify our energy portfolio with clean, 21st Century technologies — as technologies have profoundly changed and greatly improved in virtually every other sector of modern life?

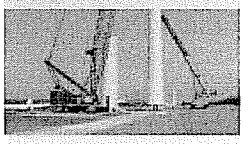
Polls consistently show that Midwesterners are ready to seize the opportunities offered by energy efficiency and renewable energy technologies and systems It is now time — past time, really — for public and private sector leaders to stand up and lead

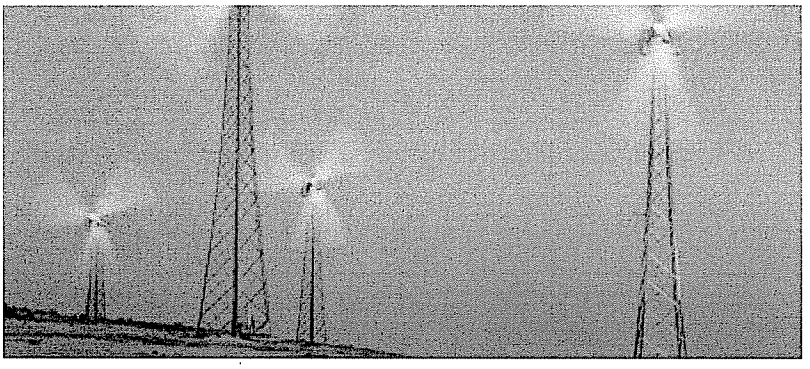
> The Midwest needs a strategic clean energy development plan that implements smart policies and practices to capture readily achievable benefits.

Our region's Congressional delegation must lead by insisting upon strong energy efficiency and renewable energy development provisions in energy, agriculture and transportation legislation

State lawmakers must lead by enacting clean energy development policies, investments and incentives, beginning with "Renewable Portfolio Standards" that require all electric utilities to include a specified percentage of clean renewable energy in the mix of electricity that they supply to consumers

Strong energy efficiency building codes should be adopted and implemented so that new commercial and residential buildings are constructed to achieve both long-term energy cost savings and pollution reduction benefits





States should also create Energy Efficiency Investment Funds and Renewable Energy Investment Funds as described in the *Repowering the Midwest* plan. These Funds should be managed by independent and highly capable third-party administrators and overseen by boards that include environmental and consumer representatives.

Governors and their appointed regulators must lead by leveling the electricity playing field so that clean, renewable power can move through the transmission system under fair terms. Electric utilities and other businesses that own and operate transmission lines must not be allowed to discriminate against renewable energy, or impose transmission rate penalties on wind and solar power generation.

County, municipal and school officials must lead by strengthening their building codes and implementing more energy efficiency technologies. Public buildings should be models of energy efficiency both to save money and to reduce air pollution.

Decision-makers at all levels should recognize that increased energy efficiency and clean renewable energy development mean more new jobs and economic gains. There is no trade-off between the environmental and public health benefits from clean energy development and the economic impacts. That is a myth. It is a win-win for the environment and the economy.

Midwestern citizens need to lead as well. We all should understand and recognize that the opportunity for clean energy development is about our clean air and clean water, our healthy lungs, our pocketbooks and our future. In some matters — fashion, entertainment and social mores — the Midwest is said to follow the Coasts. On this matter — our nation's energy future — the bountiful and sensible Midwest region is in a unique position to get out front and lead.

