Approved:March 17, 2008
Date

MINUTES OF THE HOUSE ENERGY AND UTILITIES COMMITTEE

The meeting was called to order by Chairman Carl Holmes at 9:00 A.M. on February 7, 2008 in Room 313-S of the Capitol Building.

All members were present except:
Dan Johnson- excused

Committee staff present:
Mary Galligan, Kansas Legislative Research
Carol Toland, Kansas Legislative Research
Melissa Doeblin, Revisor's Office
Renae Hansen, Committee Administrative Assistant

Conferees appearing before the committee:

KDHE, Ron Hammerschmidt, Director for the Division of Environment
Sara Hill-Nelson, Lawrence, Bowersock Energy
Karl Brooks, JD, PhD, KU Environmental Studies & History
Bruce Driver, Western Resource Advocates
Larry Flowers, National Technical Director, Wind Powering America, National Renewable Energy Labs, Department of Energy
Eileen M. Smith, Kansas Solar Electric Cooperatives
Todd Cruz or Jonathan Williams, American Legislative Exchange Council
Alan Cobb, Americans for Prosperity,
Grover Norquist, Americans for tax reform
Trudy Aron, American Institute Of Architecture
Hudson Luce, Private Citizen
Bill Wentz, Valley Falls, Kansas
Don Teske, Kansas Farmers Union
Doug Lawrence, Chesapeak
James Taylor, Heartland Institute

Others attending:
Sixty including the attached list.

Continued Hearing on:

HB 2711- Electric generation, transmission and efficiency and air emissions.

Opponents:

Ron Hammerschmidt, (Attachment 1), KDHE, presented testimony in opposition to **HB 2711.**

Grover Norquist, (Attachment 2), Americans for Tax Reform, presented testimony in opposition to **HB 2711.** Questions were asked and comments made by Representatives: Tom Hawk, Bill Light, and Tom Moxley.

Sara Hill-Nelson, Lawrence, Bowersock Energy , (Attachment 3), presented testimony as an opponent to **HB 2711.**

Karl Brooks, JD, PhD, KU Environmental Studies & History, (Attachment 4), testifying as a private citizen, offered testimony in opposition to **HB 2711**, noting that this changes dramatically the power of the regulatory system and the three law making branches in the state.

Bruce Driver, Western Resource Advocates, (Attachment 5), offered testimony in opposition of **HB 2711.**

MINUTES OF THE House Energy and Utilities Committee at 9:00 A.M. on February 7, 2008 in Room 313-S of the Capitol Building.

Larry Flowers, National Technical Director, Wind Powering America, National Renewable Energy Labs, Department of Energy, (Attachment 6), offered testimony with slides in opposition to **HB 2711.**

Eileen M. Smith, Kansas Solar Electric Cooperatives, (Attachment 7), presented opposing testimony to **HB 2711** noting a need for increased usage of photovoltaic cells for energy.

Todd Cruz, director of regional field teams, American Legislative Exchange Council, (Attachment 8), spoke in opposition of **HB 2711** with specific opposition to the tax portion of the bill.

Alan Cobb, Americans for Prosperity, (Attachment 9) noted their opposition to **HB 2711** because of inclusion of the emission cap and the carbon tax.

Trudy Aron, American Institute Of Architects, (Attachment 10), offered testimony in opposition to **HB 2711** noting their opposition to carbon created electricity.

Hudson Luce, (Attachment 11), presented testimony in opposition to **HB 2711.**

Bill Wentz, Valley Falls, (Attachment 12), presented testimony in opposition to **HB 2711**, especially to the coal burning plants to produce electricity.

Don Teske, Kansas Farmers Union, (Attachment 13), spoke to the committee in opposition to **HB 2711.**

Doug Lawrence, Chesapeak (Attachment 14), offered testimony in opposition to **HB 2711.**

Written Opponent**:**

James Taylor, Heartland Institute, (Attachment 15), offered written testimony in opposition to **HB 2711.**

Bart Hall, Farmer and Geologist, Desoto, Kansas, (Attachment 16), presented written testimony in opposition of **HB 2711.**

David Schlissel, Synapse Energy Economics, (Attachment 17) offered testimony to the committee in opposition to **HB 2711**.

Steve Clemmer, Citizen and Scientist, (Attachment 18), gave written testimony in opposition of **HB 2711** to the committee.

Karl Peterjohn, Executive Director, Kansas Taxpayers, (Attachment 19), offered written testimony in opposition to **HB 2711.**

Written Neutral:

Jack Glaves, DCP Midstream, (Attachment 20), offered neutral testimony to **HB 2711.**

Lee Gerhard, former State Geologist, (Attachment 21), offered testimony pertaining to **HB 2711.**

James Ludwig, Westar, (Attachment 22), presented written comments on **HB 2711.**

Paul Snider, KCPL, (Attachment 23), presented written testimony pertaining to **HB 2711.**

Questions were asked and comments made by Representatives: Bill Light, Annie Kuether, Carl Holmes, Tom Moxley, Vaughn Flora, Tom Sloan, Josh Svaty, Richard Proehl, Peggy Mast, and Forrest Knox.

MINUTES OF THE House Energy and Utilities Committee at 9:00 A.M. on February 7, 2008 in Room 313-S of the Capitol Building.

One member questioned why Secretary Bremby was not present at the hearing on this bill. It was noted that the committee has no subpoena powers and that this hearing is an open meeting. It was also noted that his denial decision was in the middle of a court case and that it might be understandable why Secretary Bremby chose to not attend.

The hearing on **HB 2711** was closed.

There were no new bill introductions.

The next meeting was scheduled for February 8, 2008.

The meeting was adjourned at 11:00 a.m.

HOUSE ENERGY AND UTILITIES COMMITTEE
GUEST LIST

DATE: February 7, 2008

NAME	REPRESENTING
Lindsey Douglas	Hein Law Firm
Trudy Aron	Am Institute of Architects
Paul Snider	KCPL
Steve Johnson	ONEOK, Inc.
Karl Brooks	Self
Bill Wentz	Self
Nelson Krueger	PAR Electrical
Dave Holthaus	KEC
Kimberly Gencur Svaty	KMU
Mick Urban	Kansas Gas Service
[illegible]	Orion Ethanol
Susan Hill Davis	Bowersock

KANSAS
DEPARTMENT OF HEALTH
AND ENVIRONMENT

Kathleen Sebelius, Governor
Roderick L. Bremby, Secretary

www.kdheks.gov

Testimony on House Bill 2711

Presented to
House Energy and Utilities Committee
By
Ronald F. Hammerschmidt, Ph.D.
Director, Division of Environment

February 7, 2008

Chairman Holmes and members of the Committee, I am Ron Hammerschmidt, Director of KDHE's Division of Environment. I am pleased to appear before you today to present testimony on HB 2711.

The bill focuses primarily on matters of electricity generation and transmission and efficiency and conservation measures. I will confine my testimony to the sections of the bill that would expand the department's authority to address carbon dioxide emissions in Kansas and those sections that have a direct effect on the Kansas Air Quality Act, which the Kansas Department of Health and Environment implements.

I would like to first direct your attention to Sections 10-12, pages 6 - 12, the Carbon Dioxide Emissions Offset Act. Across the United States, a number of legislative and executive branch efforts are underway to address carbon dioxide emissions, generally in the form of cap and trade programs. These state and regional efforts are in various stages of development. Kansas currently is a signatory to the Midwest Governors' Greenhouse Gas Accord and a member of The Climate Registry. The Western Climate Initiative and the Regional Greenhouse Gas Initiative (RGGI) are similar efforts to establish greenhouse gas programs that focus on cap and trade with market-driven pricing. These markets could include either an allocation of allowances or an auction or a combination of the two.

This act would establish an efficiency standard for new sources but would not implement a cap on carbon dioxide emissions in Kansas. This differs from other state and regional initiatives that are establishing a cap that then encourages facilities to implement efficient generation based on market forces. In addition, by fixing the maximum price of carbon offsets at $3/ton, the act would artificially set the price of carbon rather than allowing market forces to determine the price which, in effect, discourages carbon reductions.

Section 10 of the bill contains new definitions. In keeping with the expressed intent to keep this act separate from the Kansas Air Quality Act and to distinguish between the language used in the existing federal and state air quality laws, the department recommends that the term "affected facility" at Section 10, subsection (b)(1), page 6, lines 12-18, be changed to "affected electrical generating facility." The inclusion of the definition for "reconstruct" or "reconstruction" at Section 10, subsection (b)(7), page 7, lines 24 - 27, as well as the applicability criteria established in Section 11, page 7, lines 34 – 37, bring reconstructed facilities within the scope of the Carbon Dioxide Emissions Offset Act (Offset Act), which could have significant impacts on existing facilities. It is not clear whether all or part of an existing facility would be subject to emissions reductions or offsets.

Sections 10 and 12 of the bill imply a permitting process in several places, but the bill does not clearly establish one. Section 10, subsection (b)(5), pages 6-7, includes the concept of limiting CO2 emissions from facilities through hours of operation or the type of material combusted. This type of restriction is normally placed in a KDHE permit to make it enforceable. In addition, the phrase "permitting authority" is referenced once in Section 12, subsection(e), page 10, lines 21-29, where credits for permanently retiring facilities are discussed. The proposed Offset Act would not be part of the Kansas Air Quality Act and therefore, the CO2 limits/reductions could not be conditions in an air quality permit. In order to implement the program as envisioned by this bill, the state would need permitting and enforcement authority.

Section 10, subsection (b)(1)(C), page 6, lines 17 and 18, exempts sources from being defined as an "affected facility" if they are exempt under section 111 of the federal clean air act. This language would exempt several fossil-fuel-fired steam electricity generating units currently operating in Kansas that were built prior to promulgation of the new source performance standards by EPA.

I would now like to address Sections 30 – 33, pages 21 – 25, which amend the Kansas Air Quality Act. In Section 30, a new subsection (t) is proposed for addition to the list of the secretary's powers and duties in K.S.A. 65-3005. The secretary would be authorized to implement the federal clean air act (CAA), apparently in its entirety. The department currently implements only portions of the CAA. The department is uncertain whether the intent of subsection (t) is to extend the scope of Kansas's implementation of the CAA to other regulatory programs, such as small engine standards, vehicle emission standards, volatile organic compound (VOC)-content standards for paints, etc.

The department notes that several existing sections (e, i, q, and r) of K.S.A. 65-3005 refer to "the prevention, abatement and control of air pollution" as the bases of the Kansas Air Quality Act. In the policy statement made in Section 30, page 21, lines 17 and 18, however, the bill inserts new terms, "prevent the deterioration of air quality." This terminology is similar to the CAA terms, "prevention of significant deterioration (PSD)," which apply to the federal

preconstruction permits the department issues to major stationary sources. The similarity of language may create further confusion as to the intended scope of subsection (t).

Section 30, page 21, lines 22 – 23, limits the scope of the secretary's authority by restricting Kansas's implementation of the CAA to being no more stringent, restrictive or expansive than is required by the CAA. Using PSD permits as an example, Kansas regulation K.A.R. 28-19-350 does not implement all of the federal requirements for PSD. For example, Kansas implements Kansas-specific requirements for stack heights, air quality analysis, and visibility monitoring, which depart from the federal PSD requirements. Unlike the federal PSD rules, Kansas regulations do not require permit applicants to file environmental impact statements. The department is also concerned that a number of regulatory and voluntary programs it has implemented to prevent air pollution would be prohibited from expanding beyond the scope of the CAA. Examples of ongoing programs include: Sustainable Skylines Program; Blue Skyways Program; and the Kansas City Clean Air Action Plan.

The current air quality regulations address permitting requirements for major and minor stationary sources across a range of industrial activities in Kansas. Permits are issued for construction of the emissions source as well as for the source's operation. The department issues prevention of significant deterioration (PSD) permits, new source review (NSR) permits, and Title V operating permits to major stationary sources and construction and operating approvals for minor stationary sources pursuant to current Kansas regulations that have met the requirements for adoption under Kansas law and have met the requirements of the United States Environmental Protection Agency for inclusion in the state implementation plan required by the CAA. The last sentence of (t)(1)(A), page 21, lines 25 – 28, would require the department to seek the enactment of legislation in order to adopt air quality regulations that would be more stringent, restrictive or expansive than the CAA. This provision of the bill would disable the department from performing one of the core elements of the Kansas Air Quality Act, that is, prevention. The department would no longer have available the ability to take flexible and innovative approaches to air quality control.

Subsection (t)(1)(B), page 21, lines 32 – 35, provides an exception for non-attainment areas to the restrictions on the secretary's authority imposed in subsection (t)(1)(A). While the department acknowledges the need for this exception, we must note that the primary purpose of the Kansas Air Quality Act is to avoid federal designation of any area of Kansas as non-attainment. Such a designation means that the area does not meet the National Ambient Air Quality Standards and comes at a significant cost not only to the industries subject to further emission restrictions but to the public, in terms of health and restrictions on their personal activities, i.e., gasoline purchases, lawn mowing. The bill language would allow the department to take action only after non-attainment occurs rather than taking a preventative approach to avoid designation as non-attainment. The department is currently developing administrative

regulations to implement contingency measures in a Kansas City maintenance plan, which is part of the state implementation plan to avoid a non-attainment designation.

With respect to Section 31, which amends K.S.A. 2007 Supp. 65-3008a, it appears that there is an additional affirmation step required to affirm the issuance of any permit, and the terms and conditions thereof. The bill does not define the form or procedure to be used for this additional affirmation step.

I appreciate the opportunity to provide these comments and will stand for questions when the time is appropriate.

AMERICANS for TAX REFORM

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Statement by Grover Norquist
President of Americans for Tax Reform

submitted to the

Kansas House of Representatives
Committee on Energy and Utilities

regarding

House Bill 2711

February 7, 2008

Thank you Chairman Holmes, Ranking Member Kuether and Members of the Committee,

My name is Grover Norquist, and I am president of Americans for Tax Reform, a national taxpayer advocacy organization based in Washington, DC.

I am here today to submit testimony in opposition to House Bill 2711, which has been cross-filed with Senate Bill 515.

While these bills may have been a well-intentioned effort to broker a compromise addressing last year's rejection of the Holcomb air permit, this compromise contains several provisions which are extremely damaging from a taxpayer's standpoint, and would have lasting disastrous ramifications for businesses and consumers alike.

First and foremost, these bills would put in place statutory emission caps coupled with a punitive first-in-the-nation carbon tax. The cost of this tax on fossil fuels will be passed on to consumers, in the form of higher rates for electricity, and increased cost for goods manufactured in Kansas. Those hit hardest are the ones who may be least able to afford these added costs - most notably the poor, senior citizens, and those on fixed incomes.

The history of taxation is riddled with taxes that were once codified into law under the assumption that they would only have a minimal effect, but, once on the books, they ballooned into massive burdens on taxpayers.

Some may argue that state would receive no additional revenue under the emissions threshold put forth by these bills.

One need look no further than the personal income tax. Put in place by the U.S. Congress in 1913 with rates beginning at 1 percent and rising to 7 percent for taxpayers with income in excess of $500,000, the tax hit less than 1 percent of the population at the time. Today, almost 60 percent of the population is subject to the income tax.

Recently, the Alternative Minimum Tax, has gotten under immense fire precisely because of its morphing into a threat to millions of Americans' wallet. The AMT, too, was originally designed to capture a small number of wealthy taxpayers who were not captured by the income tax, affecting less than 1 percent.

The Spanish-American War Tax – the "temporary" 3 percent tax still on your telephone bill - provides another example, imposed in 1898.

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Make no mistake, if this tax is put on the books, however little revenue it may generate in the beginning, it will stick around and ultimately balloon, and taxpayers are once again on the losing side.

Russian dramatist Anton Chekhov once observed that if a gun is hanging on the wall in the first act, it will always go off by play's end. The same applies here.

Businesses and investors faced with the decision of whether to locate or invest in Kansas will be greeted with a sword of Damocles hanging over their heads. There is no guarantee that the threshold will not be lowered, opening the floodgates for taxpayer dollars to rush into state coffers.

However, the carbon tax is not the only troublesome provision in this legislation. An additional burden on consumers and businesses would arise from statutory regulations contained in the bill, regulations that ultimately will drive up the cost of energy, and the cost of goods manufactured in Kansas.

Again, it will be your constituents who will feel the pinch: when they commute to work, drive their kids to school, shop for groceries, or do business.

By imposing absolute caps on CO2 emissions paired with costly offsets, this energy compromise puts the legislature in the position of improperly picking winners and losers.

The bill also prohibits the expansion of new coal-fired merchant power plants, while granting exemptions for government utilities or cooperatives, thereby placing independent entities at a competitive disadvantage, and undercutting Kansas in the global economy.

Already, the cost of doing business is too high in Kansas. Every year, Americans for Tax Reform Foundation calculates "Cost of Government Day," the day of the calendar on which the on which the average American has earned enough in cumulative gross income to pay for his or her share of government spending (total federal, state, and local) *plus* the cost of regulation.

Kansans had to work 186 days of the calendar year – until July 5th - to pay for the combined cost of spending plus regulation. Increased taxation and regulation only stand to aggravate the situation and harm Kansas's competitiveness in the long run.

Businesses will think twice about investing and locating in Kansas, and the state can simply not afford to further jeopardize its competitiveness – be it in relation to other states, or foreign countries.

In sum, the long-term ramifications of this bill, which would set a bad precedent not only for the State of Kansas, but for the rest of the nation, lead us to urge you to reject HB 2511.

Rather than rushing a well-intentioned, but ill-conceived compromise this week, I urge you to vote against these measures and work towards drafting an energy bill that will allow for Kansas to thrive and prosper.

Thank you for allowing me to address your committee. I would be happy to address any questions that you might have.

Comments of The Bowersock Mills and Power Company
Sarah Hill-Nelson
SB 515 and HB 2711

My name is Sarah Hill-Nelson. I am an Owner/Operator of The Bowersock Mills and Power Company, which has been generating hydroelectric power in Kansas since 1874. I also work for the Bonneville Environmental Foundation in the Renewable Energy Certificate (or REC) Market. RECs are also commonly referred to as Green Tags.

As a representative of Bowersock, I speak today to reiterate our hydro station's long-standing efforts to encourage a comprehensive energy policy for the state of Kansas that encourages the development of renewable energy generation. Since my great, great grandfather J.D. Bowersock began generating renewable energy off the Kansas River in Lawrence in the late 1800s, Bowersock has continually contributed to the economy of Lawrence, providing clean power and economic development to the region. Today, Bowersock, like many other entities, has the opportunity to grow the economy of Kansas by investing in additional renewable energy. Bowersock is considering plans to expand our generation, potentially doubling our power production by adding additional turbines on the north side of the Kansas River. The energy policy we develop in Kansas today will impact these opportunities for generations to come. HB 2711 and SB 515 fail to recognize the economic value and long term importance of renewable energy to the Kansas economy, and the critical need for comprehensive policy and planning to prepare Kansas to capitalize on its natural resources.

Specifically, the section of the proposed legislation called the "carbon dioxide emission offset act," demonstrates little or no correlation with current national trends or current national renewable energy or carbon markets. On a national level, carbon offset markets are establishing guidelines that require scientifically-based, verifiable, additional, permanent, and enforceable reductions in greenhouse gas emissions, or increases in biological sequestration. The pieces of the legislation which are perhaps most out of step with national trends are found in Section 12, in which various carbon offsets appear to have been granted arbitrary values which have little correlation with their actual carbon impacts.

It important at this time to explain a bit about the national renewable energy markets, as they could (but not in the context of this bill) play an important role in the development of Kansas energy production.

In addition to key changes that the Federal Energy Regulatory Commission has made that have opened energy markets and allowed independent power producers to operate in a more competitive market, the most critical change that will allow Bowersock to expand (and likewise wind developers to establish new windfarms) is the existence of Renewable Energy Certificates or RECs. RECs are the environmental attributes of energy, which are

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now traded separately from the energy itself.[1] For every 1,000 kWh that a renewable generator produces, the entity earns 1 REC. One of the primary goals of the REC market is to improve the return on renewable energy. This improves financial return and encourages investment in new renewable generation.

The REC market is real, and viable. There are essentially two different markets for RECs in the nation, the compliance market and the voluntary market. RECs sold in compliance markets are sold in order to satisfy state mandates, which usually take the form of a Renewable Portfolio Standard or RPS. RECs sold in voluntary markets are sold to businesses and individuals who choose to pay a premium for their electricity in order to support renewable energy. Because there is no RPS in Kansas, the voluntary market is more relevant to this discussion. In 2006, retail sales of renewable energy in voluntary purchase markets totaled 12 billion kWh, representing a capacity equivalent of 3,500 MW of renewable energy, including 3,100 MW from "new" renewable energy sources.[2]

For a renewable energy producer, the opportunity to sell RECs on the national market is significant. In the case of Bowersock, it will mean the difference between whether our proposed project will be financially viable or not. Currently, wholesale REC prices range between $5.00 and $7.00. The Bonneville Environmental Foundation works with wind projects all over the US, many of which have demonstrated that the entire profit out of the project has been derived from the REC sales. Utilities such as Westar now recognize the value of RECs, as Westar counted in the value of the sale of RECs from their proposed wind farms in their recent case before the KCC.

Nationally, the REC market is being standardized, with formal, regional REC tracking systems emerging annually.[3] One of the key aspects of these tracking systems is that a REC may only be sold once. The tracking systems monitor the entire chain of custody of a REC, from generation to retirement.

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[1] Renewable Energy Certificates (RECs) or Green Tags are market-based commodity designed to facilitate transactions between buyers and sellers of renewable energy, free from the constraints of the electricity grid. By unbundling the renewable characteristic from the actual electricity commodity, RECs allow renewable energy generators more flexibility in the distribution of their products, and therefore encourages further development of the renewable energy market. In states or regions that have an REC program, one REC represents the environmental attributes generally associated with one megawatt-hour (MWh) of electricity from renewable resources. http://www.energybusinessreports.com/shop/item.asp?itemid=1460

[2] Bird, Lori, Leila Dagher, and Blair Sweeney, "Green Power Marketing in the United States: A Status Report, National Renewable Energy Laboratory, December, 2007, p. 25.

[3] For example, the California Energy Commission and the Western Electricity Coordinating Council established the Western Renewable Energy Generation Information System (WREGIS) to issue, register, and track RECs for the territory covered by the Western Interconnection. Other similar regional tracking organizations include the PJM Generation Attribute Tracking System (GATS) and the New England Power Pool Generation Information System (NEPOOL GIS), and the newest tracking sytem, M-RETS, the tracking system for the Midwest Independent System Transmission Operator (MISO). Each of these organizations issues certificates with unique serial numbers that represent the attributes of the generation for each megawatt-hour produced by qualified generators.

The leading national REC certification entity is the Center for Resource Solutions (CRS) via their Green-e certification program. Any Green-e certified REC has undergone a chain of custody audit that ensures that the carbon offset value of the REC has only been claimed once. Both the Environmental Protection Agency and the Federal Trade Commission have weighed in on the nature of carbon offsets including the property rights transferred from seller to buyer through the sale of carbon offsets and RECs, and the importance of matching environmental claims with the true carbon value of the offset.

Given the importance in national markets of using a REC only once, it is difficult to foresee how House Bill 2711 would reconcile its carbon offset system with national standards which require the single use of a REC.

The proposed legislation not only doesn't correlate to national trends (and could potentially be considered a violation of EPA and FTC standards), but it would have very little positive economic impact for renewable energy generators in Kansas. Admittedly, although I am quite familiar with the national system of RECs, I am struggling to understand exactly how the proposed Kansas system would work. As a hydro generator considering building a new generating facility, Section 12.3 is of particular interest, because (if I understand correctly) it would grant Bowersock "an offset credit equal to three times the actual carbon dioxide tonnage avoided." According to the newest Green-e standards for greenhouse gas offsets, a REC from Kansas is worth approximately ½ ton of carbon. A ton of carbon then, would be worth two RECs. Bowersock could currently sell that on the national market for a minimum of $10.00. It is hard to foresee a situation where any Kansas entity would buy Bowersock's carbon offset from us at $10.00 when they could pay a fine of $3.00 or the same thing, or achieve some other type of offset and only pay $1.00.

To summarize, the proposed legislation appears to create a special carbon offset system for Kansas that has no correlation with national markets or actual carbon values. As the nation moves towards uniform policies on these issues, I would urge legislators to put Kansas in step with other states in the nation to prepare the state to take full advantage of the significant economic development opportunities available through the development of renewable energy. HB 2711 and SB 515 would undermine serious efforts to create a comprehensive state energy policy that will promote clean, renewable energy and the associated economic development it can achieve for Kansas.

TESTIMONY TO THE
KANSAS HOUSE OF REPRESENTATIVES
ENERGY AND UTILITIES COMMITTEE
RE: HB 2711
Kansas Statehouse, 313-South
7 February 2008

Karl Brooks, JD, PhD
401 Boulder Street
Lawrence KS 66049
785.550.2302 H

Chairman Holmes, and members of the Committee:

Thank you for the opportunity to testify about four important, difficult environmental legal issues raised by HB 2711 – and its Senate counterpart SB 515.

First, the bill will only increase regulatory uncertainty in Kansas, despite its supporters' pleas for more certainty in the application of both environmental and administrative law.

Second, the bill guts one of the most important, long-standing principles at the heart of both the Kansas Air Quality Act and the federal Clean Air Act: state primacy for protecting Kansans' health and safety.

Third, the bill unwisely, and unnecessarily, politicizes legal matters long confided by sound precedent to the coordinate branches in the executive and judiciary.

And finally, the bill intervenes directly into several pending administrative and judicial proceedings. Legislative intervention not only complicates and undermines the sound tradition that leaves specific legal decision-making to agencies and courts, but raises the risk of provoking a constitutional collision between this body and both coordinate branches.

I testify as a private citizen who has lived for 12 years in Kansas. I work an associate professor of history and environmental studies with the University of Kansas. I have been a faculty member since earning my doctorate from KU in 2000. I am not testifying in any way as a representative of the University.

My testimony will focus only on four legal issues raised by Sections 30 through 34 of HB 2711. I address only these sections because I am a lawyer with some expertise in administrative and environmental law. I teach environmental law and policy as well as legal history at KU. I have published one book and various scholarly articles on environmental and legal topics. The University Press of Kansas will be publishing in 2009 my next book, a history of American environmental law between the end of World War II and 1970.

After graduating in 1983 from Harvard Law School, I practiced law for a decade in my home state of Idaho representing a multi-national wood-products manufacturer and the clients of a multi-state Western law firm. I belong to the Idaho State Bar, the Bar of the United States Supreme Court, and the Bars of three United States Courts of Appeal.

For six years I sat on "your side of the table," serving three terms as an Idaho State Senator. I co-chaired the Senate Judiciary Committee in the early 1990s, while the Idaho Legislature re-codified both the system for adopting state administrative rules and the process governing judicial review of state agency actions.

Although I contacted the Great Plains Alliance for Clean Energy to help schedule my testimony today, I am not testifying today in a professional capacity as an attorney for GPACE or any other interest.

Everyone in this room knows HB 2711 was written for one primary reason: to change Kansas law so Sunflower Power could get something indispensable, something the company has so far been unable to obtain through the regular channels of Kansas environmental and administrative law. Somehow, Sunflower has to get the state of Kansas' permission to build and operate 2 big new coal-burning air-pollution sources.

The Kansas Department of Health & Environment initially dealt with the legal issues raised by Sunflower's request for permission to pollute. Now the Kansas courts are also playing an important role after Sunflower sought judicial review of KDHE's decision denying its permit request. KDHE and the judicial branch are handling Sunflower's request to pollute in a manner consistent with long-standing state statutes and rules enacted and adopted by your legislative predecessors. Those laws' primary purposes are to protect Kansans' health and safety, to safeguard the health and quality of Kansas' natural environment, and to ensure Kansans' constitutional rights to enjoy due process, equal protection, and open access to impartial agencies and courts.