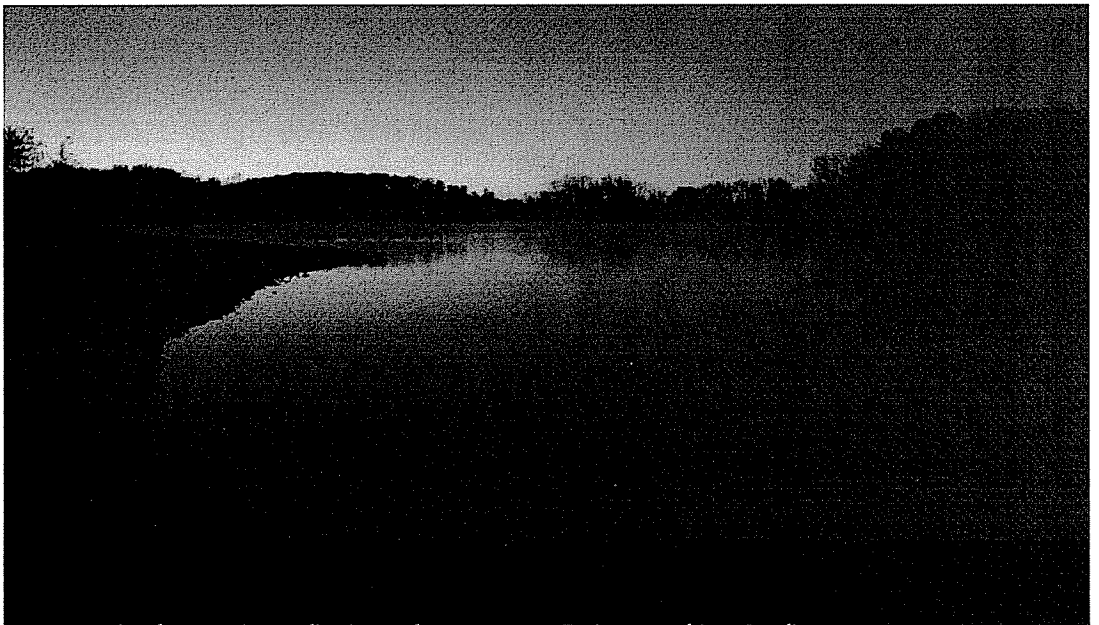
It is time to act. It is time to Repower the Midwest.

There is no trade-off between the environmental and public health gains from clean energy development and the economic impacts. That is a myth. It is a win-win for the environment and the economy.

Repowering the Midwest: The Clean Energy Development Plan for the Heartland

Repowering the Midwest, released in February 2001, presents the opportunity for the Midwest to develop its homegrown clean energy efficiency technologies and renewable wind, biomass, and solar power resources. The Clean Energy Development Plan achieves large environmental, public health and economic development benefits. Investing in energy efficiency and renewable energy will also diversify the region's electricity portfolio, thereby improving reliability.

To read more about Repowering the Midwest, please look at **www.repowermidwest.org** or call ELPC at **312-673-6500** to request a copy of the report.



Regional Economics Applications Laboratory

The Regional Economics Applications Laboratory (REAL) was formed in 1989 to provide analytical capability to a range of policy and decision makers in the Midwest through the construction and application of economic models of urban, metropolitan and state economies. REAL maintains offices in both Chicago and Urbana. Applications have ranged from impacts of cultural events to implications of gas and steel price increases and, more recently, the role and impact of international trade on interstate trade among the Midwestern state economies.

While the initial focus remains on the Midwest, REAL has constructed models for regional economies in Japan, Indonesia, Korea, Columbia, Chile and Brazil. Personnel are drawn from a diverse set of disciplines, including agricultural economics, economics, geography and urban and regional planning. Many of these researchers are from countries outside North America.

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Union Bug Recycled Soy

Environmental Law & Policy Center

The Environmental Law & Policy Center (ELPC) is the Midwest's leading environmental legal advocacy and eco-business innovation organization. We develop and lead strategic advocacy campaigns to protect natural resources and improve environmental quality. We are public interest entrepreneurs who engage in creative business dealmaking that puts into practice our belief that environmental progress and economic development can be achieved together.

ELPC's strategic approach involves proposing positive solutions when we oppose threats to the Midwest environment. We say "yes" to better solutions; we don't just say "no."

ELPC works to:

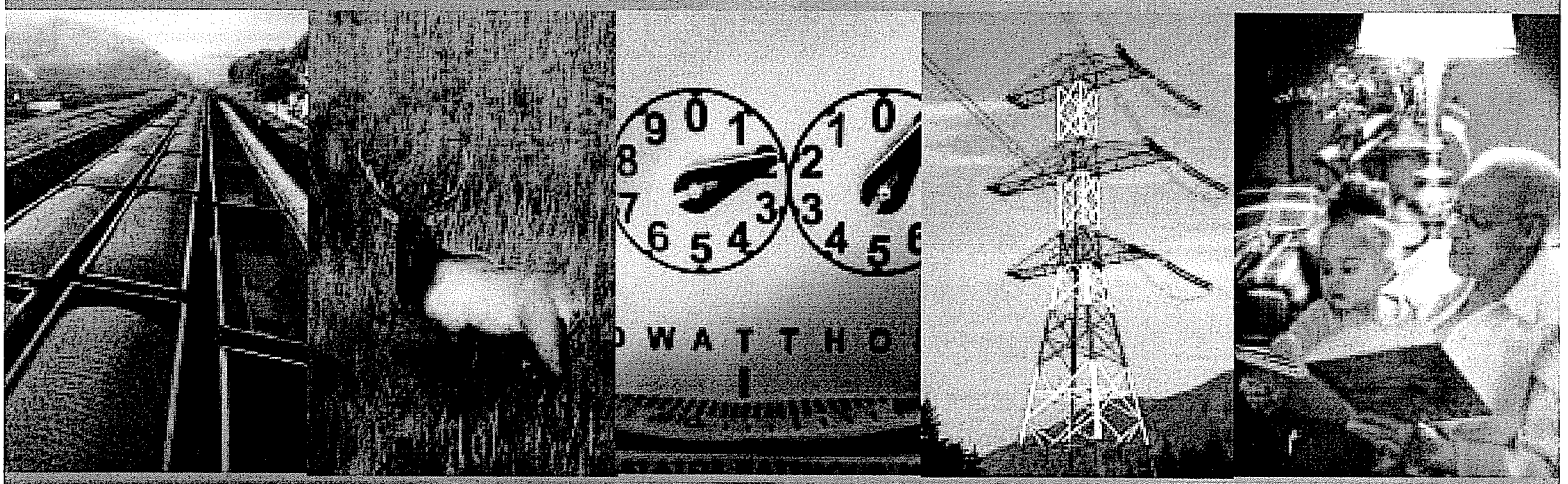
1. Promote sustainable energy strategies by developing energy efficiency and renewable energy resources to reduce pollution from coal and nuclear plants that harms our environment and public health;

2. Design and implement smart growth planning solutions to combat sprawl and innovative transportation approaches, such as the development of a Midwest high-speed rail network, that will lead to cleaner air and more jobs; and

3. Advocate sound environmental management practices that preserve natural resources and improve the quality of life in our communities.

REAL and ELPC appreciate the generous financial support provided by the Joyce Foundation to REAL for the economic analysis and related work to produce Job Jolt, and by the Energy Foundation, the Leighty Foundation and the McKnight Foundation to ELPC for its extensive work on Job Jolt.

KENTUCKY'S ENERGY ⚡ OPPORTUNITIES FOR OUR FUTURE



A COMPREHENSIVE ENERGY STRATEGY

Kentucky
UNBRIDLED SPIRIT

GOVERNOR ERNIE FLETCHER

Kentuckians can gain from improved energy efficiency. Note that:

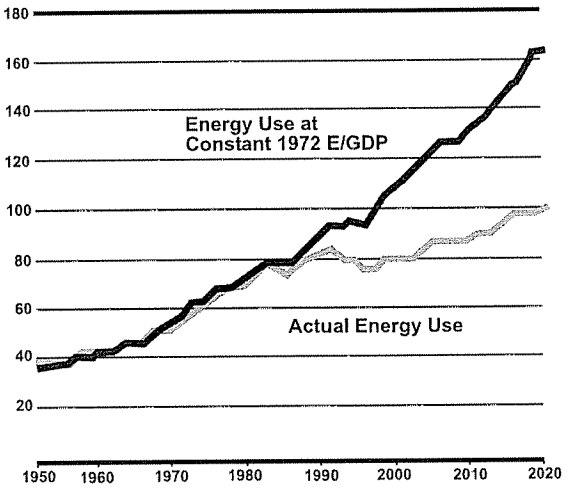
- Kentucky residents actually paid 1% more on their electric bills than West Virginia residents (even though our electricity rates are 9% lower).
- Although our electricity rates are 18% lower than Indiana's, our residents paid only 6% less on their electric bills.
- On an average monthly electric bill, Kentucky's schools spend 7% more per student than the national average
- The average Kentucky industrial bill is 123% higher than the national average.
- Kentucky's average residential electric rate is 33% less than the national average but the average residential bill is only 17% below the national average.