Other witnesses will certainly testify about HB 2711's threats to Kansas' ability to protect our neighbors' safety and our environment's health. I confine my testimony to the bill's radical, unpredictable disordering of the various legal processes Kansas has long used to administer our environmental law, afford judicial review to our aggrieved citizens, and preserve comity with the federal government and our sister states.

This bill would not only upset 40 years of settled precedent, under both state and federal laws. It would actually introduce new layers of unpredictable complexity into an administrative legal system that has so far successfully balanced economic activity, environmental protection, constitutional rights, and federal-state relations.

Even if Sunflower were able to get some version of HB 2711 enacted, its proposed Holcomb plant would be no closer to operating. Not only would Sunflower face new and unpredictable legal problems at the state and federal levels, so would every other electric utility, manufacturing industry, and agriculture processor.

Regulatory Uncertainty

HB 2711's 28 pages make far-reaching changes in at least seven distinct areas of Kansas environmental, energy-management, and administrative law. This Legislature should of course consider all of

these topics, but should do so in an orderly, systematic way. Too much change, enforced too quickly, upsets the steady, sound making of environmental law based on advancing scientific knowledge, technological innovation, and public understanding.

Sections 30 and 31 purport to grant an air-pollution permit to one specific electricity-generating source under the Kansas Air Quality Act. But those Sections, taken together with the other 29 preceding sections of the bill, set in motion far-reaching changes to the entire legal system regulating generation, sale, conservation, and distribution of electricity. They also dramatically change the duties, powers, and objectives of at least a half-dozen other state agencies charged with protecting our health and safety, conserving our vital natural resources, and ensuring equal justice before impartial decision-makers.

State Environmental-Protection Primacy

Sections 30 and 32 purport to make KDHE enforce the Kansas Air Quality Act and federal Clean Air Act consistently with the federal Environmental Protection Agency's interpretation of the Clean Air Act. Yet since at least 1970, the structure of air-quality law in America has tried to balance federal supremacy with state sovereignty. In fact, Section 110 of the Clean Air Act specifically recognizes states' primary constitutional responsibility for protecting their citizens' health and the quality of natural environments within the states. Sections 3005, 3008, and 3012 of the Kansas Act, in place since 1967, express the Legislature's willingness to take up that important duty.

Yet when Section 30 amends KSA Sections 3005 and 3012 to direct KDHE to conform only with EPA's present construction of the federal Clean Air Act, Kansas surrenders its key powers to make air-quality law responsive to Kansans' needs and this state's unique, distinctive natural environmental conditions.

In particular, Section 33's repeal of the KDHE Secretary's power under KSA Section 3012 to protect citizens from threatened environmental harms from proposed pollution sources menaces our state's ability to keep responsibility for administering the federal

Clean Air Act in this state. EPA does not have to grant primacy under Clean Air Act Section 110 to states. It is likely, especially given the federal government's ongoing efforts to slow climate-warming and restrict carbon emissions, to take a dim view of Kansas' decision to limit its environmental agency's powers when KDHE has attempted, under existing state law, to do the same.

I caution the Legislature to be careful about making this state dependent on whatever current president, congress, and EPA administrator sit in Washington, DC. You may like the present administration of the federal law, but none of us can predict who will sit in the White House, chair the germane congressional committees, or occupy the EPA headquarters or Kansas City regional office.

Politicizing the Legal System

Sections 30 and 31 purport to overrule KDHE's initial denial of Sunflower's request for an air-pollution permit. They purport to remove from the judicial system, as well as the administrative system, several active cases posing difficult legal questions about whether the KDHE secretary correctly applied Sections 3005, 3008, and 3012 of the Kansas Air Quality Act.

One big difference between law and politics is that numbers and dollars help make politics, but rules and reason, precedent and judgment make the law. If this Legislature essentially decides a case in the administrative-law system, by short-circuiting judicial review of agency action under the Kansas Administrative Procedure Act, it sets a dangerous precedent for politicizing not just environmental, but all types of law involving execution of statutes and judicial interpretation of statutes and agency rules applying those statutes to specific cases.

I caution the Legislature about making each request for a permit to pollute, or to change land uses, or to dispose of waste products, the subject of lobbying campaigns, media blitzes, and election results. This Legislature has developed a model system of making and enforcing environmental law, where the legislative branch sets broad

policy goals and objectives, and delegates the executive branch the constitutional duty to apply those broad policies in real-world settings.

Constitutional Conflicts

Sections 30 and 32 purport to instruct EPA to approve any air-pollution permit issued by KDHE under the new rules that will apply if this bill becomes law. I caution the Legislature to be wary of appearing to dictate to EPA how to apply the Clean Air Act in Kansas. Not only EPA, but our sister states, may well consider this challenge to federal administrative discretion a head-on constitutional collision in the making. Comity will certainly suffer, as will Kansas' ability to work cooperatively with sister states and the federal government on emerging environmental problems that cross state lines.

Likewise, Sections 30 through 33 purport to tell KDHE and the Kansas judicial branch how to decide not only the Sunflower Power permit application. But nothing limits the precedent this bill would set to Sunflower at Holcomb. Why would any future permit seeker not try to use its political clout to create a temporary legislative majority that favors its plans? At present, both the Kansas Air Quality Act and the Kansas Administrative Procedure Act acknowledge each of the three coordinate branches enjoy constitutional prerogatives and display practical specialties and strengths in making environmental law. If HB 2711 became law, both of the other coordinate branches may well question the legislature's constitutional right to make permit decisions, to bind agencies to interpret state and federal laws in particular ways, and to decide contested cases in pre-ordained ways should judicial review take place.

Summary

Kansans have developed, over the past 40 years, a model environmental lawmaking system. Both ordinary citizens and elected officials have cooperated in building this system. Legal professionals, as well as regulated businesses and individuals, benefit from the careful blend of politics, law, and administration. This bill would destabilize the system, producing results none of us can now foresee.

Those results, in my opinion, would leave the protection of Kansas air quality more uncertain, the administration of justice more unpredictable, and the reputation of this state for careful balancing of environmental quality and economic growth less respected.

The specific provisions of this bill I have addressed need more careful consideration, in cooperation with representatives of the bar, the bench, the whole regulated community, and those legal professionals who have worked so hard to make administration of environmental law fair, effective, and responsive.

TESTIMONY OF BRUCE C. DRIVER
FOR
WESTERN RESOURCE ADVOCATES
ON HOUSE BILL 2711

INTRODUCTON

Mr. Chairman and distinguished members of the Committee, I am Bruce Driver.[1] I am an energy and water lawyer and consultant, today appearing for Western Resource Advocates (WRA).

WRA is an environmental law and policy center serving the American Interior West. Since 1991, WRA has promoted a western electric system that lowers electricity costs, reduces economic risk and protects the natural environment of the region. Ordinarily, WRA does not appear before the Kansas legislature. However, because the legislation before the Committee will affect the future of the planned Holcomb pulverized coal units and because a substantial share of the power generated at these units would be available to Tri-State Generation and Transmission Association (Tri-State) in Colorado and elsewhere in WRA's region, WRA believed it could offer some perspectives that would be useful to the Committee. In this regard, I do not take a position on House Bill 2711. Rather, I provide information that may provide context for the Committee's consideration of the legislation.

SUMMARY

[1] My background includes working as committee staff in the U.S. House of Representatives for both parties on energy and environmental issues; serving as Scholar-in-Residence for the Western Governors' Association; and serving WRA as its Energy Program Director and, then, Executive Director. I have a B.A. from Yale University, an M.B.A. from Columbia University School of Business and a J.D. from the School of Law, University of Michigan.

ENERGY AND HOUSE UTILITIES
DATE: 2/07/2008
ATTACHMENT 5-1

I. Climate and related utility regulatory policy in Colorado.

It is my understanding that there are those who say that Kansas might as well build pulverized coal (PC) units in Kansas for the economic benefits, since these units will be built in Colorado anyway, if they are turned down in Kansas. While no one can be sure of Colorado's response to an application by Tri-State to build PC capacity in Colorado, it does not seem likely that such application would be any better received in Colorado than it has been, so far, in Kansas.

Last fall, Governor Bill Ritter issued his "Colorado Climate Action Plan, A Strategy to Address Global Warming." In it, he stated that "Specifically, Colorado will…by 2020, reduce greenhouse gas emissions by 20 percent below 2005 levels [and] by 2050, reduce [such emissions] by 80 percent below 2005 levels."[2]

In 2007 Colorado legislators and Governor Ritter approved measures requiring electric utilities, including cooperatives, to meet a state renewable energy portfolio standard; increase utility attention to energy efficiency; increase financing and planning for transmission lines designed to deliver renewable energy to market; align city, town and county building codes with the 2003 International Energy Conservation Code; require co-ops to offer net metering and many other measures and several other measures[3]. Earlier legislation promotes IGCC with CCS in Colorado.[4] Colorado is now fully committed to a "green" energy future across all sectors.

In 2005 Colorado sources emitted 118 million metric tons of CO2 equivalent gases, up from 87 million tons in 1987. Electricity consumption was responsible for 36% of 2005 emissions or about 42 million tons.[5] If the electricity sector, specifically covered by the Governor's plan, is to play its proportional role in emission reductions to meet the

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[2] "Colorado Climate Action Plan, a Strategy to Address Global Warming," Office of the Governor, November 2007, p. 3.
[3] **Id.**, p. 11.
[4] **See** 40-2-123, C.R.S.
[5] **Op Cit.**, fn 2, p. 9.

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Governor's targets, this sector will have to find a way to decrease its emissions by over 8 million tons by 2020 and by almost 34 million tons by 2050.

The Governor's plan carves out a special process for cooperative and municipal utilities, ending with a request that those entities submit plans showing how and when they propose to meet goals comparable to the 2020 20% reduction goal. The Governor's plan states that "...we believe that all of Colorado's electrical utilities and their wholesale providers should contribute to reducing the state's greenhouse gas emissions."[6]

Each 700 MW pulverized coal unit planned by Sunflower and Tri-State would add over 4 million tons of new CO2 to the atmosphere per year.[7] It seems unlikely that the state of Colorado would look favorably upon one or more large new sources of CO2 in the state when state policy is markedly to reduce these emissions well within the lifetime of any new PC unit.

II. The larger picture: PC unit cancellations and deferrals

Is Kansas, in denying the permits for the Holcomb units, alone in questioning the appropriateness of PC technology? I t does not appear so.

Increased costs of construction, the availability of cleaner, low-cost and lower-risk alternatives coupled with the risk of climate-change legislation have slowed plans to construct PC units in the U.S. For example, in 2007 roughly 14,000 MW of announced coal-fired capacity was cancelled and another 32,000 MW was deferred.[8]

Perhaps chief among the causes of the turn-around in the fortunes of coal is the risk of climate-change legislation. Every $10 in cost per ton of CO2 of the purchase of emission

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[6] **Id.**, p. 19.

[7] Assuming emission of 1,747.05 pounds of CO2 per MWh of generation and an 80% capacity factor. See also "A Balanced Energy Plan for the Interior West," Western Resource Advocates in collaboration with Synapse Energy Economics, Inc., and the Tellus Institute, 2004, p. 64.

[8] See "16 U.S. coal-fired plants scrapped this year, Utilities struggle with global warming concerns, construction costs," Matthew Brown, Associated Press, Boulder Daily Camera, October 18, 2007, based on U.S. Department of Energy data.

allowances adds about 8.7 mills per kilowatt-hour generated by burning coal from a PC unit.[9] For planning purposes, it is prudent to assume that the cost of buying an allowance to emit 1 ton of CO2 will rise well above $10 per ton during the life of new PC units. Indeed, it appears that the price will rise to whatever it takes to reduce GHG emissions by 60%-80% by 2050, the range of targets included in the leading climate-change bills before Congress.[10] At this cost power from PC units may no longer be competitive with power from combined-cycle natural gas units or even concentrating solar technology, not to mention the enormous amount of demand-side management investments that would then be cost-effective. It is no wonder that a growing number of utilities, if not Sunflower or Tri-State, are reconsidering PC technology.

Perhaps an even stronger signal to utilities about PC technology is coming from Wall Street. In an article published in the Wall Street Journal on February 4, 2008, Jeffrey Ball writes that "Three of Wall Street's biggest investment banks are set to announce today that they are imposing new environmental standards that will make it harder for companies to get financing to build coal-fired power plants in the U.S. Citigroup, Inc., J.P Morgan & CO. and Morgan Stanley say they have concluded that the U.S. government will cap greenhouse-gas emissions from power plants sometime in the next few years. The banks will require utilities seeking financing for plants before then to prove the plants will be economically viable even under potentially stringent federal caps on carbon dioxide, the main manmade greenhouse gas…'We have to wake up some people who are asleep,' says Jeffrey Holzschuh, vice-chairman of institutional securities at Morgan Stanley."[11]

Could it be that Sunflower and Tri-State are "asleep?"

III. **Tri-State's resource plan**

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[9] $10/ton is 5 mills/pound. A kWh of electricity generated from a PC unit carries with it 1.747.05 pounds of CO2 (see fn 7). Thus, a $10/ton cost of carbon emissions adds about 8.7 mills to the cost of each kWh.
[10] In its 2007 Resource Plan Tri-State modeled the effect of its resource mix of carbon costs of $10/ton, $25/ton and $35/ton. See Tri-State's 2007 Integrated Resource Plan, p. 172.
[11] "Wall Street Shows Skepticism Over Coal, Banks Push Utilities to Plan for Impact of Emission Caps, " Wall Street Journal, February 4, 2008, p. A6.

At least half of the power generated at the new Holcomb units will be used on the Tri-State system. Thus, before Kansas adopts legislation to facilitate the construction of these units, it makes sense to take a look at whether Tri-State really needs to build and finance these units.

The contents of a recent report, "A Commitment to Serve: A Cooperative Board Member's Guide to G&T Resource Planning," authored by Summit Blue Consulting, suggests that Tri-State may not need to build and finance these units, indeed, that to do so would expose Tri-State, its member co-ops and their member-owners to unnecessary and significant risks.

Summit Blue is a well-known electric-industry consultant with utility and other consultants across North America. At Western Resource Advocates' request, it described the elements of good resource planning for G&T electric utilities, of which Tri-State is one. As well, Summit Blue reviewed Tri-State's existing resource plan, on the basis of which Tri-State believes it should build and finance the majority of the capacity of the Holcomb units.

Based on the resource plan filed by Tri-State with the Western Area Power Administration about one year ago, the Summit Blue report points out that:

1. There appear to be incentives for some Tri-State member co-ops to over-forecast load growth on their systems.
2. Tri-State has failed properly to consider the role that energy efficiency, renewable resources and efficient combined heat and power resources could play in cost-effectively meeting load growth on the Tri-State system.
3. Tri-State's resource plan increases neither diversity nor flexibility on its system, leaving its members open to risk of federal climate-change regulation.

Summit Blue sees the denial of the Holcomb permits as an opportunity for Tri-State to review its existing plan, including much greater attention to clean resources for the purpose of introducing more diversity to a utility already heavily reliant on coal. In particular, Summit Blue sees additional diversity on the Tri-State system as providing system reliability benefits, offering the ability to better manage their energy costs, and maintaining a competitive regional energy economy as businesses increasingly look for locations with robust, diverse energy supplies from demand-side and supply-side resources."[12] In this regard, it is clear that the Tri-State system contains abundant resources of demand-side management, renewable resources and combined heat and power.[13] For example, Tri-State co-operative customers serve loads in an area with one of the best wind and solar resources in the country.

I should reveal that I have a personal stake here. I am a member-owner of the Gunnison County Electric Association (GCEA), a Tri-State co-op in western Colorado. It matters to me, and a growing number of GCEA and other co-op owner-members, that Tri-State review its existing resource plan and consider a more diverse and less risky mix of resources.

The result is that, if Kansas legislators think they would be doing those of us who purchase our electricity from a co-op served by Tri-State a favor by making it much easier to build the Holcomb units, we would hope that you might spare us this favor.

IV. Federal Climate-Change legislation

The leading bill under consideration in Congress to address climate change is S. 2191, authored by Senators Lieberman and Warner. This legislation would require reductions of GHGs below levels of covered sources (86 percent of U.S. emissions and including electricity production) of 4 percent by 2012, 19 percent by 2020 and 71 percent by 2050.

[12] "A Commitment to Serve: A Cooperative Board Member's Guide to G&T Resource Planning," Summit Blue Consulting, November 2007, p. 40. Http://www.summitblue.com/dyn_download/irp_white-Paper-final.pdf

[13] See "Tri-State Generation and Transmission Association's Resource Plan, Analysis and Alternatives," Western Resource Advocates and Southwest Energy Efficiency Project, April 2006.

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The bill would also create a cap and trade system administered by the EPA and would allocate a growing percentage of allowances, reaching 100 percent by 2030, to activities that would provide public benefits, such as renewable and other green technologies. It would allow up to 15 percent of a facility's compliance obligation to be met through the purchase of verified offsets, defined as reductions from sources outside the capped sectors.

Of course, it is not known today whether or when this legislation will be enacted. Yet, the bill is the result of significant negotiation, and it has been reported out of Committee to the floor of the U.S. Senate. S. 2191 is an indication of the direction in which Congress is going on climate change. Moreover, the leading presidential candidates in both parties support cap and trade legislation. My impression is that federal climate-change legislation is nearly inevitable, even while its provisions are up for debate.

It is likely that any state legislation that is not at least as strong as that contained in federal climate-change legislation will be preempted by it. That is the way virtually all federal environmental legislation works. Moreover, if one or more states are allowed to implement less stringent legislation, it would jeopardize the ability of the U.S. to meet the cap on emissions, suggesting the likely importance to federal policymakers that individual states not be permitted to implement climate-change programs that are less stringent than national policy.

If Kansas goes ahead and enacts its own coal-plant, climate policy and offset legislation, and it or elements of it are later pre-empted by federal legislation, there may be trouble for those who made investments relying on Kansas's legislation.

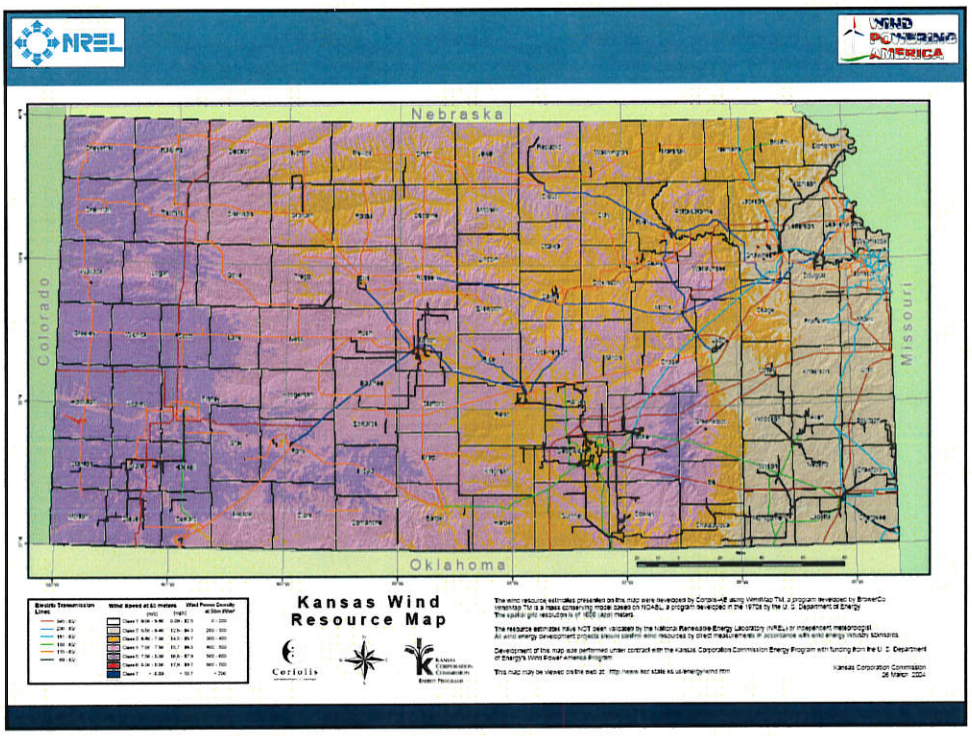
Are there elements of the pending Kansas bill that are likely to be weaker than and inconsistent with federal climate legislation? No one can know for sure now, but some provisions of the Kansas bill appear vulnerable. In particular, the Kansas bill's very liberal offset policies could well be pre-empted, in particular offsets for investments in

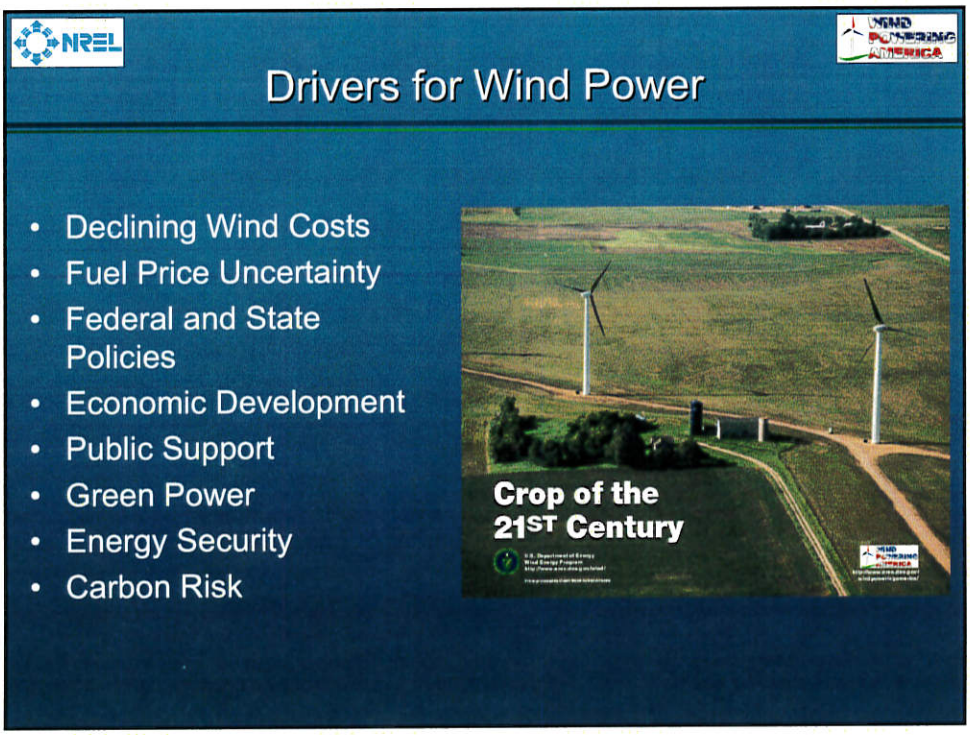
research with no necessary results and credits for investment in offset measures that may occur anyway or may have already have occurred.

Kansas needs to be careful not to send its energy economy down a road that may be preempted by federal legislation after money has been spent and expectations raised.

CONCLUSION

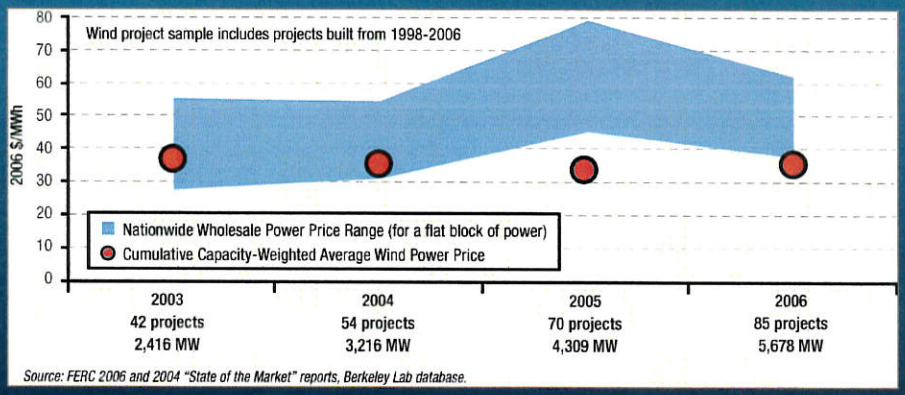
Thank you for the opportunity to present testimony before the Committee. I hope the information I present is useful to you as you grapple with the contentious issues that you face.





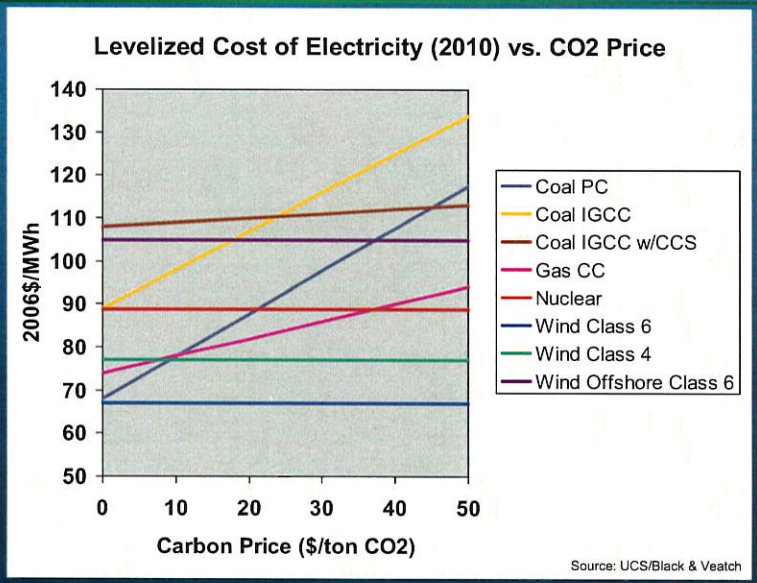
ENERGY AND HOUSE UTILITIES
DATE: 2/7/2008
ATTACHMENT 6-1

Nationally, Wind Has Been Competitive with Wholesale Power Prices in Recent Years



Source: FERC 2006 and 2004 "State of the Market" reports, Berkeley Lab database.

CO_2 prices significantly increase the cost of coal



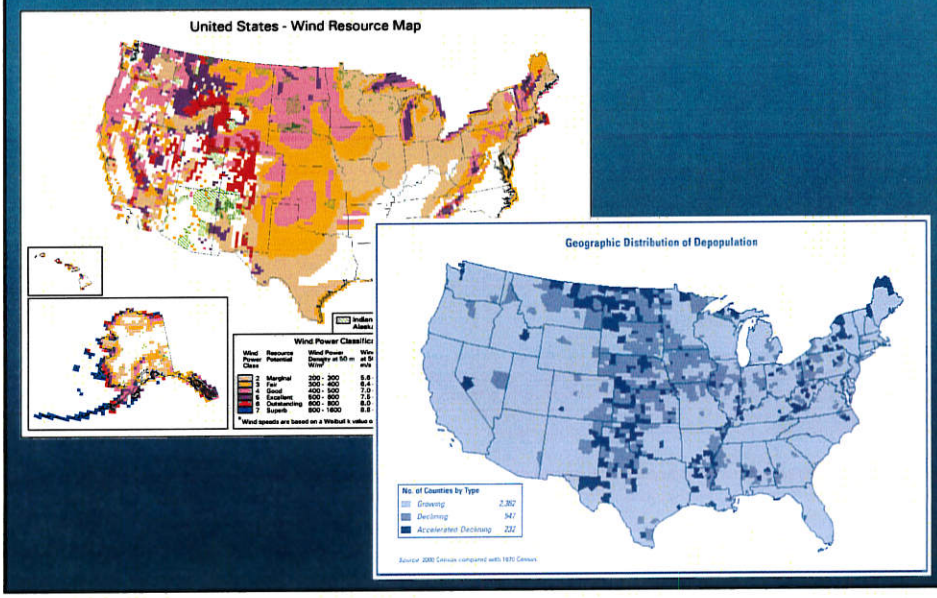
Source: UCS/Black & Veatch

6-2

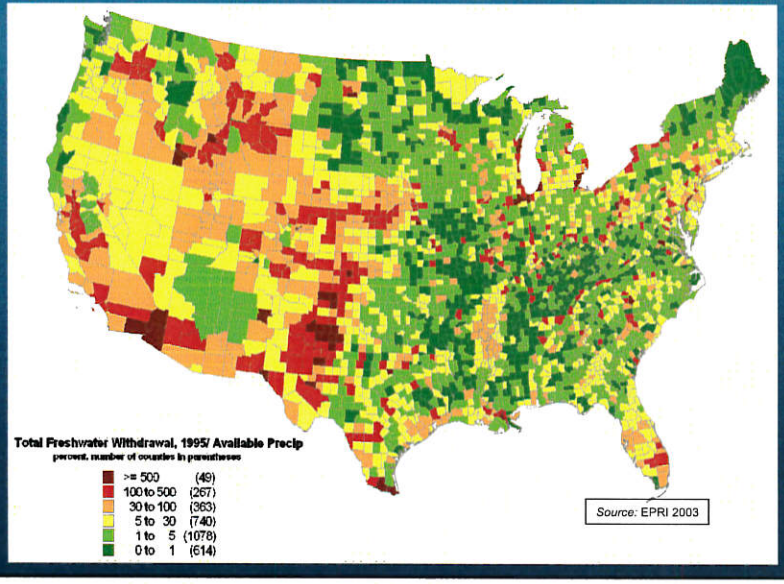
Economic Development Impacts

- **Land Lease Payments**: 2-3% of gross revenue $2500-4000/MW/year
- **Local property tax** revenue: ranges widely - $300K-1700K/yr per 100MW
- 100-200 **jobs**/100MW during construction
- 6-10 permanent O&M **jobs** per 100 MW
- Local construction and service industry: concrete, towers usually done locally

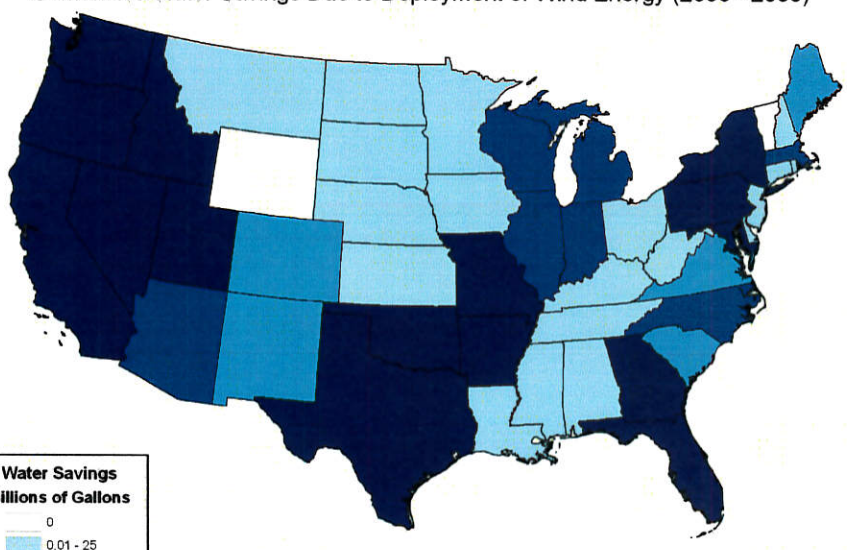
Windy Rural Areas Need Economic Development



Sustainable Withdrawal Of Freshwater Is National Issue



Cumulative Water Savings Due to Deployment of Wind Energy (2008 - 2030)



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Kansas – Economic Impacts

From the 20% Scenario
7,158 MW new development

Wind energy's economic "ripple effect"

Direct Impacts

Payments to Landowners:
- $20 Million/yr

Local Property Tax Revenue:
- $20 Million/yr

Construction Phase:
- 11,500 new jobs
- $1.4 B to local economies

Operational Phase:
- 1,800 new long-term jobs
- $150 M/yr to local economies

Indirect & Induced Impacts

Construction Phase:
- 11,200 new jobs
- $985 M to local economies

Operational Phase:
- 1,300 local jobs
- $120 M/yr to local economies

Totals (construction + 20yrs)

Total economic benefit = $7.8 B

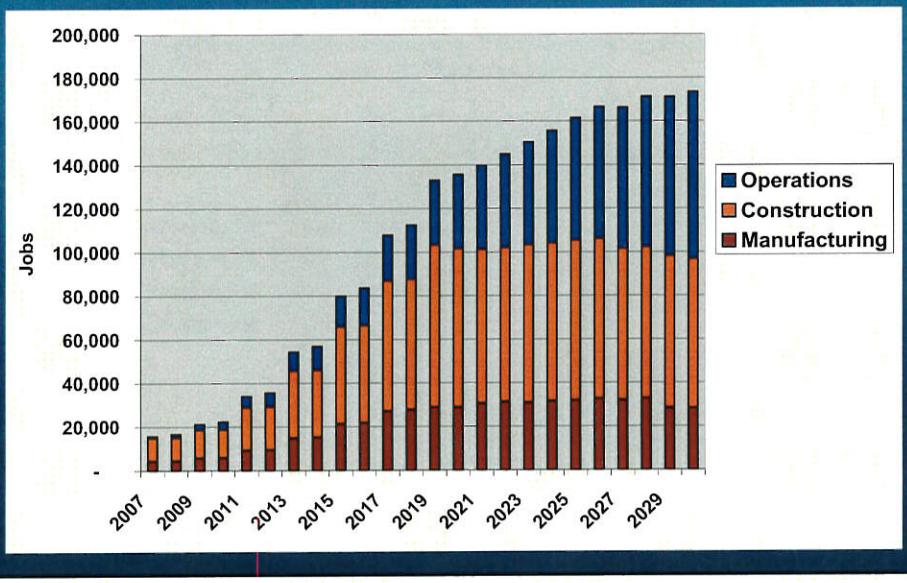
New local jobs during construction = 22,700

New local long-term jobs = 3,100

All jobs rounded to the nearest hundred jobs; Millions of dollars greater than 10 million are rounded to the nearest five million

Construction Phase = 1-2 years
Operational Phase = 20+ years

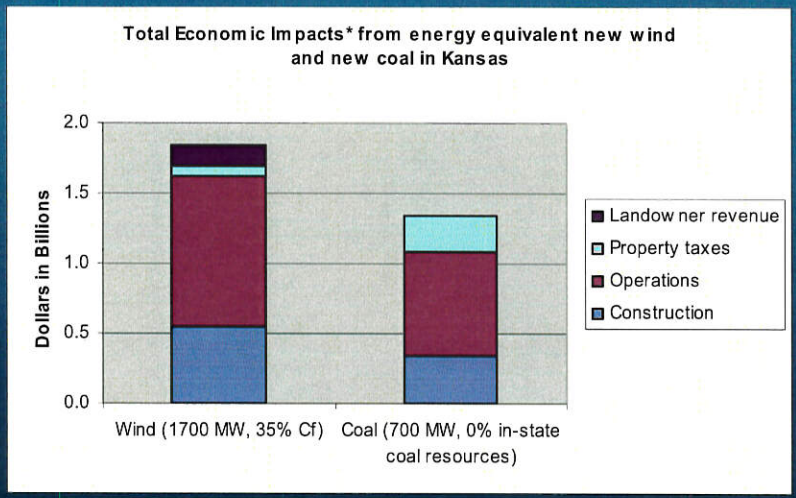
20% Wind Vision Employment



Results: Costs & Benefits

Incremental direct cost to society	**$43 billion**
Reductions in emissions of greenhouse gasses and other atmospheric pollutants	825 M tons (2030) **$98 billion**
Reductions in water consumption	8% total electric 17% in 2030
Jobs created and other economic benefits	140,000 direct $450 billion total
Reductions in natural gas use and price pressure	11% **$150 billion**
Net Benefits: $205B + Water savings	

Energy-equivalent new wind vs. new coal in Kansas



*Total economic impact includes direct, indirect and induced impacts.

Eileen M. Smith, M.Arch.
Founder and Director Since 2005 785-917-1639 cell phone
Kansas Solar Electric Co~operatives KS_SEC@yahoo.com
The K-SEC Model www.geocities.com/Solar_Electric_Cooperatives
Post Office Box 2
Lawrence, Kansas 66044

My name is Eileen M. Smith, M.Arch. I represent the Kansas Solar Electric Co~operatives founded in 2005 with the goal to evolve The K-SEC Model of 1,000 MWp Building-Integrated Photovoltaic [BI-PV] Solar in Kansas by 2020.
Please refer to the two-page $3.5 B K-SEC Business Plan Summary attached.

> *Through participatory processes and systemic methodologies, we build, enhance, and transform the capacity of ourselves, other people, and organizations to address complex societal issues and realize their highest aspirations for a greater social good.*
>
> Strategic Clarity Institute

First, I want to thank Secretary Bremby for his responsible decision to deny the Sunflower Coal Plant. There are several reasons that his decision is important and will go down in history as one of the turning points in energy industry regulation. First, Kansas legislators must take responsibility for putting Secretary Bremby in that position where they repealed the Siting Act in 2000 for all electric generation plants except nuclear energy. Please refer to the Minutes of the Senate Utilities Committee for the meeting held at 1:30 pm on February 3, 2000 in Room 531-N of the Capitol. Those minutes were approved on February 10, 2000 and I quote:

"He [Mr. Hamilton] stated that repeal of the Generation Siting Act does not repeal environmental or zoning requirements, which leaves the responsibility to local authorities and requires development be treated like manufacturing plants, with lower property taxes and competitive economic development incentives. He also urged repeal of the Generating Siting Act and quick action, as there is a stampede to build plants now, and it may be sometime before additional plants are built." He also stated that ". . . building a grid to Western Kansas, which would be very costly and the Holcomb experience of fifteen years ago, would scare off developers. Major power markets are either east or southeast of the state and Kansas can't sell into the Western Interconnection or most of Texas. . . . Sen. Steffes discussed building on top of the source of energy and inquired about coal plants, and if that was a consideration. Mr. Hamilton replied that coal plants are not environmentally friendly, that all merchant power plants will have to be gas powered; that declining costs can be credited to the costs of electrical power generation." [i]

At the time of those hearings I was an intervener in the California Public Utilities Commission rulemaking into the role of the Utility Distribution Company in Distributed Generation.[ii] We were just bracing for a spike in rates from what they called deregulation in an alleged competitive market dominated by monopolies. Energy Crisis began about three months later. It was terrible. I went to the hearings and heard of numerous people losing their businesses

and homes due to their electric bill tripling in one month. There is no such thing as a deregulated and truly competitive market. It is like a football game ---where you put the seasoned pros and the small local businesses together in competition, you had best have excellent regulatory enforcement in place to succeed.

In addition to the need to regulate the Siting of coal plants due to the Senate's own testimony regarding coal being environmentally unfriendly, there is no statement in K.S.A. 65-3012 that states the regulatory authority must *only* be issued in a crisis situation. However, it could be argued that the world is in a crisis and Secretary Bremby responded to that emergency situation where everyone in the world from banker to peasant is scrambling to reduce CO2 emissions and risks of related increased global warming. That emergency evolves larger from one alleged natural disaster after another. There were fourteen hurricanes in one year, unprecedented Tsunamis, the melting of icebergs, the first alleged global warming war in Sudan and extremely hot weather that you know is going to create a dust bowl in Kansas without extremely sensitive mitigation. We need to preserve water rights, now.

Secretary Bremby did not impose authority without gaining the consensus of statutory, judicial and other agency authority. April 2, 2007 the US Supreme Court issued a ruling in Massachusetts versus EPA stating that the EPA must enforce green house gases under the Clean Air Act first passed in 1963. Where before the vague requirement was for opponents of polluting coal plants had to prove that their plant would not pollute before a permit was provided, now businesses proposing coal plants must prove they are not going to add to the CO2 challenge driving global warming. For those that do not believe in global warming I would be glad to provide a bibliography of articles quoting numerous scientific and academic experts around the world that have no known connection or financial benefit for stating their case. However, even with the US Supreme Court decision to rely upon, Secretary Bremby still cautiously pursued an opinion by the Kansas Attorney General Morrison who stated per Attorney General Opinion No. 2007-31 that Secretary Bremby does in fact and did have on October 17, 2007 the authority under K.S.A. 65-3012 to deny or modify an air quality permit, or place a stay on issuance of an air quality permit until state or federal regulations are enacted that address the pollutant. Attorney General Paul J. Morrison indicated that the secretary may *'. . . deny the application pursuant to K.S.A. 65-3008b for specified reasons."* The US Supreme Court gave him not only the reasons to deny, but the responsibility to deny the coal plant permit. It is not only the environmental and health of Kansas people that are at stake, but it is the dignity and the economic stability that are jeopardized by those that want to ramrod these coal plants upon Kansas without proper authority or rational to do so. I would state that this is not a hearing for a coal plant this is a lynch mob in denial. Thereby, I would highly recommend that there be a cooling off period of six months to a year whereby the matter can be more responsibly considered where the stacks are very high from every perspective.

In the meantime, I would suggest that the other projects proposed be furthered along with a solar chimney, wind energy and a cooperative alliance with the Kansas Solar Electric Co~operatives to assure 10% BI-PV Solar in Kansa by 2020. In addition to the 1,000 MWp solar

K-SEC is proposing for Kansas, there is an opportunity for Sunflower Cooperatives to provide diversity to the energy mix in Kansas by the development of two or three 200 MWp Solar Chimneys and Wind Energy in Western Kansas. See the prototype developed in Spain and the proposed project being built in Australia at this time. The solar chimney creates a vacuum with a plexi glass surface over an open space about four feet deep.

There is a deadline to become a coal sequestration demonstration project that is due March 3, 2008. Apply for funding via that avenue to install the sequestration demonstration upon the existing coal plant in Holcomb. When we see that it works effectively, then we can consider using it for a larger coal resource, but not until then. We have too much CO2 emissions as it is.

In 2004, the KDHE issued warnings for the women and children not to eat the fish in Kansas lakes and rivers due to coal mercury accumulation. We are not giving up coal by cutting back in this case. Kansas already depends on coal-fired power for 80% of the electricity we consume. Use this crisis as an opportunity to justify the evolution of a new mix of renewable energy into the Kansas marketplace. Kansans spent substantial time testifying Fall 2007 and in 2005 related to the KCP&L coal plant being built in Missouri. In the meantime, we have not had any review to investigate and further The K-SEC Model while the media and community groups, academic speakers and scientific experts are holding one forum after another related to their concerns with C02 emissions. This is not a personal battle to squelch Sunflower Corporation's aspirations, this is an appeal to assure they are making sound, safe and healthy decisions environmentally and economically.

For more information about The K-SEC Model please refer to the February BI-PV N.E.W.S.Letter linked on the K-SEC website listed herein with K-SEC's address and phone number and see the 8" x 10" photograph included for you of the historic 30,000 SF BI-PV Solar Roof installed on the Georgetown University Intercultural Center in Washington, DC in 1984. This roof generates a MWh of demand-site fuel-free non-polluting solar electricity a day in the dense urban center of Washington, DC. Amoco Oil took over Solarex and their patents that year. PV production fell from 10,000 kWp to 3,000 kWp. From 1992 to 1995, the German States initiated a 1,000 Solar Roofs Program and the industry has continued to grow slowly since then. BI-PV is affordable, however like any other product it will be less expensive when deployed on a large scale basis. 100 MSF in Kansas will provide many benefits to Kansans.

Demand-side fuel free solar electricity is now a necessity due to its unique ability to the tremendous dependency on electricity, today and the volatility in the world. 10% BI-PV Solar in Kansas will increase Homeland Security, Emergency Preparedness, Environmental Integrity, Technology Expertise and it will bring 1,000 jobs to Kansas. K-SEC renewable cooperatives will produce, install, monitor, maintain and manage the solar resource from the 1,000 MWp BI-PV of generators for fifty years. Thus, it is also an excellent research and development program using the consumer lab which is far more effective and economic.

Renewable technology is no longer a partisan issue. Everyone in the world needs to be and wants to be involved in furthering sustainable technology. Please the two pages from the SEPA Record [Solar Electric Power Association] entitled "The Integration of Solar Electric into Buildings Solar Electric at the White House and Around the World." The article is written by Steven Strong, AIA an architect from Cambridge, Massachusetts. He founded the Solar Design Associates in the 1970s and is a BI-PV solar energy guru.

The primary hurdle we are facing in this proceeding is the need to make a decision regarding complex consequential issues in an impossibly short time-frame to influence a time-span of fifty to one hundred years or more. There is no immediate emergency need for the electricity resource being proposed. It will not harm the proposal to give it a six to twelve month hiatus for further consideration to encourage the use of more renewable energy in Sunflower's generation portfolio. However, there are emergency conditions related to the impact of CO2 emissions from coal-fired power plants on global warming and health hazards.[iii] Representative Vaughn Flora expressed that sentiment when he proposed a bill for a moratorium on coal-fired power plants in Kansas per HB 2219 proposed in 2007.[iv]

Conclusion – Time Frame is impossibly short to make well-informed decision
Recommendation – Table Decision-Making Process Pending Further Review

In an attempt to provide the greatest good in relation to the 360 seconds I am allotted to speak, I skimmed Senate Bill 515 and House Bill 2711. I think this bill is too complicated and important to be used as retaliation for The Bremby Decision that was issued on sound legal authority with a far more cautious position than the legislators who drafted this bill in an attempt to overstep the authority of the Kansas Attorney General, Secretary Bremby, the US Supreme Court and the EPA. We hear your concern, and that is another reason to wait.

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[i] *Minutes of the Senate Utilities Committee,* February 3, 2000 called to order by Sen. Pat Ranson at 1:30 pm in Room 531-N of the Capital as approved Feb 10, 2000

[ii] *ElectriCity BEYOND THE CURVE OF DEREGULATION* written by Eileen M. Smith, M.Arch. Ethos of Commerce Publishers Ltd. ISBN 0-9741412-9-1 released April 23, 2005

[iii] *EPA Announces Preliminary Enforcement Priorities for Fiscal Years 2008, 2009, and 2010,* Technical Resources, Air Pollution Consultant, Aspen Publishers, Inc. 2007 websites provided for references: www.epa.gov/compliance/data/planning/priorities/index.html Information on OECA at http://www.epa.gov/compliance

U.S. EPA, 2006-2011 EPA Strategic Plan: Charting Our Course; Sept. 30, 2006 www.epa.gov/ocfo/plan/plan.htm

[iv] *House Bill No. 2219 by Committee on Energy and Utilities* Session of 2007, Kansas Representative Vaughn Flora

KANSAS SOLAR ELECTRIC CO~OPERATIVES [K-SEC]

Founder and Director Eileen M. Smith, M.Arch. E-MAIL: K_SEC@yahoo.com

The K-SEC Model *. . . the safest experiment in the energy industry, today!*

K-SEC STATEWIDE NON-PROFIT COOPERATIVE WILL FACILITAE A K-SEC RENEWABLE COOPERATIVE IN EVERY COUNTYOF KANSAS PER KSA CH17-4651

MISSION

The K-SEC Model is focused on Demand-Site Fuel-Free Noise-Free Non-Polluting BI-PV Solar. We will install 1,000 MWp Building-Integrated Photovoltaic [BI-PV] Solar ElectriCity in Kansas by 2020 w/Battery Back-Up and will Monitor + Maintain + Manage this BI-PV Solar Resource for 50 Years from completion of Phase I in 2010 to 2070. K-SEC is structured upon K.S.A. Chapter 17-4651 to 4681 Renewable Cooperatives.

PROGRAM OBJECTIVES AND ESTIMATED COSTS

- K-SEC *leases* Consumer Roof for BI-PV Solar w/Battery Back-up for 50 Years
- Consumer *pays only for structural modification* if needed to install solar
- K-SEC *manages* Grid Connection, Wholesale Net Metering and Solar Commerce
- K-SEC *provides* Quality High-Tech Jobs w/Installation Training in Every KS County

Phase I Demonstration = 1% of ElectriCity Consumed in Kansas BI-PV Solar by 2010

$46 M
a. Install 1 MSF BI-PV Solar = 10,000 SF BI-PV in 105 Counties of KS by 2010

Phase II Foundation = 10% of ElectriCity consumed in Kansas BI-PV Solar by 2020

$3 B
a. Establish Two 50 MWp BI-PV Manufacturing Museums in KS by 2009
b. Install 100 MSF BI-PV Solar = 1 MSF in 100 Counties of Kansas by 2020

Phase III Manage + Monitor + Maintain 1,010.5 MWp Solar Resource 2010 to 2070

$550 M
a. Equity Lease of Roof w/Battery Back-Up for @ 500 SF BI-PV Solar X 50 Yrs
b. Manage BI-PV Wholesale ElectriCity Commerce of K-SEC Solar Resource
c. Monitor 1,01.5 MWp Solar Resource for Maintenance and R & D
d. Develop BI-PV Engineering Degree Offerings at KS Universities by 2015

$3.596B INVESTMENT = FULL-COST DISPATCH VALUATION TO 2070

- Create 21st Century Jobs = Reduce Dependency on Fossil Fuels + Foreign Commodities
- Avoid Coal-fired Health Hazards$ Mercury Toxins, CO2 Emissions & Global Warming
- Assure KS | US Global Competitiveness BI-PV Solar Plus 50 Years R & D Data

20% Dual Use Demand-Site Fuel-Free Secondary Roofing Material	-$0.60 Watt or -$6 SF = -$600 M
15% Funded by Homeland Security and Emergency Preparedness	-$0.50 Watt or -$5 SF = -$500 M
15% Environmental Integrity & Local KS BI-PV DG Expertise	-$0.50 Watt or -$5 SF = -$500 M
50% Full Cost Dispatch Values of the K-SEC Program	-$1.60 Watt or -$16 SF =-$1.6B

TOTAL EST. COST 1010.5 MWp BI-PV Solar ElectriCity w/BBU $3.596 B -$1.6B = $1.996B

1. Kansas has renewable wholesale metering incentive of *150% avoided cost of electricity*
2. *KS wholesale | avoided cost* =$0.035 KWhX150% =0.05 kWh w/increased incentive *peakAC demand*
3. 1,000 MWp X5 SunHrs Day =5,000 MWh DayX260Days Yr =1,300 GWhYrX$50,000 GWh=$65M YR

TOTAL EST. SOLAR INCOME w/1,010.5 MWp BI-PV= $65 MYr X 50 YR = $3.25B X 20%

Projected 20% Cost of Living Rate Increase Over Fifty Years = $650 M + $3.25 B = $3.9B

KANSAS SOLAR ELECTRIC CO~OPERATIVES [K-SEC]

Founder and Director Eileen M. Smith, M.Arch. E-MAIL: K_SEC@yahoo.com
P.O. Box 2 ~ Lawrence, Kansas 66044 ~ URL: www.geocities.com/Solar_Electric_Cooperatives

The K-SEC Model . . . *the safest experiment in the energy industry, today!*

K-SEC STATEWIDE NON-PROFIT COOPERATIVE WILL FACILITATE A K-SEC RENEWABLE COOPERATIVE IN EVERY COUNTY OF KANSAS PER KSA CH17-4651

K-SEC Phase I Demonstration PRE-DEPLOYMENT SCHEDULE
GOALS December 2007 to May 2008

Following activities are to be repeated for and in each of the 105 Kansas Counties

A. Solar Fair to be held in and for each of the 105 counties of Kansas
B. Establish 21 Phase I K-SEC Renewable Cooperatives per K.S.A. Ch 17-4651 to 4681
   a. Pursuant to K.S.A. Ch 17-4653 Five core board members incorporate 21 Renewable Cooperatives = 105 core board members = one incorporator for each KS County
   b. Upon making commitment K-SEC core board member pays $500 Dues
      $200 x 5 State Dues = $1,000 X 21 Renewable Cooperatives = $21,000
      $300 X 5 Local Dues = $1,500 X 21 Renewable Cooperatives = $31,500
C. Per K.S.A. Ch 17-4658 in 2 yrs @ incorporator installs 100 kWp BI-PV
   100 kWp /10 WSF = 10,000 SF BI-PV per 105 Phase I K-SEC incorporators
D. Help establish two BI-PV technology fabrication, design and training centers in KS
E. Help to Determine Potential Locations to Establish two 50 MWp BI-PV Manufacturing Museums
F. Help to Establish Kansas Silica Resource and Location for PV Grade Silicon Refinery

DETAILOF PROGRAM COSTS/INCOME & JOB DEVELOPMENT OPPORTUNITIES

PHASE I DEMONSTRATION 10.5 MWp or 1 MSF = 1% BI-PV Solar in Kansas by 2010

10,000 SF BI-PV Solar in 105 Counties of KS = 10.5 MWp BI-PV or 1 MSF = 1% Solar in KS by 2010
10,000 SF BI-PV /50 WKS = 200 SF BI-PV Installed Every WK X 105 Counties = 21,000 SF WK

		Cost Per $County
GIS Database 50,000 SF BI-PV Potential in 105 KS Counties	$0.005 Watt or $0.05 SF = $52,500	$500
Statewide 10.5 MWP BI-PV Fabrication/Training Facility	$0.75 Watt or $7.50 SF = $7.875 M	$75 G
1 MSF PV Roofing Materials Manufactured 10 WSF [15 WSF]	$1.25 Watt or $12.50SF = $13.125M	$125G
1 MSF Balance of System Components (replace 3 X 50 Years)	$0.60 Watt or $6 SF = $6.3 M	$60 G
4,200 X 3 Battery Back-Up Every 250 SF BI-PV (3 X 50 Years)	$1.20 Watt or $12.00 SF = $12.6 M	$120 G
1 MSF BI-PV Solar Packaged and Delivered to Installation Site	$0.25 Watt or $2.50 SF = $2.625 M	$25 G
1 MSF BI-PV Solar Architecturally Installed w/BBU by 2010	$0.35 Watt or $3.50 SF = $3.5 M	$35 G
SUBTOTAL COST 1 MSF BI-PV installed in KS w/BBU or 1% Solar	$4.41 Watt or $44.05 SF = $46.358 M	$440.5G

PHASE II FOUNDATION PRODUCE & INSTALL 1,000 MWp 2010 to 2020 $2.75 B

1,000 MWp BI-PV Solar at 10 WSF w/Conservative Estimate of 10 WSF = 100 MSF BI-PV in Kansas by 2020
100,000 SF BI-PV Each Year in 100 Counties X 10 Years from 2011 to 2020 = 100 MSF BI-PV for KS by 2020
2,000 SF BI-PV installed Every Week X 50 Weeks Year in 100 Counties 2011 to 2020 = 10% Solar for KS

		Cost Per $County
GIS Database 1 MSF BI-PV in 100 KS Counties by 2020	$0.005 Watt or $0.05 SF = $5 M	$50 G
Two 50 MWp BI-PV Manufacturing Museums = 100 MWp Year	$0.05 Watt or $0.50 SF = $50 M	$500 G
100 MSF PV Roofing Materials Manufactured 10 WSF [15 WSF]	$1.00 Watt or $10 SF = $1 B	$10 M
100 MSF Balance of System Components (replace 3 in 50 Years)	$0.60 Watt or $6 SF = $600 M	$6 M
400,000 X 3 Battery Back-Up Every 250 SF BI-PV (3 X 50 Years)	$0.75 Watt or $7.50 SF = $750 M	$7.5 M
100 MSF BI-PV Solar Packaged and Delivered to Installation Site	$0.25 Watt or $2.50 SF = $250 M	$2.5 M
100 MSF BI-PV Solar Architecturally Installed w/BBU by 2010	$0.35 Watt or $3.50 SF = $350 M	$3.5 M
SUBTOTAL COST 100 MSF BI-PV in KS w/BBU or 10% Solar	$3.01 Watt or $30.10 SF = $3.005 B	$30.05M

PHASE III Monitor+Maintain+Manage 1,010.5 MWp Solar Resource in KS 2010 to 2070 + R&D

		Cost Per $County
Monitor +Maintain + Manage BI-PV 2010 to 2070	$0.50 Watt or $5.00 SF = $500 M	$5 M
BI-PV Arch/Engineering Degrees at KS Universities by 2015	$0.05 Watt or $0.50 SF = $50 M	$500 G
50 Years Manage 1,010.5 MWp BI-PV Wholesale Solar Resource	$0.55 Watt or $5.50 SF = $550 M	$5.5 M

All the Latest News About Utilities and Their Involvement in Photovoltaics

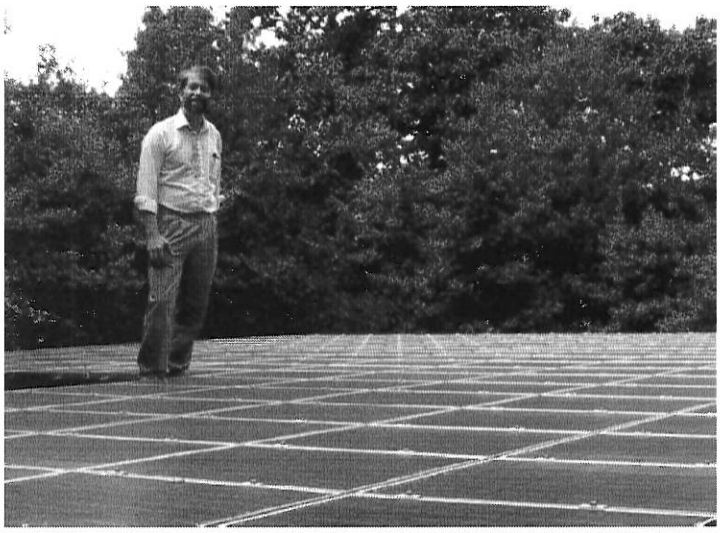
The SEPA Record

Supported by Electric Power Research Institute

WASHINGTON, D.C. | PUBLISHED BY THE SOLAR ELECTRIC POWER ASSOCIATION | FALL 2002

The Integration of Solar Electric into Buildings

Solar Electric at the White House and Around the World



Steven Strong, President of Solar Design Associates, stands with the 10-kWp PV array his firm designed to feed solar-generated power into the White House distribution system; it was completed this summer.