"Frequently overlooked, efficiency is usually our best form of 'alternative energy.' And quite often, the one most readily adaptable to every situation."

James Dontje, Department of Sustainability and Environmental Studies, Berea College

There are significant gains to be realized by increasing and promoting energy efficiency, especially in Kentucky's residential sector, which ranks eighth in the nation for electric intensity (kWh per customer). Even with its historically low electricity rates, Kentuckians have not fully realized the savings and environmental benefits associated with improved energy efficiency.

Energy Efficiency Gains in U.S. Economy



Note: If the intensity of U.S. Energy use had remained constant since 1972, consumption would have been about 74 percent higher in 1999 than it actually was.

State Government: Leading by Example

Energy costs for state government are escalating. In 2003, utility costs for state agencies were 12% higher than in the previous year. In 2004, state agencies used about 4% more energy than they did the same time the year before—with a cost increase of about $1.7 million.

"Through energy efficiency Americans saved a significant amount of energy in 2003, about 110 billion kilowatt hours (kWh) and 20,000 megawatts (MW) of peak power, the amount of energy required to power about 20 million homes. They also prevented emissions equivalent to those from 18 million automobiles - while saving $8 billion on their energy bills."

U.S. Environmental Protection Agency

2003 State Utility Expenditures

State Government Facilities	$ 41 million
Post Secondary Schools	$ 54 million
K-12 Schools	$107 million
Judicial Branch	$ 4 million
Total	$206 million

Source: Kentucky Division of Energy

These costs are manageable. Other states have demonstrated this. In Fiscal Year 2003, South Carolina public facilities saved $4.4 million in energy costs compared to fiscal year 1998 as a result of improved energy efficiency. It is estimated that Kentucky's state government could reduce energy costs by 10%—up to $20 million—with a comprehensive energy management program.

Recommendation 1:

The Commonwealth of Kentucky, through the Finance and Administration Cabinet, should dedicate staff toward implementing an aggressive and sensible utility savings initiative throughout state government and other state-funded institutions to improve energy efficiency.

Kentucky's residential customers consume 28% more electricity than the national average. Reducing our consumption to the national average would result in a 22% reduction in the average resident's bill or about $14 per month.

Recommendation 2:

The Commonwealth of Kentucky should develop and implement procurement polices that encourage sustainable practices, products and energy efficiency.

Recommendation 3:

The Commonwealth of Kentucky should encourage high performance, energy-efficient design for new construction of state facilities.

Recommendation 4:

The Commonwealth of Kentucky should require interagency cooperation to promote energy efficiency initiatives.

Consumer Outreach and Awareness

The choices we make when purchasing products, operating homes, schools and businesses, driving cars, and designing buildings can have a tremendous impact on Kentuckians' budgets and the state's environment. Energy efficiency delivers improved energy savings and an improved quality of life.

The ENERGY STAR program is a voluntary partnership between U.S. EPA, U.S. Department of Energy (DOE), product manufacturers, local utilities, state and local government agencies and retailers. ENERGY STAR works to improve the energy efficiency of products, homes, and commercial buildings and schools. As the symbol for energy efficiency, the ENERGY STAR label identifies highly efficient products for homes and commercial buildings.

Recommendation 5:

The Commonwealth of Kentucky should encourage the continued development of public-private partnerships dedicated to promoting energy efficiency through education and outreach.

Recommendation 6:

The Commonwealth of Kentucky should work with industries, businesses, schools, universities, and communities to promote and give preference to energy-efficient products and practices.

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RE: CASE NO. 2005-00090