By Steven J. Strong

Ed. Note: There are three recently installed solar systems at the White House in Washington, D.C. a building-integrated PV system and two solar thermal systems. These systems, designed by Solar Design Associates, highlight the importance of using solar energy integrated with the building structure. Completed this summer, the roof-top PV system features modules from Evergreen Solar and was installed by Aurora Energy.

There is a growing consensus that distributed PV systems that provide electricity at the point of use will be the first to reach widespread commercialization. Chief among these distributed applications are PV power systems for individual buildings.

Interest in the building integration of PV (known as BIPV), where the PV elements actually become an integral part of the building, often serving as the exterior weathering skin, is growing worldwide. With reduced installation costs, improved aesthetics, and all the benefits of distributed generation, building-integrated PV systems are the prime candidate for early widespread market adoption.

Innovative architects the world over are now beginning to integrate PV into their designs and PV manufacturers are responding with modules developed specifically for BIPV applications, including integral roof modules, roofing tiles and shingles, modules for vertical curtain wall facades, sloped glazing systems, and skylights.

Designing with BIPV

The earliest BIPV system was a 7.5-kWp residential application completed in 1980. The Carlisle House, as it became known, was designed by Solar Design Associates and cosponsored by the Massachusetts Institute of Technology and the U.S. Department of Energy. This future-oriented house was all-electric with no fossil fuel burned onsite. The surplus electricity it produced was exported to the local utility grid via a "net metering" arrangement, using the grid in lieu of onsite storage.

Other early projects in the United States included the 200-kWp Solarex (now BP Solar) facility in Frederick, Md. (1982), and the 325-kWp Georgetown University Intercultural Center in Washington, D.C. (1985). Aggressive efforts in Europe and Japan begun in the early 1990s have pulled the technology forward toward

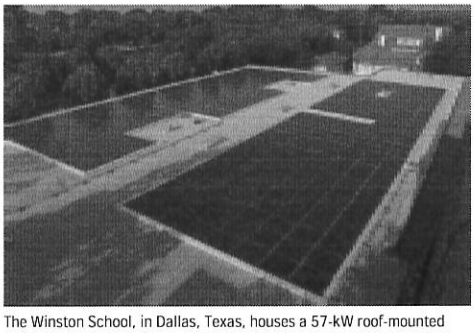
(continued on page 4)

Two New Solar Facilities Dedicated in the State of Texas

By Jordan Parker

A U.S. and a Dutch energy service provider have joined to install two new solar electric systems in Texas. Both facilities were dedicated recently.

Green Mountain Energy Company, the nation's largest and fastest growing retail provider of cleaner electricity, and Nuon, the Netherlands's largest utility and a leader in renewable energy development, have teamed up to harness the power of the sun to generate pollution-free electricity. The two new solar facilities are at the Winston School in Dallas and in the Upper Kirby District Foundation building in Houston.



The Winston School, in Dallas, Texas, houses a 57-kW roof-mounted photovoltaic system. Data generated by the photovoltaic system is incorporated into the school's educational curriculum.

The Winston School, on Royal Street in Dallas, hosts a 6,600-square-foot, 57-kilowatt rooftop solar array. The facility located atop the Upper Kirby District Foundation building on Richmond Avenue in Houston is a slightly smaller array covering 6,085 square feet, and is rated at 43 kilowatts.

Each installation is larger than a professional basketball court. Over their 20-year expected lifetime, these systems will prevent 6,355 tons of carbon dioxide, 24 tons of nitrous oxide, and 45.4 tons of sulfur dioxide emissions from entering the environment.

The Winston School, a coeducational college preparatory school serving "bright students who learn differently,"® will be the first Green Mountain Energy Company solar site to incorporate real-time data from the PV system into its curriculum. The school participates in various community projects, including a solar car program designed to develop self-esteem through a real sense of accomplishment. The program also helps other schools in Texas, around the nation, and all over the world learn how to start their own solar programs, through quarterly workshops and their solar website.

Their main project is the Winston Solar Challenge, an international education program designed to teach children the technology and physics behind a road-worthy solar vehicle. The Challenge consists of both cross-country races and closed-track races at the Texas

(continued on page 2)

INSIDE

Austin Energy Brings Green Pricing to Texas

Austin Energy has proven itself as a leader in the utility industry by establishing a successful, innovative, green pricing program.

The utility's success with green power dates back to its Solar Explorer program in the mid-1990s. Solar Explorer facilitated the installation of 28 PV systems on customer rooftops. The systems were utility-owned, but leased to the customer for 10 years at a nominal rate of $15 to $30 per month. Following the success of Solar Explorer, in January 2000 Austin Energy launched GreenChoice, a green pricing program that offers customers the option of purchasing 100 percent of their energy from renewable sources at a premium price.

Austin Energy secures long-term contracts with suppliers of renewable energy to purchase energy at a fixed price for the duration of that contract. The energy generated from these sources is branded "Austin Energy," and the utility earns renewable energy credits for that generation. Because Austin Energy receives the renewable energy at a fixed price, it offers customers who sign onto the GreenChoice program a fixed-fuel charge for the duration of that customer's contract, usually 10 years.

Electricity prices have fluctuated dramatically since the inception of the program; in some cases, the fuel charge has been markedly higher than the fixed rates of early GreenChoice participants. Cus-

(continued on page 2)

A ground-mounted PV array provides shading for the taxi stand at the Austin airport as part of Austin's Energy green pricing program.

Building-Integrated PV Systems

(continued from page 1)

broader commercial acceptance. Today, designers and engineers from more than 15 countries are participating in coordinated international activities, under the International Energy Agency's expert working group, to develop and implement BIPV programs.

It is essential to appreciate the context within which solar electricity can best function in a building. BIPV systems are only a part of the solution. We must address both sides of the energy use equation: supply *and* consumption. To maximize the solar contribution, the building should be designed to use energy most efficiently, with every aspect in the design process assessed with consideration for reducing the energy impact of the building. Energy generated from renewable resources will contribute a great deal more to an energy-efficient building. Only within the context of a comprehensive energy-conscious "whole building" design strategy can BIPV achieve its full potential.

In the past, incorporating PV into a building design required unwelcome trade-offs and concessions in the architectural design process. Today, as PV manufacturers match products to building-industry standards and architects' requirements, this is changing. Companies in the United States, Japan, and Europe are actively pursuing new module designs that displace traditional building materials.

In the mid-1990s, Solarex (now BP Solar) developed a line of pre-engineered building-integrated PV components for commercial building facades and sloped glazing applications, called PowerWall™, in conjunction with architectural curtainwall giant Kawneer of Atlanta, Ga. United Solar Systems (Troy, Mich.) fashioned its triple-junction amorphous silicon (a-Si) PV into roof shingles and standing-seam architectural metal roofing. BP Solar is currently developing a line of transparent thin-film modules suitable for overhead glazing systems and vision glass. Other architectural module designs employ glass-superstrate, crystalline modules with space between the cells and opaque backings, to provide diffuse daylighting along with their electric production.

These new building-integrated photovoltaic components are providing a window into the future of solar architecture. With the right design, the sunlight falling on a building and/or its site can provide much or all of the power it requires. In urban areas, you can only imagine the power which will be generated by incorporating PV into the thousands of square kilometers of empty flat roofs and other available building surfaces which receive generous amounts of sunlight just waiting to be harvested.

A good example of the integrated design approach is the new Cofrin Academic Center designed for the University of Wisconsin at Green Bay by Hellmuth, Obata, and Kassabaum (HOK). The facility features a student lounge whose south-facing sloped glass atrium and curtain wall incorporate the first U.S. application of insulated "solar electric glass." Solar Design Associates worked closely with HOK's green design group in their St. Louis office to design and integrate the BIPV system with the building design and then worked with the curtain wall, glazing, and PV manufacturers over a two-year period to develop the first-of-its-kind transparent, insulated PV glazing elements for use in architectural glazing systems. The solar electric glass provides daylighting, cooling load mitigation, glare control, *and* solar-generated renewable power for the building.

The first U.S. application of insulated architectural PV glazing was installed at the University of Wisconsin-Green Bay. The system, designed by Solar Design Associates, provides daylighting, cooling load mitigation, and solar-generated power to the new student center.

What's the Payback?

While the cost of solar electricity continues to drop and will soon be competitive in many areas, it is instructive to examine how we as architects invest our clients' resources. Every building that is designed and constructed (with the exception of corrugated metal self-storage warehouses and the like) has some portion of its design and construction resources allocated to make it special: to define and create a unique character or make a "statement" on behalf of the owner and/or designer.

This has traditionally been accomplished by using so-called "premium" building materials such as imported granite facades, marble interiors, curved glass walls, and made-to-order facade systems. The interesting thing to note is that many of these premium exterior cladding systems cost nearly as much as and, often, even more than a solar electric skin and none of them ever undergoes a return-on-investment analysis prior to being specified.

In the past, solar electricity has been subjected to unrealistic short-term payback demands. To justify the capital investments in PV, facilities managers have historically had to perform rigorous return-on-investment analyses based on utility savings because the funding came from their budgets while architects had to spend additional resources to construct a parapet screen to hide the unsightly PV arrays on the roof. The irony is that when a solar electric building skin is integrated, a cash flow stream is provided to the building owner on day one and for decades to come, whereas a granite facade will deliver only prestige.

Future Outlook

Today, there are more than one million homes worldwide using PV to supply or supplement their electricity requirements, although the majority are rural or remote off-grid applications. In addition, there are already many thousands of commercial buildings using integral or retrofit PV systems interfaced with the utility grid in Europe, Japan, and the U.S.

The potential opportunity for building-integrated PV systems is enormous, and many companies are now beginning to work on the development and commercialization of specialized BIPV components and systems. Residential and commercial BIPV will likely be the nearest-term large-scale markets for PV in the developed countries.

As building-integrated PV components become an integral part of the form and aesthetic of the built environment, these systems are helping to define a whole new architectural vernacular in environmentally responsive buildings whose primary design goal is to harvest their own energy. This new generation of buildings will contribute greatly to a more sustainable future for their owners, their communities, and society at large.

Steven J. Strong is President and founder of Solar Design Associates, Inc., located in Harvard, Massachusetts, U.S.A.. Tel: 978. 456.6855. eMail: sjstrong@solardesign.com.

Member Activities

AstroPower, Inc.

R&D Magazine named AstroPower's eight-inch Apex solar cell one of the 100 most technologically significant new products of the year. The APx-8 solar cell is the largest, most powerful solar cell available within the solar electric power industry, and is manufactured via the company's proprietary high-speed, continuous-sheet silicon-film process. Currently in commercial volume production, the APx-8 solar cell is suitable for a variety of applications, including building-integrated photovoltaics, and offers unmatched power in an eight-inch package.

AstroPower's SunUPS and SunLine Solar Electric Home Power Systems will now be featured in Home Depot stores throughout Long Island, N.Y., five stores in southern New Jersey, and four in Delaware. This expansion brings the total number of Home Depot locations that carry AstroPower's solar electric home power systems to 61. These include 18 stores in greater San Diego as well as 16 in the Los Angeles metropolitan area. Through displays at each of these stores, customers learn how easy it is to generate their own clean electricity with AstroPower solar electric home power systems.

Austin Energy

The number of Austin Energy customers subscribing to GreenChoice, a green pricing program offering clean renewable energy at a premium price, has climbed to over 150 businesses and more than 6,700 residential customers. Subscribers use more than 240 million kilowatt-hours of green power annually.

CSG Services, Inc.

The organizers of the Texas Renewable Energy Roundup turned to CSG Services to provide 100 percent solar power for the event. The electricity was generated by solar electric systems at ten public schools in Texas and transferred to the Roundup in the form of renewable energy certificates.

Evergreen Solar, Inc.

Evergreen Solar has partnered with Conservation Services Group to install 10-kW PV systems on four BJ's Wholesale stores in Long Island, N.Y. These systems receive rebates from Long Island Power Authority (see the story on page 15).

Hawaii Electric Light Company

As team leader of the Island of Hawaii Million Solar Roofs Initiative Partnership, HELCO was recently awarded a U.S. Department of Energy MSRI grant for $50,000 for several projects to increase the acceptance and use of solar technologies on the Big Island. The projects include workshops on solar technologies, designing and installing code-compliant PV systems, and integrating solar education curricula into school classrooms. Also, a one-kilowatt solar electric system was installed at a local public school in conjunction with the State Dept. of Education.

Additionally, HELCO is working with the County of Hawaii to install solar lighting at two remote county parks and has just completed a solar lighting system installed at the Hilo bay front restrooms. This project includes an educational kiosk featuring a display on the Million Solar Roofs Initiative and the Island of Hawaii MSRI Partnership. A third lighting project was recently completed at the Ka Hale O Kawaihae transitional shelter for the Catholic Charities Community and Immigrant Services to provide security for the shelter's parking lot.

Los Angeles Department of Water and Power

In unprecedented action to expand the LADWP Solar Incentive Program, the Board of Commissioners has approved measures that will increase incentive payment limits, extend the highest incentive levels for another year, and expand the program by allowing large customers to participate in both the LADWP incentive program and a rebate effort of another local utility.

Incentive payment limits for commercial and industrial customers were doubled from $1 million to $2 million per project and increased from $50,000 to $60,000 per project for residential customers. The highest incentive payments of $4.50 per watt and $6.00 per watt for systems manufactured in Los Angeles were extended for an addition year until the end of 2003. The overall solar program was extended to 2010.

North Carolina Solar Center

The N.C. State University Solar Center, with support from the National Renewable Energy Laboratory, recently completed *Case Studies on the Effectiveness of State Incentives for Renewable Energy*. This study details the performance of 10 financial incentive programs in six states and clarifies the key factors that influence the effectiveness of each at stimulating the adoption of renewable energy technologies. Based on a number of common themes that emerged regarding the effectiveness of all of the programs examined, the report makes several recommendations to policy makers to improve the effectiveness of incentive programs.

PowerLight Corp.

PowerLight has announced that it will install what is claimed to be the largest commercial solar rooftop electric system in North America at Toyota Motor Sales USA Inc. (Torrance, Calif.), headquarters. The 501-kW solar system, which covers 52,000 sq. ft. and features 3,300 PV tiles, will be installed by fall of 2002 at Toyota's South Campus expansion project.

"We are extremely pleased to see Toyota join the growing roster of leading companies that are realizing the benefits of deploying clean, reliable, and cost-effective solar power," said PowerLight President Daniel Shugar.

Wisconsin Public Service Corporation

This fall, three new high schools were added to the SolarWise for Schools program. Ashwaubenon, D.C. Everest, and Wabeno high schools each received two-kW solar electric rooftop installations. The SolarWise program now includes 18 schools, all of which use the solar electric systems as a tool in their educational curriculum.

7-8

ARCHITECTURE & ENERGY in the 21ST CENTURY
SPEAKER'S BIOGRAPHY

Eileen M. Smith, M.Arch.

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Solar_Cooperatives@yahoo.com

A Kansas native Eileen M. Smith, M.Arch. is founder and CEO of the SOLAR DEVELOPMENT COOPERATIVE since 1992 wherein she has persistently advocated the role of solar *building-integrated photovoltaics* [BI-PV] as a viable source of electricity, a deterrent to energy crisis caused by *peak air conditioning demand,* and as an absolute national security necessity providing demand-side fuel-free electricity in our modern world of terrorist attacks and natural disasters. www.geocities.com/Eureka/1905 Her papers on architecture and BI-PV solar electricity have been published at conferences around the world. www.geocities.com/Eureka/1905/EMSPAPERS.html

In January 2005 she founded the Kansas Solar Electric Co~operatives [K-SEC] to bring 1,000 MWp BI-PV to Kansas by 2016. Phase I is structured around Kansas House Bill 2018 Renewable Cooperatives passed in 2003. The goals of electricity autonomy in the mainstream market and collective electricity security lay at the foundation of her deployment and intervention activities. www.geocities.com/Solar_Electric_Cooperatives This program will assure 10% demand-site fuel-free non-polluting solar electricity in Kansas by 2016. This non-profit approach for manufacturing, installation, monitoring, maintenance and related electricity commerce management came from fifteen years of industry observation and intervention.

Upon discovering the *1,000 Solar Roofs Program* by the German States installed above the 49 degree parallel from 1993 to 1995, in 1995, she initiated the *100 Solar-Voltaic Dome Power Stations by 2000 Program A Three-World Powers Competition for the United States ~ European Commission ~ Japan.* Following a related lecture and workshop before the American Power Conference April 1-3, 1997, the Solar Energy Industries Association announced the *Million Solar Roofs in USA by 2010 Program* before the end of that month. www.geocities.com/Eureka/1905/137.pdf and www.geocities.com/Eureka/1905/139.pdf Summer 1997, she began organization of the first *Orange County Solar Winter Gala* to educate California consumers about the Million Roofs Program. December 1997, she filed her first comments before the California Energy Commission. June 1998, she became a prime signatory initiating the order instituting rulemaking regarding the role of the utility distribution company in Distributed Generation. The dual agency Rulemaking 98-12-015 and follow-up quasi-legislative rulemaking 99-10-025 lasted five years wherein a solid foundation for demand-side consumers was etched into the California electricity marketplace. March 2004 Cal Governor Schwarzenegger initiated a Million Solar Roofs Program. www.geocities.com/Eureka/1905/RULEMAKINGI.html

Neighborhood Electricity Watch Solution Groups or N.E.W.S. Groups is her vision founded on the model of Neighborhood Crime Watch Groups to organize and facilitate mass consumer intervention via in state and federal energy agency proceedings Internet and E-mail. April 23, 2005 her book "ElectriCity BEYOND THE CURVE OF DEREGULATION" was released. www.geocities.com/EthosOfCommerce Eileen is pursuing architect licensure. She is finalizing a plan to restore the Temple Theater and Opera House in her hometown of Yates Center, Kansas.

EILEEN M. SMITH

Master of Architecture

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VITAE: www.geocities.com/KS_SEC_2006/VITAE.pdf



CAREER SUMMARY AND PROFESSIONAL EXPERIENCE

Professional expertise developed in architectural design, site planning, programming, sustainable architecture, *building-integrated photovoltaic* [BI-PV] solar system design and historic preservation.

Architect Design Consultant ~ Sustainable Architecture ~ Preservation ~ PM ~ Executive

- *Founder and Director Since 2005* **Kansas Solar Electric Co~operatives [K-SEC] KS HB 2018 2003**
- *Founder and CEO since 1992* **SOLAR DEVELOPMENT COOPERATIVE [SDC]**
  - *Designed 4 MWp BI-PV Solar Power Program*, The Irvine Company Newport Beach, CA 2000
  - *Designed/Presented 1.3 Million SF* **'ECO TECHÉ for Kansas City Union Station'** 1990-95
- *Site Management* **Clovis Construction Jan Schaake** Lawrence, Kansas 2005 to 2007
- *AutoCAD Instructor and Office Assistant* **WPM, Inc. Dennis Dahlin, ASLA** Sacramento, CA 2000
- *President & Owner* **Quality Renovators** Lawrence, KS and Kansas City, Missouri 1986 to 1995
- *Architect Intern* **Dan Stainer-Hutchins, RIBA** Cirencester, England 1989 to 1990
- *Administrative Assistant* **Bath City Council James Elliott, RIBA** Bath, England 1989 to 1990
- *Admin. Assistant* **Dr. George Wilson** Higuchi Distinguished Professor of Chemistry KU 1987 to 1988
- *Office Manager* **Frasier/Miles Architects** Kansas City, MO and Overland Park, Kansas 1985 to 1986
- *Office & Building Manager* **Evenson Lundgren Larsen, Architects** Portland, Oregon 1984 to 1985
- *Manager Small Walls* **Guerdon Modular Homes** Manhattan, Kansas 1975 to 1976

Client-Consumer Education Specialist ~ Photographer ~ Author ~ Speaker ~ Policy Analyst

- *Achieved Milestones for Solar Architecture as Expert Witness* in California and Kansas 1997 to 2007
  - *Intervener* Kansas Corporation Commission Dockets 04-KCPE-1025-GIE and 05-WSEE-981-RTS
  - *Intervener* California Public Utilities Commission DG Rulemakings 98-12-015 and R.99-10-025
- **"A CONVENIENT TRUTH BI-PV Solar ElectriCity® | Protect Earth's 21 MILES OF PARADISE"** 2007
- **"ElectriCity® BEYOND THE CURVE OF DEREGULATION"** Released April 2005
- *Producer ~ Writer ~ Talent Host* **'IN FOCUS Special Edition Energy Crisis 2000'** California 2001
- *Editor and Writer* **Flint Fortnightly News Magazine** Manhattan, Kansas 1974 and 1975

Library Assistant and Information Management Specialist

- *Library Assistant and Legal Database Manager* **NW Power Planning Council** Portland, Oregon 1985
- *Student Librarian* **Millar Library Portland State University** Portland, Oregon 1982 to 1984
- *Student Librarian* **Mt. Hood Community College** Gresham, Oregon 1981 to 1982
- *Student Librarian/AV Specialist* **Weigel Architecture Library KS-State University** 1974 to 1977
- *Sales and Customer Service* **CMC (Custom Music Corporation)** Topeka, Kansas 1973 to 1974

EDUCATION

Energy & Lighting Studies/Certifications **Greg Sharp, AIA Southern California Edison CTAC** 1999 to 2003
Building Code Studies **Chuck Minadeo Chief Bldg Inspector Irvine, CA 1982-2002, Saddleback College** 2003
Advanced Photovoltaics Short Course Certification **University of New South Wales**, Sydney, Australia 1998
AutoCAD Instructor **MTI** Santa Ana, CA 2002 ~ *AutoDESK Certification* **Longview Comm. College** MO 1994
Master of Architecture **University of Kansas School of Architecture & Urban Design** Lawrence, KS 1988 to 1991
Bachelor of Arts **Portland State University School of Performing Arts** Portland, Oregon 1981 to 1984
Pre-Design Program AIAS Rep **K-State University College of Architecture, Planning & Design,** Manhattan, KS
Diploma **Yates Center High School** ~*Drum Major* ~*FHA President* ~*4-H Leader* ~*Teen Center Founder* Yates Center, KS

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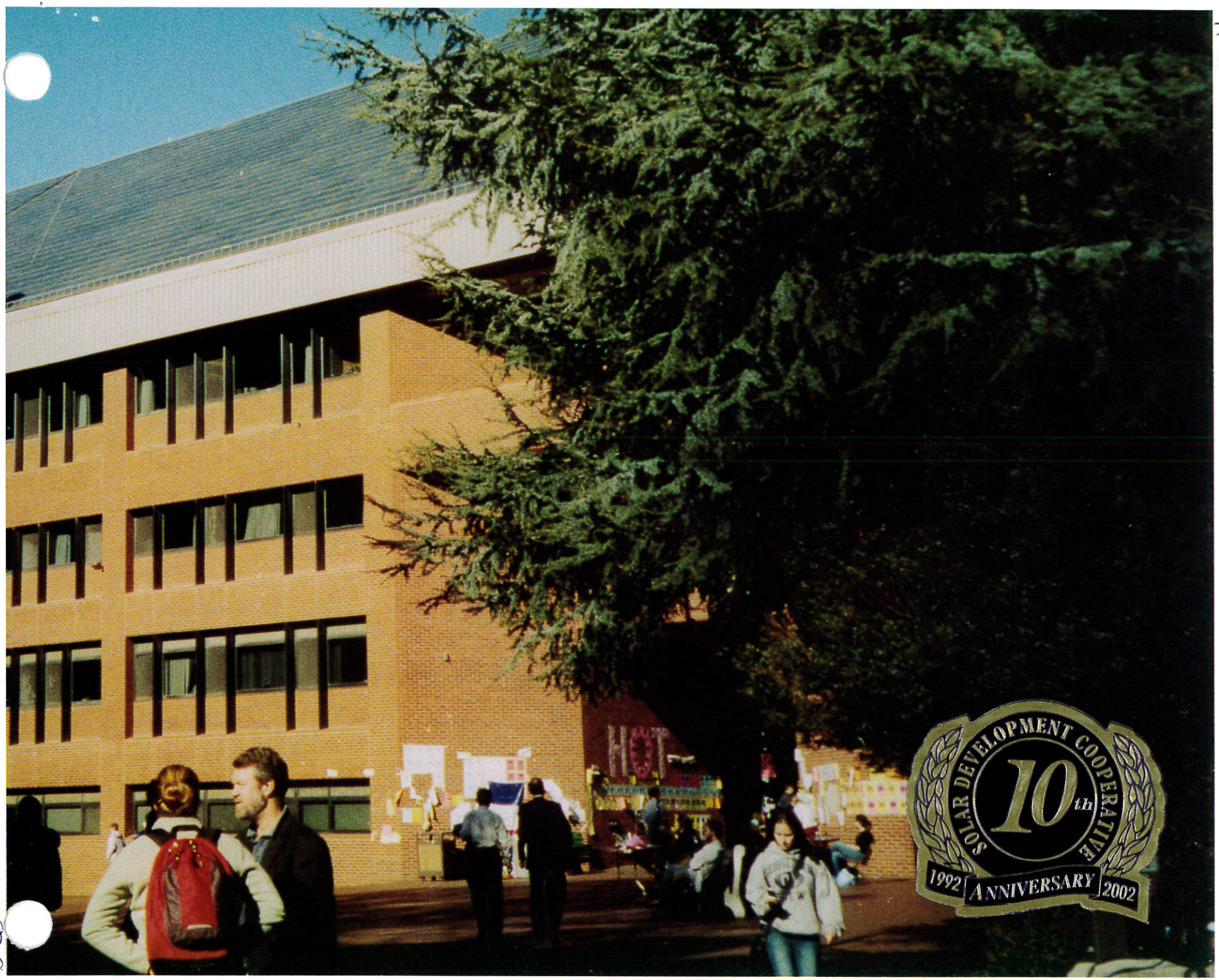
SOLAR DEVELOPMENT COOPERATIVE
10th
1992 ANNIVERSARY 2002

AMERICAN LEGISLATIVE EXCHANGE COUNCIL

Testimony Before the Kansas House Committee on Energy and Utilities
February 7, 2008

Chairman Holmes, Vice Chairman Olson, and members of the committee, thank you for the opportunity to testify on this important issue. My name is Todd Kruse and I serve as Senior Director of Regional Field Teams at the American Legislative Exchange Council.

As many of you know, ALEC is a non-partisan individual membership organization of over 2,400 state lawmakers from all 50 states. ALEC's mission is to promote the Jeffersonian principles of free-markets, individual liberty, federalism and limited government to our members.

We have been following the recent developments on the bill we are discussing today - HB 2711. ALEC's support of Jeffersonian principles of free markets, limited government, federalism, and individual liberty causes us to be very disturbed by the possibility of this precedent-setting carbon tax.

As this legislation is considered, we urge you to look towards the motto of the medical profession: "First, do no harm." While some of the goals to expand energy production in HB 2711 are laudable, this legislation unquestionably will harm both energy producers and consumers with the creation of the nation's first carbon tax.

As the old truism goes, once a camel's nose is in the tent, it is not easily removed. Once government sets the precedent of taxing carbon emissions, we could soon see an explosion of attempts to increase energy taxes throughout the states. After all, the federal income tax started with a benign top rate of 7 percent for the super wealthy and the federal Alternative Minimum Tax (AMT) was designed in the Nixon era to hit 155 high-income families. Today the federal income tax collects nearly a trillion dollars annually and the AMT punishes millions of Americans every year.

We urge our ALEC members in Kansas to remember one often forgotten element in tax debates: Tax changes are not instituted in a vacuum. Every time taxes are increased in Kansas, or any other state, it negatively impacts that state's competitive position relative to states in the region and all throughout America. If the legislature approves the carbon tax component of this legislation, it would almost certainly increase the cost of doing business within the boarders of the state. Therefore, this legislation would make Kansas less competitive, not more competitive for business investment and economic development.

The creation of a carbon tax might be attractive to those who desire to soak business and inhibit energy generation in Kansas; however, this neglects a very important economic fact. As economists of all stripes agree, businesses don't pay taxes, people do. Taxes on businesses get passed to individuals through higher prices for consumers or lower wages for employees. If successful, this legislation to increase taxes on energy companies will ultimately mean that the people of Kansas will pay the price.

Thank you for this opportunity to share with you today and I look forward to your questions.

ENERGY AND HOUSE UTILITIES
DATE: 2/7/2008
ATTACHMENT 8

AMERICANS FOR PROSPERITY
KANSAS

February 7, 2008

Members of the committee,

I am Alan Cobb, Kansas State Director of Americans for Prosperity, a free market grassroots public policy group with more than 12,000 members in Kansas.

We oppose Senate Bill 515 and House Bill 2711 because of the creation of an emissions cap and the creation of a "Carbon Tax". It would be the first such tax in the nation to penalize new energy production. It is hard to overstate the negative significance of creating the first carbon tax in the United States.

If passed, these bills will create higher energy bills and more government bureaucracy.

Kansas should not serve as a test case for environmental policies far outside the mainstream of opinion or economic reality. Becoming the first state to compromise on such a tax would only serve to compromise our economic future.

Many people believe that these bills will create regulatory certainty. That is incorrect. Looking at the debate in a broader sense, this compromise would further weaken regulatory certainty in Kansas. Why? Because Sunflower followed the regulatory process and was denied. In its place, this is a short-term fix as a concession prize, highlighting that regulated industries in Kansas and potential capital investments coming into the state can follow the process only to be denied or have the regulations altered with new restrictions placed upon them by the administration or the Legislature.

Do we need and want these plants, yes, but not at the expense of future economic growth.

Lawmakers should go back and craft a bill that gets the plants built without new caps and without instituting the first in the nation carbon tax. In its current form, the bill will serve as an albatross to future growth in Kansas.

Passage of this bill will further impede economic development through measures that stifle certain industries and increase energy costs on households, businesses and government services.

Americans for Prosperity is strongly opposed to the higher taxes and burdensome government regulations that would result if this bill is passed.

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ENERGY AND HOUSE UTILITIES
DATE: 2/7/2008
ATTACHMENT 9

AIA Kansas
A Chapter of The American Institute of Architects

February 7, 2008

TO: House Committee on Energy and Natural Resources

FROM: Trudy Aron, Executive Director

RE: Opposition to HB 2711

Good Morning Chairman Holmes and Members of the Committee, I am Trudy Aron, Executive Director of the American Institute of Architects in Kansas. Thank you for allowing me to testify in opposition to HB 2711.

AIA Kansas is a statewide association of architects and intern architects. Our 700 members are currently designing the facilities we will all use into the future. That is why our members are designing these facilities to leave a lighter carbon footprint on our environment. The goal of our national organization is to design facilities that reduce the fossil standard for all new facilities by 60% in 2010, reducing the standard by 10% each five years and be carbon-neutral in 2030. These targets can be accomplished by implementing innovative sustainable design strategies, generating on-site renewable power and/or purchasing (20% maximum) renewable energy and/or certified renewable energy credits. We are providing our members with the tools to reach these benchmarks.

The coal-fired plant authorizations in HB 2711 are contradictory to what we can accomplish by designing and constructing our future facilities utilizing sustainable design and construction principles. Our members are passionate advocates for sustainable approaches to creating the built environment and minimizing our impact on the natural environment. We support the application of energy sources and technologies that minimize the consumption of fossil fuels and do not support the construction of additional coal-fired facilities

Coal is among our most polluting sources of energy. Now is not the time to give carte blanche to the electric utilities. We know caps on carbon emissions are coming from the federal government and we believe that it will be sooner rather than later. On my way in from home on Tuesday, I heard that three of our nations largest banks will require those seeking funding for coal-powered plans to meet "environmental principles" before they will fund new projects. These include using renewable resources instead of coal, following sound conservation principles and how future federal regulations may affect the financial viability of a project.

The construction of coal-fired power plants in southwest Kansas raises several concerns from the majority of our members:

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ENERGY AND HOUSE UTILITIES
DATE: 2/7/2008
ATTACHMENT 10-1

- Today's most environmentally efficient coal-fired power facility will still produce more carbon than allowed by the goal to be carbon neutral by 2030.
- For these plants to be as environmentally efficient as possible (which we believe they need to be if they do in fact get built) will require massive amounts of water. Where will that water come from? From an aquifer that is already being depleted?
- It is our understanding that the end result of the construction of these coal-fired power plants will be approximately 110 new jobs. Are 110 new jobs worth the cost to the environment and health of our citizens?

There are several sections of HB 2711 that we do support and hope will be offered as stand-alone bills. However, we cannot, in good conscious, support them when they are tied to the rest of the bill.

AIA Kansas is, however, ready and willing to help this committee draft legislation that makes environmental and economic sense for our State today and for the future.

I'll stand for questions at the appropriate time.

Kansas House Energy & Utilities Committee

Room 313 South

Statehouse

Topeka, KS

February 6, 2008

Re: House Bill 2711

To the Committee:

I oppose Senate Bill 515, and urge you to vote against it. This bill would remove the authority of the Kansas Department of Health and Environment to regulate CO2 emissions, and would allow SEPC to reapply for its permit for the Holcomb plant expansion. It would also provide a great disincentive for utilities to adopt solar power as a means of power production, by requiring utilities to reduce their rates in proportion to how much power is produced using solar.

The Committee had better hope that global warming is at least produced, in part, by human-produced CO2 and other greenhouse gases. If it is strictly a phenomenon of solar output, then we are in for difficult times. If on the other hand, as has been stated by the majority of atmospheric scientists, it is due in major part to man-made CO2 emissions, it is an issue which may and must be addressed by appropriate action, both by government, by utilities, and by consumers.

The Sunflower plant as proposed has many other adverse effects on the environment, amongst them the production of particulate matter of less than 2.5 microns in size, which can easily pass through the wet and dry scrubbers and which, if released in to the atmosphere, can travel for hundreds and thousands of miles downwind. In fact, the Pacific Coast states of California and Oregon are receiving high amounts of this particulate matter from coal-burning power plants in China. This particulate matter has been implicated in the increase of the incidence of childhood asthma, and in increased morbidity from both respiratory disease (including COPD) and cardiovascular events. The SEPC plant would be the largest coal-burning plant west of the Missisippi, and over 90% of its power would be sold out of Kansas. Meanwhile, the ill wind produced by the plant could cause adverse health consequences for Kansans downwind from the

plants, and for citizens of other states, and cause increased health care costs for citizens and employers and decreased productivity due to illness.

In addition, the ash pit for the coal ashes would be placed directly on the sandy soil near the plant, without any liner or leachate collection system (see attached). Granted, the area receives very little rain, about 20 inches/year on average, but this water would percolate through the ash bed and perhaps contribute to the salinity problems in the Oglalla and alluvial aquifers, and perhaps further contaminate these aquifers, which are already becoming grossly depleted. Unless steps are taken to conserve these resources, it is likely that Western Kansas will revert to grassland, since the ability to pump clean, uncontaminated water in sufficient quantity will no longer exist. The ash pit would be in place for thousands of years and leach poisons (arsenic, mercury) into the groundwater; the power plant is intended to cease operations in 30 years after construction. Eventually Powder River Basin coal, which SEPC uses, will be depleted, both by normal demand, and by demand from synfuel plants which would be built if crude oil became expensive or difficult to get. So, for 30 years of cash flow, the Oglalla aquifer and the fertility of the soil for growing crops would be sacrificed for thousands of years. That doesn't seem like a very good deal.

The same winds which blow from the Front Range of Colorado eastward through Kansas could be used to power wind turbines which could produce more than adequate power for the use of Kansas consumers, instead of spreading a cloud of dangerous contaminants downwind, which would result in increased death and illness amongst Kansans and also decreased productivity and costs to employers for health care. In closing, I urge the Committee to look beyond short-term economic benefit for Sunflower Electric Power Corporation and its owners, and look instead to the long-term benefits in terms of health, sustainable wind turbine power, and the conservation of natural resources in Kansas.

Hudson H Luce, PhD

Hudson H Luce

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Observations and Conclusions

1. **By analogy with the closed landfill at the Lawrence Energy Center, Permit #333, the leachate at the current landfill in Holcomb, Kansas, owned by Holcomb Common Facilities LLC (hereinafter referred to as "HCF Landfill" may contain up to 2900 mg/l of sulfate anion.** Currently, all ground water monitoring wells at HCF Landfill are either upgradient or cross-gradient, which can be observed by plotting normals to the isopotential lines at the edges of the current landfill site as indicated on the groundwater flow diagrams for 1985, 2001, 2002, 2005, and 2006 (Figures 1-6) , ignoring the effects of Water Well #2 on the groundwater flow as noted in KDHE's Letter to Sunflower Energy Corporation ("SEPC") as of May 2, 2005 (Exhibits 1-3). Given that none of the groundwater monitoring wells (Figures 7-10) are downgradient (Exhibit EE), and none have been since initial deposition of fly ash at HCF Landfill in 1983, it is impossible to assess leachate concentrations of sulfates and other pollutants coming from HCF Landfill and going into groundwater. Since direct evidence is lacking, the only way to make this assessment is by comparison with a similar landfill. The landfill at Lawrence Energy Center ("LEC") denoted by "LEC Landfill #333" is such a landfill.

LEC burns Powder River Basin coal, which is a low-sulfur coal, (Figure 11) and has a wet scrubber system. LEC ash was deposited in a slurry pond, then draglined out, and left to dry, until the compacted weight was 80 pounds per cubic foot.(Exhibit 4) SEPC burns Powder River Basin coal, and has a dry scrubber system.(Exhibit 5) The resultant ash at time of deposition in the HCF Landfill has a moisture content of 25%. The compacted weight of SEPC ash is 89 pounds per cubic foot.(Exhibit 6)

Currently, HCF Landfill occupies 31 acres; LEC Landfill #333 occupies 27.5 acres. The rainfall at HCF Landfill averages 19 inches per year with several 3 inch events; the rainfall at LEC Landfill #333 averages 37 inches per year, with proportionately more 3 inch events. HCF Landfill is sprayed with water on a regular basis to reduce fugitive dust emissions, as is LEC Landfill. Continual spraying of water at HCF Landfill, coupled with addition of water at the plant and at the disposal site, may lead to saturation of the fly ash deposited in the HCF Landfill. There may be a difficult choice to make, between leaching contaminants into the groundwater, and potential silicosis and respiratory diseases caused by inhalation of fine dusts from windblown fly ash.

HCF Landfill rests on a low strength unreinforced fly ash concrete liner, on top of "3 to 29 feet of loose to medium dense eolian (wind-deposited) soils of silts and sands ... underlain by alluvial sands and gravels with alluvial clay and silt layers." Vol. 3 Engineering Report, HCF Landfill Permit Application, see Exhibit. The eolian soils absorb water quickly, (Id.), but some subsidence may occur. (Exhibit BB) This subsidence may lead to a loss of support of the concrete liner, which may in turn lead to cracking of the liner. (See Addendum 1, Structural Applications of 100 Percent Fly Ash Concrete, D Cross, J Stephens, J Vollmer 2006) There is no leachate collection system at the solid waste landfill at HCF Landfill. (Exhibit AA.) LEC Landfill #333 rests on an in-situ compacted clay liner of varying thickness, with a 24" reinforced concrete drain pipe running downhill, north to south, through the landfill and ending at the BNSF railroad tracks. There are two sampling points for groundwater monitoring at LEC Landfill #333, a downgradient monitoring well (MW), and the discharge point for the underdrain(UD), also downgradient.

Groundwater values for sulfates at MW were measured every six months during the active phase of the landfill, from 1979 to 1996, and every year in the closure phase of the landfill, from 1997 until the present. These values are, for the active phase from 1979 to 1996 (in mg/l): 210, 269, 388, 184, 377, 519, 580, 430, 400, 380, 478, 580, 760, 800, 720, not reported, not reported, not reported, not reported, 1240, 890, 825, 550, 1100, 893, 1100, 716, 616, 868, 970, 862, 654, and 984. For the closure phase from 1997 to 2005, where the landfill was capped with 18 inches of low permeability clay and six inches of topsoil, planted in native grasses, the values for sulfates measured at MW are: No Flow, 722, 530, 510, 490, 570, 670, 710, 790, 1000, 1080, and 1200. (Figure 12)

Groundwater values for sulfates at UD were measured every six months during the active phase of the landfill, from 1984 to 1996, and every year in the closure phase of the landfill, from 1997 until the present. These values are, for the active phase from 1984 to 1996 (in mg/l): 1020, 1100, 1390, 1200, 1050, 2940, 240, not reported, not reported, not reported, not reported, 1430, 590, 597, 490, 360, 703, 1200, 194, 1370, 1368, 1490, 1270, 1240, 1070, and 1060. For the closure phase from 1997 to 2005, where the landfill was capped with 18 inches of low permeability clay and six inches of topsoil, planted in native grasses, the values for sulfates measured at UD are: No Flow, 1210, 1100, 910, 800, 10, No Flow, 640, 160, 670, and 604. (Figure 13)

KDHE found that the levels of sulfate were of concern (Exhibit CC) and in 2005, there was some discussion at KDHE on setting maximum allowable levels of sulfate in groundwater (Exhibit DD). The water wells which provide Holcomb with drinking water are 2-3 miles away from the landfill, and the groundwater is used by irrigators in the area, of which there are at least 30 in a 3-mile radius of the HCF Landfill property line.

Therefore, using the analogous information above, the sulfates concentrations found in the downgradient to the HCF Landfill can be estimated to be, during the active phase of the HCF Landfill, around 1200 mg/l, and in the closure phase of the landfill, around 1000 mg/l. Note that this holds even if HCF Landfill only receives 19 inches of rain per year as compared with 37 inches for LEC Landfill #333, since at least 21.5 inches of irrigation water per acre are required to sustain the chosen cover vegetation crop, sorghum, in the fine loamy sand cover at the HCF Landfill after a cell is in its closure phase (Addendum 2 and see also Waskom, R.M. 1994, "Best Management Practices for Irrigation Management", Bulletin XCM-173, Colorado State University Cooperative Extension and Colorado Dept. of Agriculture). Also note that during the active phase of the landfill, sufficient water to prevent fugitive dust emissions must be sprayed on the ash.

2. **The unreinforced fly-ash concrete liner underlying the landfill may be subject to cracking and fissuring due to uneven hydration, compaction, strength or thickness at time of liner formation, and also due to subsidence of eolian sands below the liner. Leachate, including sulfates, from the landfill may percolate through these cracks, travel vertically through the sandy soils and end up in the alluvial aquifer.** The HCF Landfill rests on a liner made by mixing six inches of fly ash with twelve inches of the fine loamy sand present at the site ("Tivoli sands") by means of a disc harrow, wetting the mixture and letting it set up to form a low strength unreinforced concrete.(Landfill Permit #420 1982). If this fly ash concrete is compacted immediately, the compressive strength is 1450 psi; if not compacted for four hours, the compressive strength is 162 psi; and if not compacted for 24 hours, the compressive strength is 103 psi. (Woodward/Clyde Consulting Report 1978). The preceding values assume a 30 second mixing period using de-aired water.(Id.) Field results may vary. If the mixing is not uniform, the quality, strength, and resultant thickness of the unreinforced concrete layer may vary, which may lead to various kinds of stresses being introduced into the loaded

finished liner. The eolian soil present at the site is subject to compaction and subsidence if wetted. If the underlying soil gives way under at points under the burden of the liner and the ash, the resultant unsupported unreinforced low-strength fly-ash concrete will deform under the load, develop cracks and fissures, and perhaps undergo complete failure so that holes form in the liner. (See Addendum 1, Structural Applications of 100 Percent Fly Ash Concrete, D Cross, J Stephens, J Vollmer 2006). This process may be accelerated by leachate entering the cracks and fissures in freeze-thaw cycles and mechanically exacerbating the cracks and fissures to the point of failure, although fly ash concrete is less susceptible to this process than concrete made with portland cement.

3. There is extensive sulfate contamination in the alluvial aquifer associated with the Arkansas River. The majority of this area of contamination lies in western Finney and eastern Kearny counties, centered near Holcomb. Due to the lack of downgradient groundwater monitoring wells at the HCF Landfill, there is no direct evidence that the HCF Landfill contributed to this contamination; on the other hand, looking at the leachate sulfate concentrations observed in the downgradient monitoring wells at LEC Landfill #333, there is indirect evidence that indicates that the HCF Landfill could reasonably have been expected to contribute an unknown amount of sulfate contamination to that in the aquifer arising from other sources. This problem has been extensively studied by research teams headed by Donald Whittemore, of the Kansas Geological Survey. The most recent report, "Hydrologic Responses to Pumping in the Upper Arkansas Basin and Effects of the Conservation Reserve Enhancement Program", presented to the Kansas Senate and House Natural Resources Committees in February 2007, is appended as Addendum 4. This report does not explicitly speak to the question of groundwater contamination from the HCF Landfill, perhaps owing to the absolute lack of downgradient groundwater monitoring data from the HCF Landfill. The levels of sulfate contamination are between 1500-2000 mg/l for most of the Arkansas River alluvium, from 15 miles west of Holcomb to 10 miles east of Holcomb. This level of sulfate contamination is seen all the way to the Colorado border, but appears to expand to roughly twice the width seen in western Kearny county starting at Lakin, roughly 15 miles west of Holcomb, and only narrowing back to the width seen in western Kearny county about 10 miles east of Holcomb. Whittemore 2007 at 8. It is possible that sulfate groundwater contamination from leachate from the HCF Landfill for a

period of 23 years at levels (by analogy to LEC Landfill #333) averaging 1200 mg/l may have contributed, perhaps significantly, to the existing sulfate contamination in the Arkansas River alluvial aquifer.

4. The closure plans for the various phases of the HCF Landfill call for 24 inches of local soil to be placed on top of the ash piles, and for sorghum to be planted as a cover crop, along with a mixture of native grasses. Sorghum requires at least 21 inches of irrigation water to survive (in addition to the 19 inches of average rainfall), and since the native soils are highly permeable, this water will act to quickly saturate the landfill, percolating through the soil into the ash pile. The roots of sorghum and native grasses are at least three feet long, which means they will penetrate the soil layer and come into contact with the highly alkaline ash. The result of this contact could be that the vegetation dies off, with the channels created by the withered roots acting as channels for more water to enter the landfill and percolate through to the groundwater below. Moreover, the dead plants will no longer act to hold the soil in place, creating the possibility of erosion of cap soil and exposure of the ash pile to the wind.

The local soils consist of either fine loamy sand containing 10-20%clays, 10%silts, and 70-80%sand which is indigenous to the area, to be taken from borrow areas nearby on the landfill property, or the Tivoli sands which contain no clays or silts, depending on which part of the permit application is examined. Both soils are unsuitable for growing crops without extensive irrigation, in excess of 21 inches per year, in addition to the local rainfall of 19 inches per year. Both soils are easily permeable, compared to the loamy clays seen at the LEC Landfill #333 site, which was covered with 18 inches of clay, and twelve inches of topsoil and planted in native grasses. The native grasses used at the LEC 333 site apparently are shallow rooting grasses, whose roots do not penetrate the clay cover to the ash pile. The annual rainfall of 37 inches per year appears to be adequate to ensure continued growth. The closure plans for inactive cells in the HCF landfill call for sorghum to be planted as a cover crop, along with indigenous native grasses, and for the cap to be fertilized with ten tons of manure per acre, which is roughly eight ounces per square foot, for a depth of about 1/2 inch. Sorghum roots generally extend down about five feet, and the native prairie grasses may have roots up to five feet long as well. Since the fine loamy sand soil layer is only two feet thick, and there is no underlying relatively impermeable clay layer, the roots can be assumed to penetrate down

into the ash pile, especially considering that the fine loamy sand will lose water quickly, either by percolation down into the ash pile or by evapotranspiration. The effect of the highly alkaline ash pile on the cover crops could well be expected to be deleterious to growth, and perhaps fatal to the cover crops. There are grasses and forage crops which grow well in highly alkaline soils, see Addendum 5, Soils and Water Salinity. Moreover, some of these crops are better adapted for arid and semi-arid regions in which alkaline soils predominate. The best plan, of course, is to select cover crops which will not have roots which extend through to the ash pile, and to discourage this kind of root growth by adding a comparatively impermeable layer of clay below the topsoil layer. It should be noted that even with 18 inches of clay and 12 inches of topsoil with native grasses planted (and thriving, from the pictures in the LEC landfill #847 permit application), the levels of sulfate in leachate and groundwater at the closed LEC Landfill #333 are still high, the values for sulfates measured at MW from 1997 to 2005 being: No Flow, 722, 530, 510, 490, 570, 670, 710, 790, 1000, 1080, and 1200 mg/l, and the values for sulfates measured at UD being: No Flow, 1210, 1100, 910, 800, 10, No Flow, 640, 160, 670, and 604 mg/l. These leachate concentrations reflects the lack of a liner sufficient to prevent leachate penetration and the lack of a leachate collection system.

Suggested Permit Modifications

Given the observations and conclusions above, I now suggest the following permit modifications for the HCF Landfill at Holcomb Kansas:

1. Soil boring tests to be performed for at least one location underlying each phase in the landfill, phases 3 through 11, inclusive, as shown in the map below. A boring log is to be made for each site, and the following tests are to be performed:

a. Soil Compaction testing for both wet and dry soils;

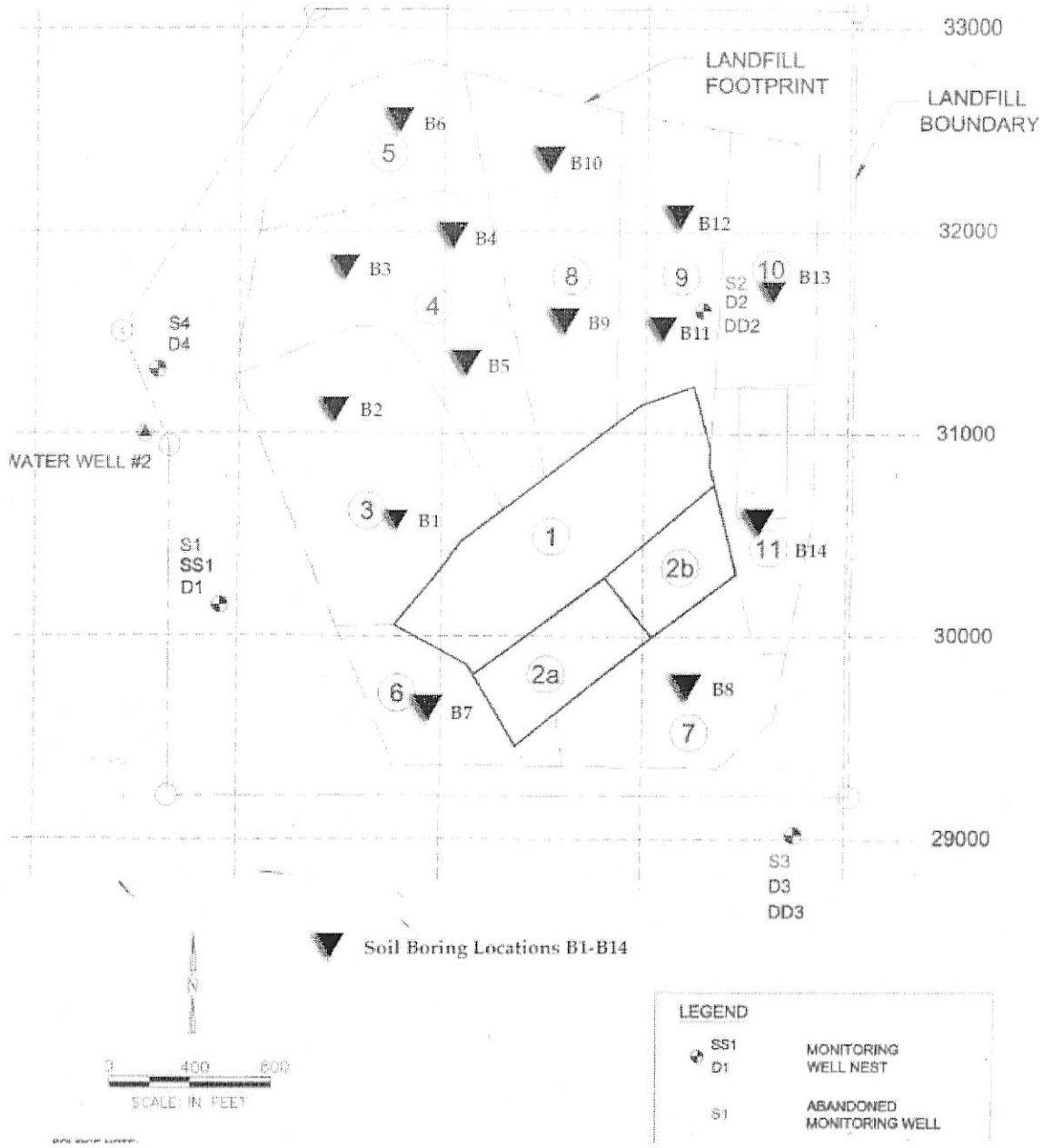
b. Permeability analyses;

c. Hydraulic conductivity measurements;

d. Measurement of hydraulic gradients;

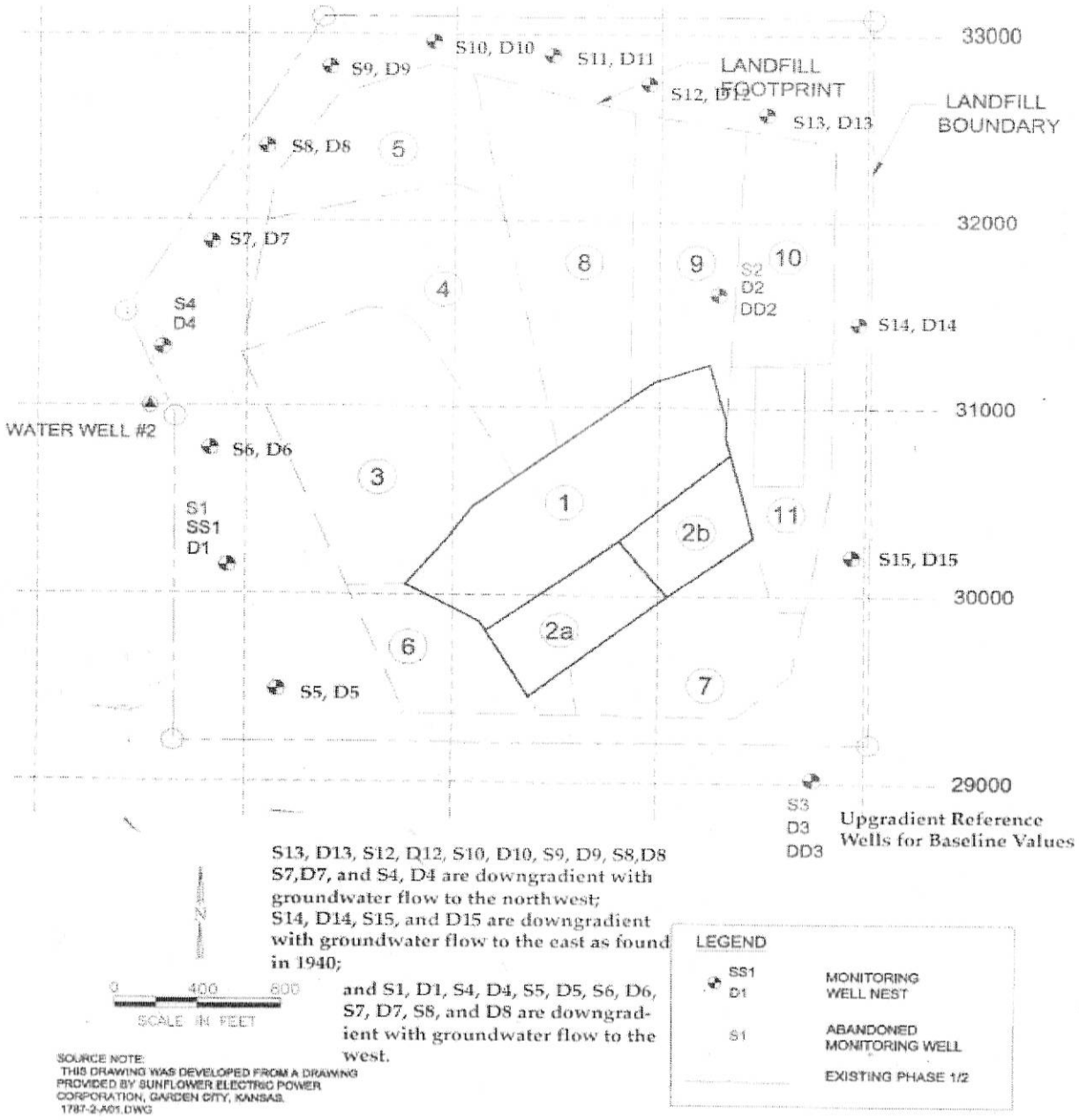
e. Soil bearing capacities, for both dry and wet soils; and

f. Particle Size Distributions for all soil types encountered in the boring samples.



Locations Of Soil Borings and Soil Testing Samples

2. Placement of Downgradient Groundwater Monitoring Wells. I believe that the standard applied to the LEC Landfill #847 permit should be applied here as well, due to the analogous nature of the two landfills, and the potential harm which could result from possible additional sulfate contamination of groundwater arising from leachate originating at the HCF Landfill. It should be noted that the HCF Landfill is in an area designated as a Sensitive Groundwater Area by the State of Kansas. The LEC standard is to place a groundwater monitoring well every 500 feet (Exhibit FF).



Location of Downgradient Groundwater Monitoring Wells

Wells, both shallow and deep, are to be placed every 400-500 feet on the downgradient sides of the landfill, both historical (1940, 1985) and present. The present downgradient direction is toward the northwest, disregarding any possible influence from Water Well #2, which draws its water from the Oglalla Aquifer and not the alluvial groundwater. Hydraulic gradients, conductivities, and soil permeability should be measured at each well site, as well as the usual well boring log information.

3. Construction of Liner and Leachate Collection System. In view of the fact that quantities of water will be needed to keep down fugitive dust emissions during the active stage of the landfill, and that extensive irrigation will be necessary to ensure the survival of cover crops during the closure stage, it is reasonable to assume the landfill will have the same leaching characteristics as LEC Landfill #333, which had high levels of sulfate concentrations in its leachate in both its active and closure stages. Accordingly, in order to prevent further possible contamination of an already saline groundwater alluvial aquifer, and underlying aquifers as well, I propose that the liner system as designed for LEC Landfill Permit #847 be adopted for the HCF Landfill. This liner system, according to various modeling studies (Exhibits GG, HH), will reduce sulfate contamination from 1500 mg/l to 20 mg/l, which should have a negligible effect on the alluvial aquifer, given that the sulfate concentration at the upgradient monitoring wells S3 and D3 at the HCF Landfill site are in this neighborhood. (Figure XX)

Specifically, the following liner should be built:

From grade upwards, there should be

A. a layer of four feet of compacted clay as specified below; or a layer of two feet of compacted clay, and a layer of reinforced fly-ash concrete eight inches thick, with steel mesh reinforcement, on top of the clay layer;

B. a geotextile layer as specified below;

C. a leachate collection system, as specified below, in a matrix of granular bottom ash. The leachate collection system is to be laid out so that the leachate will flow with the direction of gravity towards a leachate collection tank, in which leachate is to be stored and then treated to remove sulfate and other contaminants; and finally

D. a one foot thick layer of granular bottom ash, on which the first two foot thick lift of fly ash may be laid.

This design will make it possible to spray any amount of water needed to control fugitive dust emissions onto the fly ash dump, without fear of contamination of a sensitive groundwater area. After closing, it will be possible to irrigate the cover crops on the cap so that they will be able to survive and perform the function of securing the cap against wind erosion, without fear of leachate contaminants entering the groundwater.

Observations and measurements of the anchor trench so that it is as specified in the construction drawings, that trench corners are rounded to limit stressing the geotextile, and that backfilling of the trench is performed as soon as possible and compacted with care so as not to damage the geotextile.

Measurements to confirm that the required overlaps of adjacent geotextile sheets were achieved.

As each geotextile roll is placed, it shall be inspected for tears, punctures, and thin spots. To accomplish this, the panels will be traversed by Contractor QC personnel and the Company in such a way that the entire surface is observed.

If the weather becomes unacceptable for installation of the geotextile, the Contractor QC personnel will stop the installation until conditions again become favorable, thus minimizing the potential for unacceptable installation.

4. Construction of Cap at Closure of Landfill Phase. Instead of using the highly permeable, high sand content, low fertility native soils to construct a cap for the landfill, I propose that the cap conform to the standard set by KHDE in Exhibit JJ, namely that the cap be constructed of at least 18 inches of clay, on top of which is placed 12 inches of topsoil. Moreover, I propose that some cover crop, chosen from the cover crops listed in Addendum 5, Soils and Water Salinity, be used instead of sorghum. Native grasses should only be used if they are not deep-rooting. Shallow-rooting prairie grasses do exist. Bermudagrass, which is commonly used on levees for its superior earth holding ability, not to mention its ability to survive both alkaline soils and arid to semi-arid conditions, could also be considered, keeping in mind that it is a highly invasive species and will spread rapidly, forming a tight mat of roots which will choke other species out.

Conclusion

If the permit modifications outlined above are incorporated into the permit, I believe that the possibility of worsening the already severe sulfate contamination of the alluvial groundwater aquifer in the Arkansas River area due to infiltration of sulfate contamination arising from the HCF Landfill will be substantially reduced. The modifications proposed for the liner and leachate collection system are drawn directly, with very little change, from the design of the newly permitted LEC Landfill Permit #847, as are the groundwater monitoring system, and soil boring sample testing modifications. Since these modifications have already been incorporated into another KDHE permitted landfill, they should be per se reasonable, and the modification of the HCF

STATEMENT TO THE KANSAS HOUSE OF REPRESENTATIVES COMMITTEE ON UTILITIES (2/7/08)

By

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Distinguished Professor Emeritus, Aerospace Engineering, WSU
Executive Director Emeritus, NIAR, WSU

Mr. Chairman, Members of the committee: Thank you for giving me the opportunity to appear before you today.

My background.

I am a Kansas native. My education includes B. S. in Mechanical Engineering, power option, and M.S. in Aeronautical Engineering, propulsion option, from Wichita State University, and PhD from the University of Kansas in Aerospace Engineering. I served on the faculty at WSU in Mechanical Engineering and Aerospace Engineering and was involved in many research projects funded by NASA, the Department of Energy and other federal agencies. I served as founding Executive Director of the National Institute for Aviation Research (NIAR), and I am pleased to acknowledge the support which NIAR has received from the State of Kansas. Since its beginning in 1985 with less than $1 million total funding, NIAR has grown to a $42 million operation, of which the state provides less than 30%. NIAR leverages the state support with federal and industry support, and provides research and development in support of aviation and aviation-related industries. It now has 350 employees on payroll, up from 10 in 1985. The projects of NIAR assist Kansas companies in being world leaders in high-tech fields. I have been involved in energy conversion engineering as a major part of my career, including wind turbine research beginning in the 1970's, and recent publications relating to alternate fuels and propulsion systems for aircraft.

I requested the opportunity to appear before you today to express some concerns regarding legislation being considered regarding the proposed Holcomb coal plant expansion. I ask you to consider the following points.

Why coal burning is a concern.

* World human population growth is placing unprecedented strains on the earth's eco-systems. World population has grown from 3 billion in 1950 to 6 billion in 2000, and is projected to reach 9 billion by 2050. We, our children and grandchildren need to be aware of the implications of such a large world population.

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* Global warming is a reality which virtually all reputable climatologists recognize.

* Carbon dioxide emissions from fossil fuels are a principal contributor to the greenhouse gas effect contributing to global warming.

* Coal burning for electricity generation is a principal source of greenhouse gases.

* Carbon emission limits are coming. Given the realities of global warming, many nations have begun the process of limiting carbon emissions, through the United Nations Intergovernmental Panel on Climate Change, as evidenced by the Kyoto and Bali agreements. The European Union is taking leadership in this process, and since much of our economic vitality depends on international trade, the United States cannot ignore the IPCC guidelines. U.S. manufacturers, including airplane manufacturers in Kansas can expect to be required to meet emission reduction goals within the next few years. If we ignore these world-trends, we risk the future economic health of our nation, and its many businesses. There are those who argue that since China and India, (major carbon polluters), are not an IPCC partners, the U.S. should not adopt clean air practices until China and India participate. This is poor reasoning and poor politics. When the U.S. takes a leadership role, we will exert tremendous economic leverage on China and India to begin the emissions reduction process. China already has automobile fuel mileage standards higher than the U.S. Have you noticed how quickly they responded to fixing dangerous Mattel toys? I believe that regardless of the outcome of the national election in November, the U.S. will make substantial moves to become a leader in clean air and in world respect within the next few years. Many business leaders agree, and some businesses and state and city governments are already implementing steps to monitor and reduce carbon emissions. In fact, I and some colleagues recently completed a preliminary study of the green gas emissions for the city of Wichita operations. Not surprisingly, 84% of the emissions are the result of electricity use, because of the primary use of coal by Westar Energy. As Westar integrates more wind energy into the system, this source of emissions will be reduced. We are eager to see that happen, along with energy-conservation practices which Wichita is adopting.

Holcomb Coal-Burning Expansion Concerns:

Given this background, it is alarming to learn that Kansas is considering allowing construction and operation of major coal-burning electric plants which will have a 50-year life expectancy and would export most of the electric power to out-of-state users. I find that much of the information is misleading to the public, and that is really why I am here today.

The energy and economic future of Kansas will <u>not</u> be jeopardized by not building the proposed 1,400 megawatt coal expansion at Holcomb. The coal interests are engaging in unethical fear motivation. Present and future electrical power needs of the Sunflower customers can be met with modest expansion, a small fraction of the expansion proposed at Holcomb. Yes, Kansas needs to continue coal, natural gas and nuclear power along with our new wind turbines to meet our sustained energy needs

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when the wind doesn't blow. However, we shouldn't become the dumping ground for pollution to satisfy power needs of our neighboring states.

Shipping coal from Wyoming to Kansas and building new transmission lines to send the electricity back across the Kansas-Colorado border would be more expensive than burning the coal and generating the electricity in Colorado or Wyoming. The geography is obvious. The energy losses and construction and operation of new transmission lines to send electricity back across the Kansas-Colorado borders to supply the Tri-State customers are not free. Since locating the new coal plants in Kansas would be more expensive than locating them in Colorado, we must ask, "Why Kansas?"

Colorado and other Tri-State customer states do not want these coal generating plants located in their home locations. Clearly, they regard the pollution, water use and other impacts an unacceptable price to pay for the added jobs and other economic benefits claimed by the coal interests. If the proposed 1,400 megawatt additional Holcomb coal-fired plants with 11 million tons of CO2 and other emissions annually are such a great economic benefit, Colorado, Wyoming and other Tri-State users should be clamoring to locate the plans in their home states, where nearly all the electricity will be used. I understand that this committee has been told that the reason Tri-State did not consider expansion in Colorado or another member state is that "It would take too long." Why would it take too long? Would other states have more stringent emission regulations or process? More public opposition to the emissions? The committee should not the "take the too long" answer lightly. In fact, the Dallas Morning News, February 4, notes that major Wall Street banking institutions are setting "carbon principles" which will mean more stringent review before investing in coal. Is Wall Street telling us something?

Some have attempted to justify support of the expanded Holcomb coal plants by stating, "If they don't build the plants here, they will build them near our borders, and we'll get the pollution but not the money and the jobs." This is disgraceful reasoning. If the plants are not built in Kansas, they could be built nearer the coal supply and end users, far from our borders. In fact, Colorado evidently does not want the coal plants. If Kansas rejects the proposal, Tri-state might decide to invest more in wind energy, which Kansas could export in abundance without pollution.

Recent coal interests' claims of clean coal are misleading. Carbon dioxide capture will not be incorporated in the proposed Holcomb expansion, and in fact has not been demonstrated on an economical utility-scale project. The advertised "clean coal" isn't that clean. Of course, Holcomb expansion units would meet current federal regulations, as will all existing plants. And federal regulations are expected to become much more stringent in future years. Even if carbon dioxide capture is eventually proven, the technology will certainly increase the cost substantially. CO2 capture is not a simple add-on to an existing coal power plant. Underground storage and/or algae remediation would require a complete re-design and re-build. The "carbon tax" which the coal interests are belatedly offering to pay is far from adequate to alleviate the potential climate damage of CO2 and other emissions.

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Research projects are not proven technology. As a research engineer, I am well aware of the distinctions between experimental projects, and full-scale commercial adoption. When WSU began wind energy research in the 1970's, we conducted research on a NASA 125 ft.-diameter, 100 kilowatt turbine that was considered large. There were a variety of developmental headaches, including short service life and high maintenance. Three-decades later, these problems have been resolved, and I am delighted to see hundreds of mature-technology 1- to 3-megawatt turbines being installed in Kansas. These machines capture some of the abundant supply of clean energy supplied by Mother Nature, create Kansas jobs, and reduce carbon emissions. I am pleased to learn that Kansas is negotiating to become a manufacturer of wind turbines, probably to be located at Hutchinson. Wind turbine blades are essentially large propellers, and Kansas has the expertise in composite materials and aerodynamics to become a world leader in wind turbine production as well as airplanes.

Kansas should not relinquish its current position and reputation as a clean-air state, and a leader in environmental stewardship. In addition to wind, Kansas also has abundant solar energy, and individual home or business solar photo-voltaic units could reduce the emissions and peak load which is troublesome to our utility companies, but we must have a net-metering policy which encourages small solar units. I am please to see that the proposed bill includes a net-metering provision, but I am concerned that in its present form, the policy does not make individual solar voltaic panels economically viable.

The action by Health and Environment Secretary Bremby and supported by Governor Sebelius and Lt. Governor Parkinson in denying the Holcomb expansion is in concert with a recent U.S. Supreme Court ruling that it is indeed appropriate to regulate excess CO2 created by human actions which can lead to human suffering. Manipulative legislation in Kansas to permit the Holcomb coal expansion would be a major setback to our environment, our reputation, and the health of our descendents. I urge you to allow Secretary Bremby's decision to stand, and to focus on issues which will assure the continuation of adequate, clean energy for the economic and environmental future of our state and its citizens.

Again, thank you for allowing me to speak before this committee.

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HB2711 **2-7-2008**

Testimony before the Kansas House Energy & Utilities Committee.

Thank you Chairman Holmes for allowing me to present my testimony here today.

My name is Donn Teske & I currently serve as Kansas Farmers Union president and I am here today to testify in opposition to HB2711.

Kansas Farmers Union policy supports renewable energy and environmental stewardship. We feel that both of these are threatened if HB2711 is passed into Kansas law.

Carbon emissions are a serious issue but water is also. In the case of the Holcomb plant the water of the Ogallala, a precious, non-renewable resource will be mined for the purpose of exporting energy out of state, whereas energy plants in other areas use surface water in which the evaporation is part of the cycle. Also there is concern about the value placed on the water.

In my opinion the renewable parts of HB2711 are pretty much token and the guidelines placed on coal generation easily met.

Of course as we all know the issue that makes HB2711 so controversial is Global warming and whether mankind is causing or contributing to it. There are a lot of pretty smart people in the world that are convinced man is causing global warming and that the future is threatened by it, and I believe them. With the fast pace of this bill through your committee I have to assume that you do not.

I hope very much that you are right and I am wrong for I worry much about my off-springs future world.

Regretfully, in this instance it will not do us any good to get back together a hundred years from now to figure out who was right. If you were right then

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whatever we did was fine, however if I was right then you were a contributing factor to the ruin of your grandchildren's world when you could have been leaders in global responsibility.

During this bills discussion much has been made about off-setting and / or capturing the emissions from coal generation, partially from agricultural practices sequestration. This is an area I know a little about. Farmers Union is now, as I understand it, the largest agricultural carbon sequestration aggregator in the United States. And in Kansas I'm pretty much the guy running around for Farmers Union working on this.

But it can only do so much. To put things in perspective I hear that the proposed Sunflower project at Holcomb would emit 11 million tons of Carbon per year. Farmers Union now has 1.6 million acres of land enrolled in the Carbon Sequestration program at rates that run from .2 tons of sequestration per acre to .6 tons. If one averages them out to .4 tons per acres then the entire national program of Farmers Union to date is off-setting approximately 640,000 tons of carbon per year. This is a little under 6% of just this one proposed plants emission!!! Talk about an act of futility!

Also, the value being placed on carbon penalties in this bill is a joke and I feel would draw coal generation to Kansas like a magnet. Three dollars a ton?? Last year it was almost five dollars on the CCX and this is really just a market that is starting to get it's legs under itself. Our European neighbors are paying more like TEN times this amount! When Congress enacts a Cap & Trade how relevant do you think three dollars a ton will be?

Again, I hope you're right, otherwise I don't envy your legacy.

I urge you to stop HB2711.

Thank you and I will be happy to address any questions.

Capitol Consulting Group
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Doug Lawrence
Managing Partner

February 7, 2008

Testimony on behalf of Chesapeake Energy Company before the House Utilities Committee

My name is Doug Lawrence. I represent Chesapeake Energy Company, of Oklahoma City, a company that holds significant interests in natural gas production in Kansas today.

I also served as a member of this committee, and worked diligently on electric utility public policy issues throughout my career as a legislator. Indeed, I served on the House Energy and Natural Resources Committee in 1993 when the legislature rewrote major portions of the clean air act in our state. From this perspective, I am in a unique position to provide insight regarding this statute.

Earlier this week, your committee heard testimony from a Washington DC attorney, and a former State Senator. These two gentlemen addressed legislative intent regarding the authority of the KDHE Secretary to act as Secretary Bremby did last year. In particular, Mr. Wehrum's testimony, attempted to make several points:

1. There is a long history of application of the emergency powers in Federal Law and application of the law in Kansas. In the Federal Law there is language which limits that power to existing pollution sources
2. In 1993, the Kansas legislature was clearly aware of the provisions of Federal Law because the legislature adopted language using some of the phrases and language that was part of the 1990 Federal Clear Air Act.

Thus:

3. The legislature intended to adopt the full meaning of the process outlined in the Federal law.

Based upon the language that was adopted by the Kansas legislature, it can easily and more accurately be argued that the facts set forth by Mr. Wehrum make it clear that the legislature considered and REJECTED certain concepts of the federal standard and further, put in place language that authorized the type of action Secretary Bremby took relative to the Sunflower permit.. This type of authority is entirely consistent with federal law as state statutes may contain provisions different or more restrictive than its federal counterpart. The language of Section 3012 is clear. The State Attorney General transparently and succinctly set forth the authority of the KDHE Secretary in an opinion. Secretary Bremby followed the opinion of the attorney general.

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Further evidence of current statutory intent may be discerned by evaluating HB 2711. HB 2711 purports to "clarify" the intent of the statute but language changes only serve to validate that Secretary Bremby's actions were appropriate. Otherwise, why would HB 2711 propose changes that lead directly to the result Sunflower desires?

With due respect to those who have previously testified, the Kansas Clean Air Act is consistent with federal law. Further, the action of Secretary Bremby is consistent with the plain reading of state law. This is the fundamental tenant of statutory interpretation. Finally, no testimony in these hearings has established that the Secretary's action is contrary to the intent of the Kansas legislature. Reciting the intent of the federal law is unpersuasive as it relates to the Kansas statute in question.

There are a number of provisions in HB 2711 that may have unintended or unexpected consequences. What you intend, may not be what you allow under the language you have put into this legislation.

HB 2711 essentially leaves the decisions about where new generation capacity is built in our state and the fuel choices that are made in the hands of independent power producers who may have no connection to our community or our public interest.. While we all know and understand the sunflower electric proposal, what do we know about others who may see Kansas as an opportunity to develop new generation capacity in our state with little or no regulatory oversight. This legislation doesn't control or limit any decisions by private sector development, and when coupled with existing law offers tax abatements as incentive to develop in Kansas. The sole test with regard to facility approval is whether the facility meets the minimum air emission standards established by federal law.

This may not be just two power plants in Western Kansas. There doesn't appear to be any way to simply say no to a proposed development.

HB 2711 implements a carbon tax proposal that could easily be abused and ultimately result in increased CO2 emissions in our state. There are good public policies reasons to implement such a program, but if the net result is higher emissions rather than lower emissions, you aren't actually achieving your goals. With 16 ways to claim a reduction in CO2 emissions, and no real power to implement or qualify the credits, it is extremely hard to determine whether the program will actually reduce emission rather than provide an accounting mechanism to offset increased emissions.

Imagine using the approach defined in HB 2711 to implement a 50 cent per pack cigarette tax. Allowing cigarette companies to take credit for any money they spend on programs intended to help people stop smoking, against the tax owed, even if the programs they created were never successful.

Clearly, Kansas needs a balanced mix of generation capacity. The question is how you achieve and maintain that balance.

James M. Taylor, Senior Fellow of Environment Policy,
The Heartland Institute

Testimony on HB2711
Before the Kansas House Utilities Committee

February 7, 2008

Thank you very much, Mr. Chairman, for extending me the opportunity to be here today. My name is James Taylor, and I am the Senior Fellow of Environment Policy at The Heartland Institute. The Heartland Institute is a non-profit, non-partisan organization dedicated to sound science and sound economics regarding environmental and other issues.

I am here because I am very concerned about the financial hardship S.B. 221 will inflict on Ohio taxpayers and Ohio electricity consumers. In short, the renewable and alternative power mandates of S.B. 221 will impose significant economic hardship on the citizens of Ohio while achieving virtually no real-world benefits.

No Measurable Impact on Temperatures

Let us start with a very brief summary of S.B. 221's ability, or more accurately, inability, to achieve its desired purpose of fighting global warming.

According to the U.S. Environmental Protection Agency (="http://www.epa.gov/climatechange/downloads/s1766analysispart1.pdf"MACROBUTTONHtmlResAnchorhttp://www.epa.gov/climatechange/downloads/s1766analysispart1.pdf), the U.S. accounts for merely a quarter of global greenhouse gas emissions related to energy use. If we measure total greenhouse gas emissions, rather than just energy-related greenhouse gas emissions, the U.S. accounts for merely one sixth - or 17% - of global greenhouse gas emissions (="http://www.epa.gov/climatechange/downloads/s1766analysispart1.pdf"MACROBUTTONHtmlResAnchorhttp://www.epa.gov/climatechange/downloads/s1766analysispart1.pdf). Moreover, our percentage contribution to global emissions is shrinking every year.

Simple mathematics tell us that S.B. 221's alternative power mandate will have absolutely no measurable impact on global temperatures. S.B. 221 seeks to displace 25% of conventional power with alternative sources. Electrical power generation accounts for roughly half of U.S. greenhouse gas emissions (http://www.sciam.com/article.cfm?articleID=6DB6EF35-E7F2-99DF-3EC5491903FC2A34). Even if S.B. 221's alternative energy mandate utilized entirely emissions-free power generation – which, by the way, it does not – Ohio would reduce by merely

one quarter the 50% of its emissions produced by electrical generation. In other words, Ohio would reduce its emissions by just over 10%.

Let's put this in perspective. Even if the entire nation enacted Ohio's plan, global emissions would be reduced by less than 2% (in other words, a 10% reduction of the U.S.'s 17% global share of emissions). Therefore, even if the entire nation enacted S.B. 221, global emissions would still be more than 98% of what they would be if the U.S. did not act at all. In essence, an entire national effort to enact S.B. 221 would merely forestall for two years -- until the year 2102 -- the greenhouse gas emissions that would otherwise have accrued by the year 2100. The temperature effects of such a minor reduction in global greenhouse gases would be too small to measure.

And of course, Ohio is just one of 50 states, so reduce the already too-small-to-measure impact of national implementation of S.B. 221 still further, to account for the small portion of U.S. greenhouse gas emissions for which Ohio is responsible.

What we are left with, therefore, is merely a symbolic statement – nothing more, nothing less. No matter what the renewable power industry or any other special interest group tells you, S.B. 221 will have absolutely no measureable impact on global temperature, either now or anytime in the future.

Renewable Power Substantially More Expensive

The next pertinent question is, "H ow much does S.B. 221 demand the citizens of Ohio pay for such a symbolic gesture?" The answer, unfortunately, is a substantial amount of money, a substantial amount of lost jobs, and a substantial reduction in our standard of living.

Despite what activist groups and the renewable power industry may tell you, alternative power mandates will not create jobs or boost the state's economy. Indeed, simple common sense tells us that if a product makes economic sense, you don't have to subsidize it to make people produce it, and you don't have to put a gun to somebody's head to make him or her purchase it. The unavoidable reason why renewable power comprises such a small percentage of U.S. power generation is because it is significantly more expensive to produce than conventional power. If indeed it were otherwise, the renewable power industry would be too busy making a killing in the electricity production market to come here and repeatedly lobby for government intervention and favoritism.

Real-world data support such common-sense wisdom. Business Week magazine reports that the true price of wind power is $91 per megawatt hour, after factoring in the $40 per megawatt hour of federal subsidies (http://www.businessweek.com/magazine/content/07_44/b4056001.htm). By contrast, coal costs merely $37 per megawatt hour (http://www.nytimes.com/2006/12/28/business/28wind.html). Wind power is 2 ½ times more expensive than coal power. And solar power is far more expensive than wind power. Indeed, according to the U.S. Energy Information Administration, even if we ignore the staggering behind-the-scenes subsidies received by renewable power, the average retail price of electricity in states with renewable power mandates is 42% higher than the price of electricity in states without such mandates (="http://www.eia.doe.gov/cneaf/electricity/epa/fig7p4.html"MACROBUTTONHtmlResAnchor http://www.eia.doe.gov/cneaf/electricity/epa/fig7p4.html, ="http://www.cei.org/pdf/5982.pdf"MACROBUTTONHtmlResAnchorhttp://www.cei.org/pdf/5982.pdf).

The renewable power industry attempts to claim that Ohio is uniquely blessed with special solar and wind resources that make the state especially well suited for solar and win production. Such assertions are patently absurd. According to the U.S. Energy Information Administration, and as shown in Appendices 2 through 4 in my written testimony, Ohio is especially ill-suited for the production of solar and wind power (="http://tonto.eia.doe.gov/state/index.cfm"MACROBUTTONHtmlResAnchorhttp://tonto.eia.doe.gov/state/index.cfm, ="http://www.eia.doe.gov/cneaf/solar.renewables/ilands/fig13.html"MACROBUTTONHtmlResAnchorhttp://www.eia.doe.gov/cneaf/solar.renewables/ilands/fig13.html, http://www.eia.doe.gov/cneaf/solar.renewables/ilands/fig12.html). Ohio ranks in the lowest possible tier of solar and wind potential. Only a decision to industrialize and further degrade Lake Erie with thousand upon thousands of giant wind turbines could produce any meaningful amount of renewable power in Ohio. And even this is an especially poor option, as offshore wind turbines are even more expensive to build, connect, and maintain than the onshore wind turbines that currently make up a majority of domestic wind power generation.

Environmental Harms

An additional issue to consider is the very serious environmental degradation caused by renewable power. The National Audubon Society has called wind turbines aviary "cuisinart" for good reason. Existing wind turbines already kill 70,000 birds per year in the U.S. Substantially adding to the number of wind turbines would substantially add to the number of unnecessary bird deaths, including many migratory and endangered species. Indeed, Ohio's top bald eagle researcher, Mark Shieldcastle of the Ohio Department of Natural Resources, warns that wind power is "a tremendous eater of land" and is not the environmentally friendly technology that the wind power industry would lead this committee to believe. While S.B. 221 would have no real impact on global temperatures, it would have a very real, and a very negative impact on endangered migratory bird species.

Destroying Jobs, Reducing Real Income

Finally, assertions by activists and the renewable power industry that renewable power creates jobs are misleading at best. True, if you mandate the construction of renewable power plants, you are creating jobs for people who build such plants. But you are at the same time taking away jobs from the people who build more cost-efficient conventional power plants, and you are taking away the jobs that would have been created in more productive sectors of the economy if Ohio citizens had been able to keep their money and spend it on goods and services that actually provide them with some benefit. Renewable power mandates create some jobs in the narrow sector of renewable power generation while eliminating a greater number of jobs in other sectors of the economy; sectors that would have enhanced the standard of living for citizens of Ohio.

As an analogy, an Ohio law outlawing self-service gas pumps would create thousands of jobs for professional gas pumpers. However, a greater number of jobs would be eliminated elsewhere in the economy because money that used to be spent on goods and services that actually benefitted people would now be spent on unnecessary gas-pumping services. No serious economist would argue that outlawing self-service gas pumps would create jobs and be good for the economy, yet this is exactly the kind of argument that the renewable power industry is making in support of the renewable power mandates of S.B. 221.

Real-world economic studies from some of the world's leading economists confirm this common-sense result. Numerous leading economists and economic institutions have analyzed the costs of addressing greenhouse gases – which would necessarily entail reducing conventional power generation in favor of renewable power – and virtually all have reached the same conclusion; reducing greenhouse gas emissions through the greater use of renewable power will have substantial negative repercussions on the economy and on our standard of living.

In Appendix 1 of my written testimony, I have provided brief summaries of many of these studies. In recognition of time constraints I will merely summarize the findings now. The consensus of studies by such economic experts as professors at the Massachusetts Institute of Technology, Yale University, the Congressional Budget Office, and the U.S. Energy Information Administration report that electricity prices are likely to rise by roughly 40 percent, and American households are likely to see a reduced standard of living totaling $2,000 to $5,000 per year, as industry-wide higher energy costs are passed along to consumers.

By contrast, the only "studies" presented by the supporters of S.B. 221's renewable power mandate have all been commissioned by, paid by, and/or conducted by the renewable power industry and renewable power advocacy groups.

In a world where money does not grow on a tree, and costs must be weighed versus benefits, S.B. 221 will have absolutely no beneficial impact on global temperatures, yet will come at substantial cost to the citizens of Ohio.

Thank you once again, Mr. Chairman, for the opportunity to testify here today. I would be happy to answer any questions you may have.

APPENDIX 1

2007 Congressional Budget Office Study

According to a 2007 study conducted by the Congressional Budget Office (CBO) (="http://www.cbo.gov/ftpdocs/80xx/doc8027/04-25-Cap_Trade.pdf"MACROBUTTONHtmlResAnchor

http://www.cbo.gov/ftpdocs/80xx/doc8027/04-25-Cap_Trade.pdf), reducing greenhouse gas emissions by a mere 15 percent would cost the average household nearly 3 percent of its income. A family making $50,000 per year would be forced to pay an extra $1,400 every year for the same goods and services it purchases today.

"Most of the cost of meeting a cap on CO2 emissions would be borne by consumers, who would face persistently higher prices for products such as electricity and gasoline. Those price increases would be regressive in that poorer households would bear a larger burden relative to their income than wealthier households would," CBO determined.

Moreover, "A CO2 cap would worsen the negative effects" of "existing taxes that dampen economic activity--primarily taxes on labor, capital, or personal income, such as payroll taxes and individual or corporate income taxes," CBO reported. "The higher prices caused by the cap would lower real (inflation-adjusted) wages and real returns on capital, indirectly raising marginal tax rates on those sources of income."

2007 MIT Study

A 2007 study by the Massachusetts Institute of Technology (MIT) reached similar conclusions. According to the MIT study (="http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt146.pdf"MACROBUTTONHtmlResAnchor

http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt146.pdf), mandatory greenhouse gas reduction schemes similar to those most popular in Congress and the state legislatures would cost

typical families of four close to $5,000 each and every year.

2007 Charles River Associates Study

A 2007 study by Charles Rivers Associates
(="http://www.crai.com/pubs/pub_7285.pdf"MACROBUTTONHtmlResAnchor

http://www.crai.com/pubs/pub_7285.pdf) examined how reducing greenhouse gas emissions to 1990 levels by 2020, and how reducing emissions 80 percent by 2050, would impact California. According to the study, agricultural production, real wages, and the demand for labor will fall dramatically.

"The costs of GHG controls will worsen California's terms of trade," the study concludes. "For example, imposing GHG controls in California will increase in-state production costs thereby permitting out-of-state businesses to raise the prices that they charge California customers and still remain competitive. For California exporters, on the other hand, although GHG controls will increase their production costs, they will find it difficult to raise prices for their out-of-state customers, as long as their out-of-state competitors do not face the same policy-driven cost increases. These changes erode the purchasing power of Californians, which will decrease their consumption and economic well-being."

By 2050, the greenhouse gas reductions are expected to cost Californians $500 billion in lost income.

2004 University of Colorado Study

Importantly, a 2004 study by economists with the U.S. International Trade Commission and the University of Colorado
(="http://www.mines.edu/~ebalistr/Papers/CO2004.pdf"MACROBUTTONHtmlResAnchor

http://www.mines.edu/~ebalistr/Papers/CO2004.pdf) found that it would be more costly for most other states to meet greenhouse gas restrictions than it would be for Californians. This is due in large part to the fact that California has more abundant and cost-effective solar, wind, hydro, and geothermal resources than do other states.

2004 Charles Rivers Associates Study

A 2004 study by Charles Rivers Associates
(="http://www.crai.com/Showpubs.asp?Pubid=3694"MACROBUTTONHtmlResAnchor

http://www.crai.com/Showpubs.asp?Pubid=3694) concluded that reducing greenhouse gas emissions to 1990 levels would force electricity prices up by 18 to 24 percent, resulting in families with $200 per month electrical bills paying an extra $480 per year in electricity costs. The same study found that reducing greenhouse gas emissions to 1990 levels would force a 32 to 45 percent rise in gasoline prices, resulting in $3.00 per gallon gasoline being replaced by $4.00 to $5.40 per gallon gasoline.

The economy-wide effects of the mandatory greenhouse gas reductions would cost the average household $1,200 per year by 2020, according to the study.

2003 Energy Information Administration Study

A 2003 study by the U.S. Energy Information Administration (EIA) (="http://www.eia.doe.gov/oiaf/servicerpt/ml/pdf/summary.pdf"MACROBUTTONHtmlResAnchor

http://www.eia.doe.gov/oiaf/servicerpt/ml/pdf/summary.pdf) found that mandatory greenhouse gas reductions similar to the most frequently proposed federal and state legislation would result in a 27 percent increase in gasoline prices and a 46 percent rise in electricity prices.

2003 Heartland Institute Study

A 2003 state-specific analysis by The Heartland Institute (="http://downloads.heartland.org/11133.pdf"MACROBUTTONHtmlResAnchor

http://downloads.heartland.org/11133.pdf) made reached similar conclusions as the studies above, but additionally considered state-specific factors and broke down the expected costs on a state-by-state basis. The Heartland study found that cutting greenhouse gas emissions to 1990 levels would cost the average Ohio household more than $7,000 per year.

2007 Nordhaus Study

In 2007, Yale University economics professor William Nordhaus conducted an analysis of numerous proposals to reduce greenhouse emissions (="http://nordhaus.econ.yale.edu/dice_mss_072407_all.pdf"MACROBUTTONHtmlResAnchor

http://nordhaus.econ.yale.edu/dice_mss_072407_all.pdf). Nordhaus discovered that substantial near-term reductions in greenhouse gas emissions are extremely costly while achieving little measurable benefit. "Because the initial emissions reductions are so sharp in the ambitious proposals, they impose much higher costs than are required to attain the same environmental objective," Nordhaus concluded.

Even assuming alarmist projections of 3-degree Celsius warming in the upcoming century, "Climate change is unlikely to be catastrophic in the near term, but it has the potential for serious damages in the long run." As a result, "the best approach is one that gradually introduces restraints on carbon emissions."

In more tangible terms, Nordhaus observed that the optimal method of reducing greenhouse gas emissions would require only a 25 percent reduction by 2050, with more stringent reductions required – and more readily achievable – after that time.

2007 Wake Forest Survey

In 2007, Wake Forest University Economics Chair Robert Whaples surveyed a random selection of American Economic Association Ph.D. economists. Whaples asked the economists what the impact of projected global warming will be on U.S. Gross Domestic Product by the end of the 21st century. Fully 59 percent projected that even 100 years from now global warming will have a neutral or positive impact on the U.S. economy

2004 Mendelsohn Study

In 2004, Yale University economics professor Robert Mendelsohn (="http://www.copenhagenconsensus.com/Admin/Public/DWSDownload.aspx?File=Files%2FFiler%2FCC%2FPapers%2FOpponent+notes%2FOpponent_Note_-_Climate_Change_-_Mendelsohn.pdf"MACROBUTTONHtmlResAnchor

http://www.copenhagenconsensus.com/Admin/Public/DWSDownload.aspx?File=Files%2FFiler%2FCC%2FPapers%2FOpponent+notes%2FOpponent_Note_-_Climate_Change_-_Mendelsohn.pdf) concluded that the benefits of global warming will outweigh the harms until temperatures surpass 2.5 degrees Celsius warmer than they are today. Scientists do not expect temperatures to surpass 2.5 degrees Celsius until at least the 22nd century.

2007 IPCC Report

In 2007, the United Nations Intergovernmental Panel on Climate Change (="http://www.ipcc.ch/WG1_SPM_17Apr07.pdf"MACROBUTTONHtmlResAnchor

http://www.ipcc.ch/WG1_SPM_17Apr07.pdf) analyzed agricultural output in a warming world and reached the same conclusion as Mendelsohn; agricultural production in places such as the American Midwest should experience a net benefit from projected global warming for at least the next several decades. Efforts to reduce greenhouse gas emissions will not only cost American farmers substantial money in out-of-pocket mitigation costs, but they will also cost American farmers substantial money in reduced agricultural output.

2004 Copenhagen Consensus

In 2004, the Danish government convened many of the world's leading economists and presented them with the following scenario: Assuming a budget of tens of billions of dollar to address global health and environment concerns, where would the money best be spent? From a list of more than a dozen health and environmental issues, the world's leading economists ranked addressing global warming as dead last in terms of benefits accrued per dollar spent, even assuming IPCC global warming scenarios. Significantly, the economists concluded that spending such money on preventing global warming actually did more harm than good, as the minimal human welfare benefits accrued by such expenditures failed to equal the human welfare benefits that are would accrue simply by leaving the money where it currently is.

APPENDIX 2

Source: U.S. Energy Information Administration, October 2007; http://tonto.eia.doe.gov/state/index.cfm

APPENDIX 3

Source: U.S. Energy Information Administration, October 2007;
http://www.eia.doe.gov/cneaf/solar.renewables/ilands/fig12.html

APPENDIX 4

Source: U.S. Energy Information Administration, October 2007;
http://www.eia.doe.gov/cneaf/solar.renewables/ilands/fig13.html

To: **Kansas State Legislators** **06 February 2008**

From: **Bart Hall, farmer and geologist, De Soto**

Re: **Unpacking the carbon debate – a scientist guiding mostly non-scientists**

A key assumption of the forthcoming energy bill is that carbon dioxide is a pollutant.[1]

The second key assumption is that carbon dioxide in the atmosphere causes global warming.

Because human activity perforce releases carbon dioxide, the key conclusion, therefore, becomes that human activity is responsible for global warming.

If true it would be both illogical and imprudent *not* to control carbon dioxide release.

The core assumption in all discussions of climate change is this: The world is warming inexorably as a direct result of human-caused increases in atmospheric concentrations of carbon dioxide — in short, anthropogenic global warming (AGW). If this assumption is correct we've absolutely *got* to restrict CO_2 release, the sooner the better.

But what if it's not correct? The unnecessary costs, expenses and damage would be huge.

So let's look at the science … and let the politics fall where it will.

This is from one of our era's most credible climate scientists, Carleton University [Ottawa, Ontario] paleo-climatologist and Professor of Geology Tim Patterson. In 2005 he testified to the Canadian House of Commons Committee on Environment and Sustainable Development that:

> *"There is no meaningful correlation between CO_2 levels and Earth's temperature... In fact, when CO_2 levels were over ten times higher than they are now, about 450 million years ago, the planet was in the depths of the absolute coldest period in the last half billion years. On the basis of this evidence, how could anyone still believe that the recent relatively small increase in CO_2 levels would be the major cause of the past century's modest warming?"*

The most important thing to understand, especially for non-scientists, is the ***difference between association and causality***. Two things can be happening at the same time and be completely unrelated to each other. Or, perhaps, they might even each be responding to a third component.

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[1] While it's appropriate scientifically to challenge the concept of CO_2 as a "pollutant" — it is after all a very natural substance and therefore at worst a "contaminant" — that's being picky, and it's not the assumption that matters most to this discussion or to our future.

The most important conclusion of people believing that human-produced CO_2 is responsible for the modest warming we saw between about 1970 and 2000 is that the relationship between CO_2 and average global temperature is one of "causality," that is, that rising CO_2 levels in the atmosphere (indisputable) are the *cause* of rising temperature.

They arrive at this conclusion on the basis that CO_2 will absorb some of Earth's heat, trapping it relatively near the surface, which will therefore lead to gradual warming of the planet. This is partially true, but only very partially.

This is because no molecule (or atom) absorbs energy at all wavelengths. That simple fact is the basis of many analytical techniques used for at least two generations. Each molecule absorbs energy most heavily in its own specific area of the electromagnetic spectrum. For carbon dioxide, peak absorption is between 13.5 and 15.5 micrometres [Yates and Taylor, '*Infrared transmission of the atmosphere*' 1960, US Naval Research Laboratory], in what is called the mid-infrared spectrum (3 to 50 micrometres). A micrometre is one-millionth of a metre.

Earth radiates as what physicists call a black-body, with an average temperature of 300 Kelvin — 80 Fahrenheit (or 27 Celsius). Black bodies at 300 K have a peak radiative wavelength of 10 micrometres, and in the case of Earth, just over 8% of our total radiation is in the 13.5 to 15.5 micrometre wavelength at which carbon dioxide absorbs most of its energy.

In other words, ***over 90% of Earth's warming or cooling is entirely unaffected by carbon dioxide***. It's just not in the game. This is where the AGW (anthropogenic global warming) proponents have it almost totally wrong.

Furthermore, spectral analysis demonstrates that CO_2 absorption between 13.5 and 15.5 micrometres is "saturated." That means it's absorbing as much energy as it can, and if you examine the absorptivity of carbon dioxide (Beer's Law), atmospheric concentrations of carbon dioxide would have to drop below 200 ppm for any change in concentrations (up or down) to affect absorptivity at relevant wavelengths.

Let's look at that again, because it's tremendously important to discussions of the Energy Bill here in Kansas.

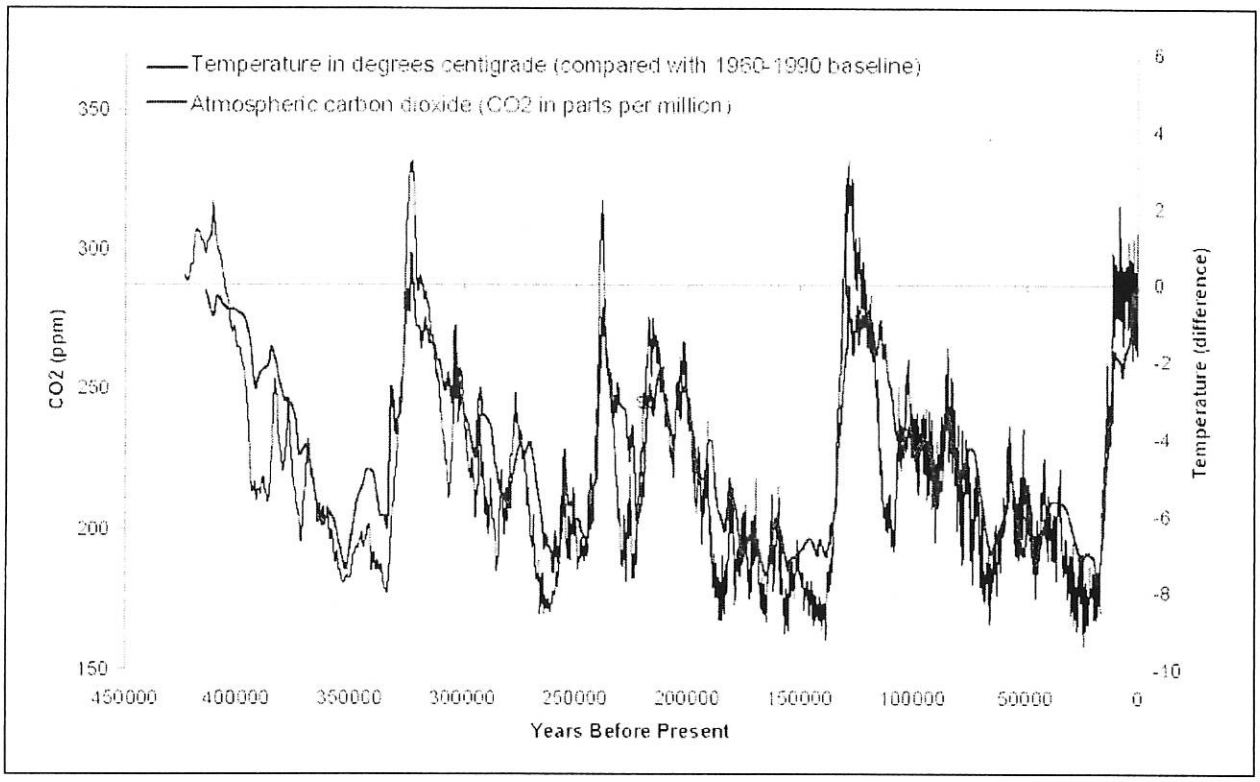
Carbon dioxide can be responsible for no more than 8% of Earth's warming or cooling, and once the atmospheric concentration is above 200 ppm (parts per million) — it's now over 350 ppm — any increases in CO_2 concentration will have no effect on the amount of energy absorbed. At present carbon dioxide is just not a factor in warming. Not now, not 450 million years ago. That is physics, not politics.

Looking at it all a bit differently, let's assume that there actually *is* a causal relationship between the concentration of CO_2 in the atmosphere and average global temperature. We still need to decide which of the two factors (CO_2 and global temperature) is the *independent* variable (that is, the driver) and which of them is the ***dependent*** variable (the driven).

The ice cores first used (1985 to about 1998) to conclude that the concentration of CO_2 in the atmosphere was the driver of rising global relied on data points well in excess of a thousand years apart. The entire AGW discussion is to this day being driven by those early data.

In the first years of this century, however, a series of much more detailed studies (at Vostok, Antarctica) developed data points an order of magnitude (ten times) closer together (having, therefore, much better resolution) and those studies have arrived at the opposite conclusion from those of two decades ago.

Current data show that **changes in average global temperature *precede* changes in the concentration of atmospheric CO_2 by about 800 years**. If there is a causal relationship between the two factors, it is temperature that drives carbon dioxide levels and not the other way around. If, as the data show, atmospheric CO_2 levels are dependent on temperature (not the other way around), then attempting to regulate CO_2 levels is an expensive exercise in futility.



There are in circulation some two dozen different theoretical global warming models based on the assumption that atmospheric CO_2 drives subsequent warming. The standard models clearly predict greatest warming will be in the tropics about 10 kilometres up in the atmosphere. A series of satellite and weather balloon studies from 2005 to 2007 have demonstrated conclusively that no such warming has (or is) taking place. In fact, that portion of the atmosphere the models predict should be the warmest are actually the coolest.

The test of any theory is its ability to predict. The above-mentioned Hadley Centre radiosonde studies in 2006 and 2007 demonstrate the complete inability of the standard AGW model to predict anything. In fact, the data show the correlation to be negative. That is, it's more accurate to assume the exact *opposite* of the theory.

So, where does this all leave us, and what kind of sense can we make out of it?

- We know that CO_2 can absorb only a small fraction of Earth's radiant energy.
- We know from physics that above 200 ppm atmospheric CO_2 has reached saturation of its ability to absorb additional radiant energy. Above 200 ppm the effect on energy absorption of changing CO_2 levels — and therefore the possible effect on average global temperature — will be nearly zero.
- We know from recent high-resolution ice core studies that atmospheric CO_2 *lags* changes in average global temperature by roughly 800 years, and therefore cannot possibly be responsible for those changes. A subsequent event can never cause a previous event.
- We also know, unsurprisingly in view of the above three points, that predictive models based on the assumptions of AGW fail completely to describe the now-known distribution of atmospheric warming. They are wrong not just by degree, but predict the exact opposite of what the data demonstrate.
- Climate is naturally and constantly changing, from cooler to warmer and back to cooler again – at multiple levels and time scales even within the much larger cooling trend of the last 50 million years.
- AGW proponents believe, as an article of faith, that current rates of warming and climate change are unprecedented. As the graph shows clearly, they are not.
- Earth has been in a long-term cooling trend for the last 50 to 60 million years. Forty-five million years ago areas only 500 miles from the North Pole had climate similar to Memphis, Tennessee today.
- Over the really long term temperature and atmospheric carbon dioxide do not co-vary. During one of Earth's coldest periods (450 million years ago) carbon dioxide was at least ten times more concentrated in the atmosphere than it is today.
- Within the period for which we have data, fluctuations in solar energy and Earth's temperature *do* co-vary. This might explain why we are now documenting global warming on Mars.
- Carbon dioxide accounts for much less than 1% of greenhouse gasses, hardly sufficient to drive something as massive as the energy system of Earth's climate. Water vapor, in contrast, is a very big deal, and evaporation from the oceans is driven by solar energy.

Carbon dioxide is simply not the issue, and regulating its release would be counter-productive, especially since the US Department of Energy reports that nationwide CO_2 production actually *declined* by 1.5% in 2006.

TESTIMONY

OF

DAVID A. SCHLISSEL

BEFORE THE

KANSAS HOUSE OF REPRESENTATIVES

COMMITTEE ON ENERGY AND UTILITIES

FEBRUARY 6, 2008

Mr. Chairman and Members of the Committee, thank you for affording me an opportunity to submit this testimony. I would have preferred to present this testimony in person but I have previous work commitments that require me to be present at state regulatory commission hearings in Virginia.

Mr. name is David A. Schlissel. I am submitting this testimony on behalf of the Climate and Energy Project of the Land Institute in Salina, Kansas, for whom we conducted a study in January.

I am a Senior Consultant with Synapse Energy Economics, Inc. I have more than 34 years of experience as an attorney and consultant on energy and environmental issues including the need for and cost of proposed coal-fired power plants. My clients have included the U.S. Department of Justice, state regulatory commissions in Arizona, Arkansas, New Mexico and here in Kansas, municipally-owned utilities and power agencies in North Carolina, Texas, New York and Massachusetts, as well as state attorneys general, consumer advocates and environmental and consumer organizations in more than thirty states.

I hold engineering degrees from the Massachusetts Institute of Technology and Stanford University. I also have received a Juris Doctor degree from Stanford Law School. In addition, I have studied nuclear engineering and project management at the Massachusetts Institute of Technology.

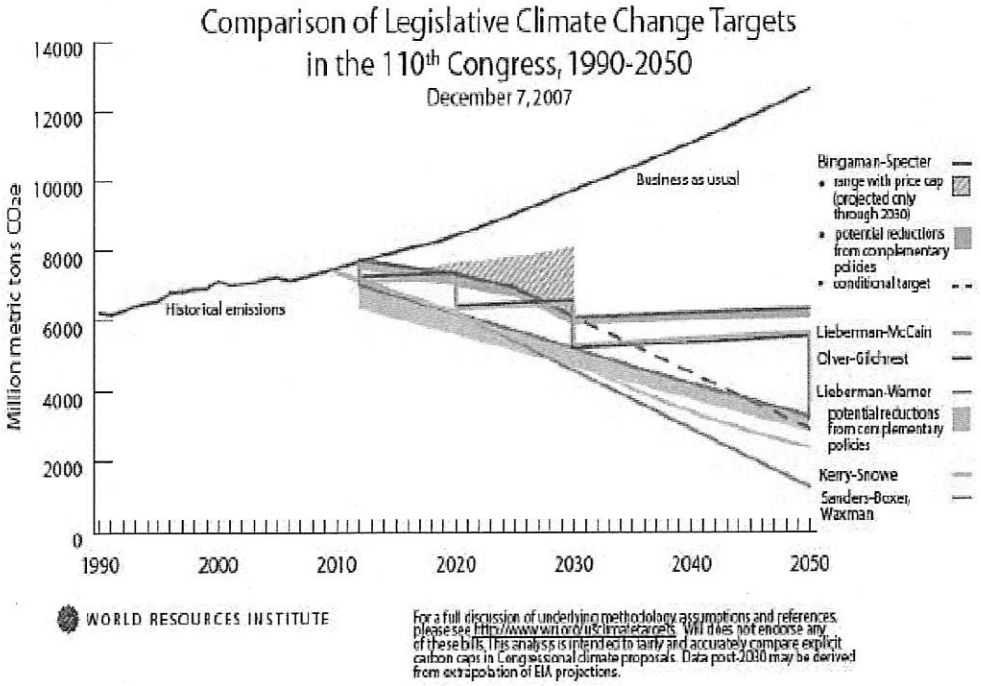
My purpose today is to alert you to the risk involved in building new coal-fired power plants. I understand that you have been told that new coal plants are still the cheapest

resource. That may have once been accurate but it is no longer true. Impending federal regulation of greenhouse gas emissions, and its resulting costs, and soaring power plant construction costs suggest that coal is no longer the cheapest option. Instead, coal is a high risk alternative.

Federal regulation of greenhouse gases is no longer a matter of if -- it is a matter of when. More than 35 bills on global climate change have been introduced in the current Congress by members of both political parties.

Figure 1 below, shows the emissions trajectories that would be mandated under the major bills that have been introduced in the current Congress. These bills would generally require a reduction in overall CO_2 emissions of between 60 percent to 80 percent from current levels by the middle of this century. With such requirements on the horizon, building two 700 MW coal-fired power plants that will emit more than 10 million tons every year during an expected 40 to 60 year operating lifetime is a risky step.

Figure 1: Legislative Proposals Introduced in Current U.S. Congress



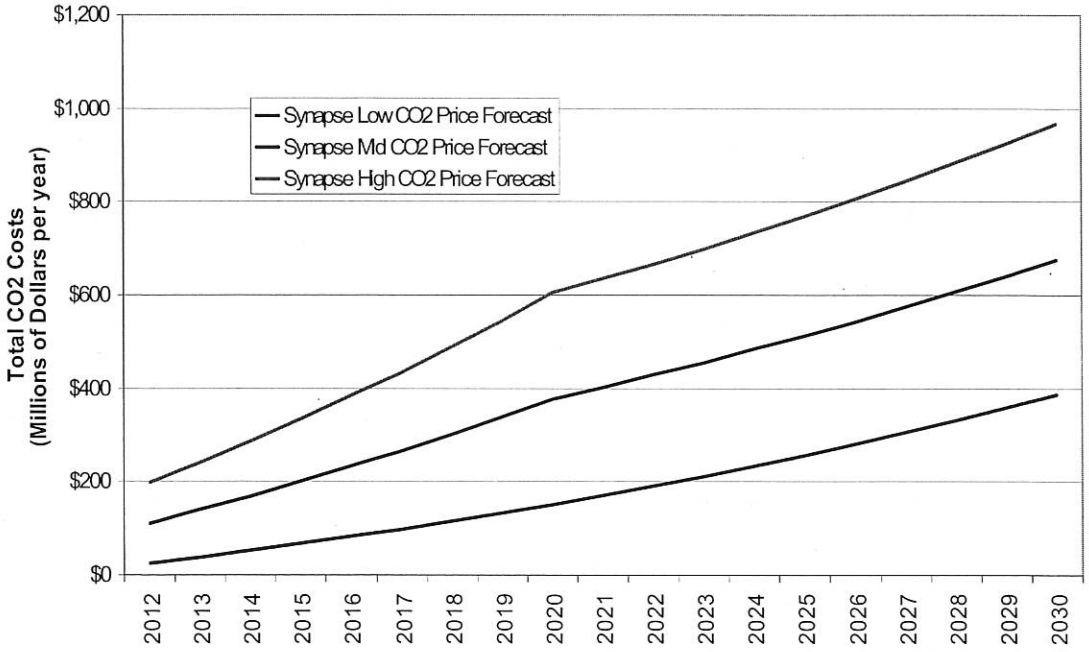
Although the form and details of the coming federal regulation of greenhouse gas emissions are uncertain, most expect that a cap-and-trade program will be established

17-2

under which caps will be set and generators, like Sunflower and Tri-State will have to purchase CO_2 emissions allowances.

There have been a number of analyses prepared during the past year or more of what the costs of these emissions allowances will be under the various proposals currently being considered by Congress. Synapse has developed a range of CO_2 emissions allowance price forecasts that we believe should be used by utilities in their resource planning and evaluation of the economics of proposed generating resources.

Figure 2: Likely Range of Costs of CO2 Emissions Allowances for the Holcomb Expansion



Two important points must be emphasized. First, our Synapse forecasts of future CO_2 emissions allowance prices are not extreme. Second, under our CO_2 price forecasts, the owners of the Holcomb Expansion coal plants will be paying between $67 million and $334 million a year for CO_2 emissions allowances by 2015, between $151 million to $600 million a year by 2020 and $387 million to $966 million a year by 2030. These are considerable costs even at the low end of our range. Coal is the most carbon intensive fuel. Lower and non-carbon emitting fuels will not have to pay such high costs for CO_2 emissions allowances.

17-3

One hoped-for solution for global climate change is the capture and sequestration of CO2 emissions from power plants. However, such capture and sequestration is not expected to be commercially viable until perhaps as late as 2020 to 2030, and it will be very expensive. As shown in Table 1 below, studies by the Edison Electric Institute (which represents utility companies) and researchers at the Massachusetts Institute of Technology and the U.S. Department of Energy's National Energy Technology Laboratory have estimated that adding CO_2 capture equipment will increase the cost of generating power at new coal-fired power plants by somewhere between 61 and 81 percent.

Table 1: Projected Increase in the Cost of Generating Power Due to Carbon Capture and Sequestration

Source	Projected Increase in Cost of Electricity from Addition of CCS
Duke Energy Indiana[1]	68%
MIT Future of Coal Report[2]	61%
Edison Electric Institute[3]	75%
National Energy Technology Laboratory[4]	81%

The increased amount of water that would be required as part of the capturing of CO_2 emissions is another concern. Studies at the National Energy Technology Laboratory have estimated that a coal-fired power plant with CO_2 capture will use 2.2 times the amount of water as a plant without CO_2 capture. Where will this water come from in Western Kansas and, if available, will it have to diverted from other important uses such as agriculture.

At the same time that future federal regulation of CO_2 emissions is coming, the prices of building new coal-fired have skyrocketed, in most part due to an intense worldwide competition for power plant design and construction resources and commodities. This

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1 Testimony of James E. Rogers in Indiana Utility Regulatory Commission Cause No. 43114, Joint Petitioners' Exhibit No. 1, at page 13, lines 6-11.

2 *The Future of Coal, Options for a Carbon-Constrained World*, Massachusetts Institute of Technology, 2007, at page 19.

3 Letter to Hon. Edward J. Markey, Chairman, Select Committee on Energy Independence and Global Warming, from Thomas R. Kuhn, Edison Electric Institute, September 21, 2007, at page 4.

4 *Cost and Performance Baseline for Fossil Energy Plants, Revised August 2007,* DOE/NETL – 2007/1281, at page 17.

17-4

competition is fueled both by increasing demands for power plants here in the United States as well as in China and India. It is not expected to subside at any time in the near future.

For example, in mid 2006 Duke Energy Carolinas estimated that it could build two 800 MW coal plants for about $2 billion without financing costs. The Company now estimates that it will cost just about this much to build a single 800 MW power plant. And the Duke experience is typical of what other companies have been experiencing. The proponents of one plant, AMP-Ohio, have called the cost increases being experienced by proposed power plants, "staggering."

Similarly, Westar Energy announced in December 2006 that it was deferring site selection for a new 600 MW coal-fired power plant due to significant increases in the facility's estimated capital cost of 20 to 40 percent, over just 18 months. This prompted Westar's Chief Executive to warn: "When equipment and construction cost estimates grow by $200 million to $400 million in 18 months, it's necessary to proceed with caution." As a result, Westar Energy suspended site selection for the coal-plant and considered other options, including building a natural gas plant, to meet growing electricity demand. The company also explained that:

> most major engineering firms and equipment manufacturers of coal-fueled power plant equipment are at full production capacity and yet are not indicating any plans to significantly increase their production capability. As a result, fewer manufacturers and suppliers are bidding on new projects and equipment prices have escalated and become unpredictable.[5]

The combination of uncertainty about future CO_2 prices and escalating construction costs has led to the cancellation of more than proposed 20 coal plants, just since December 2006. Another three dozen plants have been delayed. At the same time, a growing number of companies have indicated that they will not seek to build new coal plants due to the regulatory and cost uncertainty and the risks that building such plants would pose for their customers. And state regulatory commissions in Oregon, Florida, North Carolina

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[5] Id.

and Oklahoma have rejected applications for licenses to build new coal-fired power plants. Kansas is not alone.

Public Service of Colorado has recently concluded that:

> In sum, in light of the now likely regulation of CO_2 emissions in the future due to a broader interest in climate change issues, the increased costs of constructing new coal facilities, and the increased risk of timely permitting to meet planned in-service dates, Public Service does not believe it would be prudent to consider at this time any proposals for new coal plants that do not include CO_2 capture and sequestration.

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

Testimony on Senate Bill 515 / House Bill 2711
February 7, 2008

Steve Clemmer, Research Director
Union of Concerned Scientists

Mr. Chairman and Members of the Committee:

Thank you for the opportunity to submit written testimony on behalf of the Union of Concerned Scientists (UCS). UCS is the leading science-based nonprofit working for a healthy environment and a safer world. With over 75,000 members, UCS combines independent scientific research and citizen action to develop innovative, practical solutions and secure responsible changes in government policy, corporate practices, and consumer choices. I am the Research Director of the UCS Clean Energy Program and manager of our Midwest renewable energy project. Prior to joining UCS, I was the Energy Policy Coordinator for the Wisconsin energy office from 1991-1997. I received my M.S. in Energy Analysis and Policy from the University of Wisconsin-Madison.

I am testifying in opposition to Senate Bill 515/House Bill 2711. The scientific consensus that global warming is already here as well as recent actions by Wall Street, the private sector, and various levels of government are creating momentum for regulating global warming emissions at the federal level in the next few years. This will put a price on carbon dioxide emissions, which will significantly increase the cost of producing electricity from new coal plants and make cleaner alternatives such as energy efficiency, wind power, and other renewable energy sources more cost-effective. It is in the best interest of the state of Kansas to reject these bills.

The Intergovernmental Panel on Climate Change (IPCC, www.ipcc.ch) released its most recent findings in 2007, representing the consensus of over 2500 scientific experts from more than 130 countries. The report concluded that it is "unequivocal" that Earth's climate is warming, "as now evident from observations of increases in global average air and ocean temperature, widespread melting of snow and ice, and rising global mean sea level." The report also finds that it is "very likely" (a likelihood of over 90%) that emissions of heat-trapping gases from human activities have caused "most of the observed increase in globally averaged temperatures since the mid-20th century." But even if in spite of all of this evidence if one were to agree with one of the few remaining skeptics on the science of global warming, one can no longer doubt that a national and global consensus has emerged that action must be taken now to reduce the likelihood and potential consequences of worst-case global warming scenarios.

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Just this past Monday, February 4, 2007, three of Wall Street's biggest investment banks – Citigroup Inc., J.P. Morgan Chase & Co. and Morgan Stanley – concluded that the U.S. government will enact so-called "cap and trade" legislation to reduce global warming emissions from power plants and other sources sometime in the next few years. As a result, the three banks committed to a set of Carbon Principles that included factoring in future U.S. regulations when evaluating new power plants that are seeking funding as well as evaluating energy efficiency and renewable energy options as alternatives. This move builds on other recent actions by Wall Street. For example, in July of 2007, Citigroup announced[1] that they were downgrading all coal stocks across the board for reasons including the expectation that political pressure to address global warming would intensify and that carbon constraints were almost certain.

The United States has agreed in principle to work with more than 180 other nations under the United Nations Framework Convention on Climate Change to bring about the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-caused] interference with the climate system. Though the federal government has done little to live up to that agreement thus far, there is now growing momentum to pursue deep reductions in emissions of carbon dioxide (CO_2) and other heat-trapping gases that cause global warming.

Already in the U.S. we have seen the advancement of policies at the local, state, and regional level to mitigate and reduce greenhouse gas emissions in light of the threat posed by global warming. To date, 780 mayors have signed on to the U.S. Mayors Climate Protection Agreement launched by Seattle Mayor Greg Nickels in 2005. The mayors are working to meet the targets of the Kyoto Protocol in their own communities and to push for bipartisan legislation from the U.S. Congress to reduce greenhouse gas emissions nationally. At the state level, California, Florida, Hawaii, Minnesota, New Jersey, Oregon, and Washington have all enacted laws or established policies setting global warming pollution reduction targets.

In April 2003, New York Governor George Pataki sent letters to the 11 governors from Maine to Maryland, inviting their states' participation in discussions to develop a regional cap-and-trade program covering carbon dioxide emissions from power plants. The Regional Greenhouse Gas Initiative (RGGI, www.rggi.org), as it is now known, has become a cooperative effort of 10 Northeast and Mid-Atlantic states establishing a cap to stabilize power plant CO_2 emissions in 2009 and then cut them by 10 percent by 2019. The RGGI model rule was adopted in August 2006 to implement the agreement. All of the RGGI states that have released draft regulations so far have committed to nearly 100 percent auctioning of allowances. Auctioning encourages polluters to actively reduce their emissions by requiring them to pay for allowances rather than being able to obtain them for free.

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[1] News story available online at: http://www.streetinsider.com/Downgrades/Citigroup+Downgrades+Coal+Stocks+-+BTU,+ACI+and+FCL/2687454.html and a copy of the report is available online at: http://switchboard.nrdc.org/blogs/ngreene/media/Citibank 071807.pdf

In February 2007, following in the footsteps of RGGI, the Governors of Arizona, California, New Mexico, Oregon, and Washington, came together in a collaboration now called the Western Climate Initiative (WCI, www.westernclimateinitiative.org) to develop regional strategies to address global warming. They established a goal of reducing greenhouse emissions in the West to 15 percent below 2005 levels by 2020. Since its inception, the regional pact has grown to include Utah, Montana, and Canadian provinces of British Columbia and Manitoba.

In November 2007, the Governors of 10 Midwest states, including Governor Sebelius, and the Premier of Manitoba signed an historic agreement[2] to reduce global warming emissions at the Midwestern Governors Association (MGA) Energy Summit in Milwaukee. In the so-called "Midwestern Greenhouse Gas Reduction Accord" the Governors agreed to establish greenhouse gas reduction targets and time frames consistent with the MGA member states, many of which already have strong targets in place. The Accord will also develop a market-based and multi-sector cap-and-trade mechanism to help achieve those reduction targets. As a part of the Summit, the Midwestern Governors, including Kansas, also adopted an Energy Security and Climate Stewardship Platform that includes strong goals to increase renewable electricity use to 30 percent by 2030 and to reduce electricity and natural gas use by two percent per year by 2015 through energy efficiency.

The momentum and progress is no different at the international level. This year at the UN climate summit and negotiations in Bali, Indonesia, even developing nations began stepping up their commitments to addressing global warming and delegates from all over the world called on the U.S. to play a stronger leadership role.

Over the years, most of the power industry has been strongly opposed to federal CO_2 limits from power plants, but that attitude has been changing rapidly. As highlighted in our September 2007 report, Gambling with Coal[3] (see attached), many prominent power companies now openly support the federal regulation of CO_2 from coal plants. The chief executive of Duke Energy, one of the nation's largest coal-burning utilities, has said of global climate change, "From a personal perspective I can think of no more pressing global issue." He went on to say:

> *"From a business perspective, the need for mandatory federal policy in the United States to manage greenhouse gases is both urgent and real. In my view, voluntary actions will not get us where we need to be. Until business leaders know what the rules will be—which actions will be penalized and which will be rewarded—we will be unable to take the significant actions the issue requires."*[4]

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[2] http://www.midwesterngovernors.org/govenergynov.htm

[3] Available online at: http://www.ucsusa.org/clean_energy/fossil_fuels/jump.jsp?itemID=30513972

[4] Paul Anderson, "Being (and Staying in Business): Sustainability from a Corporate Leadership Perspective," speech to CERES Annual Conference, April 6, 2006. Online at *http://www.duke-energy.com/news/mediainfo/viewpoint/PAnderson_CERES.pdf*).

Duke's website states, "Congress needs to establish a national, economy-wide greenhouse gas mandatory program as soon as possible."[5]

The head of Exelon has stated, "We accept that the science on global warming is overwhelming. There should be mandatory carbon constraints."[6] And the head of PNM Resources said at Senate hearings, "We believe now is the time for a healthy debate at the federal level on climate change, and we support the move to a mandatory program."[7]

To date, five of the nation's 10 largest private power producers (Calpine, Duke, Entergy, Exelon, and Florida Power & Light), accounting for more than 15 percent of U.S. electricity generation, now support mandatory limits on CO_2 from power plants. Another (Progress) acknowledged in a 2006 special report to shareholders that the evidence for climate change is sufficient to warrant "action" by the "public sector," which the company believes should cover all sectors of the economy.[8] Executives from three of the remaining companies in the top 10 (American Electric Power, Southern Company, and Xcel), accounting for another 12 percent of U.S. power generation, have acknowledged that federal limits on CO_2 are coming, even if they do not support them.[9]

The industry leaders quoted above echo the rising call for CO_2 limits by companies in other industries, including some of the nation's largest corporations and largest energy consumers. Wal-Mart calls climate change "an urgent threat not only to our business but also to our customers, communities, and the life support systems that sustain our world." Both Wal-Mart and GE expressed support for CO_2 limits in April 2006 Senate hearings, and Ford Motor Company and Hewlett-Packard joined 22 other multinational corporations in a 2005 statement urging leaders of the G8 nations to adopt cap-and-trade or other market-based mechanisms to limit global warming emissions.

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[5] "Climate Change: Duke Energy Position on U.S. Climate Change Policy." Online at *http://www.duke-energy.com/environment/policies/climate_change*.

[6] John W. Rowe, August 16, 2004, quoted in *Business Week*. Online at *http://www.businessweek.com/print/magazine/content/04_33/b3896001_mz001.htm?gl*.

[7] Jeff Sterba, April 4, 2006, quoted in the *Albuquerque Tribune*. Online at *http://www.abqtrib.com/albq/nw_national_government/article/0,2564,ALBQ_19861_4594645,00.html*.

[8] Progress's vague statement on the need for action on global warming has been interpreted by the trade press as a call for carbon regulation. See "Progress Energy calls for U.S. carbon regulation," March 31, 2006, *Carbon Finance Online* (online at *www.carbonfinanceonline.com*; subscription required); also see "2006: Progress Energy's Report to Shareholders: An Assessment of Global Climate Change and Air Quality Risks and Actions" (online at http://www.progress-energy.com/environment/climatechange.asp).

[9] See Dale E. Heydlauff (American Electric Power), quoted in "Global Warming," August 16, 2004, *Business Week* (online at *http://www.businessweek.com/print/magazine/content/04_33/b3896001_mz001.htm?gl*); David Ratcliffe (Southern Company), quoted in "U.S. Utilities Urge Congress to Establish CO_2 Limits," Bloomberg.com (online at *http://www.bloomberg.com/apps/news?pid=10000103&sid=a75A1ADJv8cs&refer=us*); and Wayne Brunetti (Xcel), quoted in "Xcel Energy expects U.S. carbon regulations," September 9, 2004, PointCarbon (online at http://www.pointcarbon.com/article.php?articleID=4459&categoryID=147).

When a significant share of industry speaks out in favor of environmental regulations, including several major companies in the industry sector likely to be most heavily regulated, it is a strong sign that such regulations are near at hand. It is quite possible that limits will be in place and operational before the same could be said for a proposed coal plant currently in the regulatory approval process.

With pressure mounting from all sides, the federal government will need to act soon, and has already moved forward in the process. In 2005, the Senate passed a non-binding resolution showing for the first time that a majority of Senators recognized the need for a mandatory cap on global warming emissions. Today, legislation setting declining caps on U.S. global warming emissions has been reported out of the Senate Environment and Public Works Committee, and 176 Representatives have cosponsored such legislation in the House. Dozens of other bills to reduce global warming emissions have also been introduced in Congress by both parties.

We estimate that coming federal regulation of global warming emissions could increase the costs of new coal plants by 30-50 percent, as coal is the most carbon intensive fuel. As described in more detail in David Schlissel's testimony, under a likely range of future CO_2 prices, the Sunflower plant could be paying an additional $387 million to $966 million a year by 2030. When combined with the significant increase in construction costs of approximately 30-80 percent over the past few years, investing in new coal plants is a risky financial gamble.

Last year the Kansas Department of Health and the Environment rejected the Sunflower coal plant, the first state to reject a new coal plant because of its public health and environmental impacts of global warming pollution. As other states are considering proposed coal power plants, this decision sets an important precedent. This step put Kansas in a leadership role among the other states that have begun to take concrete actions to address global warming.

House Bill 2711 and Senate Bill 515 would undo Kansas' major contribution to solving global warming to date and allow the massive Sunflower coal plant to proceed, without any requirement to control its carbon emissions. By stripping the Secretary of the Kansas Department of Health and the Environment of his power to require coal plants to meet more stringent standards than the federal government and requiring the state to issue a permit even if the Secretary determines that a proposed project threatens the health and environment of Kansans, these bills would open the door to other coal plant developers who have had their plants rejected in other states.

In contrast, Kansas has enormous untapped potential to meet its electricity needs with energy efficiency and clean, renewable energy sources such as wind, solar, and bioenergy. Data from the U.S. Department of Energy shows that Kansas has the technical potential to produce more than all of its current electricity needs with renewable energy. Investing in renewable energy instead of new coal plants would provide a hedge against future carbon regulation and rising energy prices, save Kansas consumers money, grow the economy, create jobs, and leave a healthier environment for future generations. Kansas could realize these benefits by joining the 25 other states that have adopted renewable electricity standards.

Do not let Kansas take a step backwards.
For these reasons, we urge you to reject House Bill 2711 and Senate Bill 515.

Steve Clemmer

Steve Clemmer
Research Director
Union of Concerned Scientists

Union of Concerned Scientists

Gambling with Coal

How Future Climate Laws Will Make New Coal Power Plants More Expensive

by Barbara Freese and Steve Clemmer
Union of Concerned Scientists[1]
September 2006

Abstract

New conventional coal plants are an imprudent financial investment. The world scientific community warns that carbon dioxide (CO_2) emissions from our use of fossil fuels, especially coal, is leading to dangerous global warming. Policies to reduce CO_2 emissions are emerging at every level of government, including in the US Congress, which is actively considering several mandatory, market-based CO_2 proposals with increasing support from the private sector. Laws requiring coal plants to pay to emit CO_2 will be adopted in the next few years, substantially raising the costs of coal power.

Nevertheless, many utilities have proposed investing in new conventional coal plants that will operate for decades, ignoring the economic impact of these virtually inevitable CO_2 reduction laws, perhaps because they believe they will be able to pass these costs on to ratepayers. Utility managers and shareholders should reconsider the financial risks to their companies and customers. Regulators should prevent utilities from making these major investment mistakes by refusing to approve the construction of new conventional coal plants and by requiring them to invest in cleaner alternatives, or at the very least, by warning utilities that CO_2 costs must be borne by their shareholders, not by ratepayers.

Executive summary

It is now virtually inevitable that America will adopt a federal law limiting global warming pollution from power plants. Indeed, given the momentum of emerging policy responses to global warming on the local, state, and regional levels in the United States (as well as internationally), federal legislation will probably be adopted within the next five years. This document discusses why such a law is so likely, what kind of new costs coal plants will face as a result, and how these future costs make building new, conventional coal plants a reckless financial gamble.

[1] We would like to thank the Garfield Foundation for providing funding for this work.

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The need for legal limits to America's global warming pollution is undeniable. Scientists have long known that the burning of fossil fuels releases heat-trapping carbon dioxide (CO_2) into the air, where it is building up. Scientific concern that this buildup could disrupt our climate has been growing steadily since the late 1980s. Every year, the science has become even more compelling: Earth continues to experience record-breaking warmth, humans' dominant role in this warming becomes clearer, and we see the planet reacting to the warming in troubling ways.

Most developed nations have responded to this evidence by ratifying the Kyoto Protocol, which requires them to reduce their CO_2 emissions. The United States has not ratified Kyoto, but as the world's largest emitter of heat-trapping gases by far, it is under increasing international pressure to act. Along with almost every other nation in the world, the United States did ratify the 1992 Framework Convention on Climate Change, a treaty with the objective of preventing dangerous global warming. And in 2005 the U.S. Senate passed a landmark resolution stating that mandatory federal CO_2 limits should be enacted. Several proposals establishing CO_2 limits are being considered by Congress, and a series of hearings have been held in the Senate to discuss the design of such limits.

The congressional response is being spurred in part by a growing policy response on the state and regional level, including the regional CO_2 limits and trading system being established by eight northeastern states. Within the last year or two, a substantial number of major companies—including half of America's 10 largest power companies—have called for such regulation, and most utility executives believe that such regulation is coming.

There is no doubt that the burden of future CO_2 regulations will fall heavily on coal plants. Power plants are the largest source of U.S. CO_2 emissions, accounting for 39 percent of the nation's energy-related emissions, and most of these emissions come from coal plants. In fact, coal plants produce one-third of America's CO_2 emissions—about the same amount as all our cars, SUVs, trucks, buses, planes, ships, and trains combined.[2]

Each new coal plant represents an enormous long-term increase in global warming emissions. A 500-megawatt (MW) plant, for example, produces the annual global warming emission equivalent of roughly 600,000 cars,[3] but unlike a car, a coal plant is designed to operate for 40 to 50 years (and they often operate even longer). Global warming cannot be effectively addressed without limiting coal plant emissions, so the congressional proposals under consideration all target coal plants.

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[2] U.S. Environmental Protection Agency (EPA), "Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2004," April 2006. Online at *http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsGHGEmissionsUSEmissionsInventory2006.html*. Also see U.S. Energy Information Administration (EIA), *Emissions of Greenhouse Gases in the United States 2004*, December 2005, 20–22. Online at *ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057304.pdf*.

[3] Based on average annual emissions of 13,500 lbs/vehicle as estimated by the EPA (*http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterToolsGHGCalculator.html*) and annual emissions of 4.1 million tons from a 500 MW plant as estimated by the Public Service Commission of Wisconsin (*http://psc.wi.gov/utilityinfo/electric/cases/weston/document/Volume1/W4_FEIS.pdf*).

18-8

It is widely expected that future CO_2 regulations will take the form of a "cap-and-trade" system, similar to the national law for controlling the sulfur dioxide (SO_2) emissions that cause acid rain. Such a system would establish a national cap on CO_2 emissions, and power plant operators would have to own an "allowance" for each ton of CO_2 they emit. Operators could buy and sell these allowances for a price established by market forces. Economists believe such a cap-and-trade system would provide the flexibility and incentives to meet a given CO_2 cap at the lowest cost.

Utilities are increasingly quantifying the risk they face from future CO_2 allowance costs in their planning documents. In some cases, they do so because state regulators demand it, and in other cases they do it at their own initiative. Studies forecasting the price of future CO_2 allowances range widely, but useful estimates are emerging from the literature. These estimates indicate that coal plants face CO_2 costs that will increase the cost of coal power substantially and perhaps severely. Mid-range projections of CO_2 allowance prices could increase the cost of electricity from the average new coal plant by roughly half.[4] Because coal plants are designed to last for decades, these added financial costs—along with the environmental costs created by coal plants—will be borne by both the present and future generations.

These allowance price forecasts generally assume the adoption of federal policies that aim for modest CO_2 emission reductions at best. However, the science now indicates that if we hope to avoid dangerous global warming, developed nations will need to reduce their CO_2 emissions dramatically—as much as 60 to 80 percent or more—by 2050.[5]

This evidence has prompted governments including California, New Mexico, the New England states, the eastern Canadian provinces, the United Kingdom, and the European Union to adopt long-term CO_2 emission reduction targets in the 60 to 80 percent range. It is therefore reasonable to expect that even if the emission cap initially enacted establishes only modest, short-term targets, it will be followed with increasingly strict national caps in the decades ahead—that is, throughout the operating lifetime of coal plants proposed today.

Meanwhile, climate policies are likely to accelerate the development of energy resources that significantly reduce heat-trapping emissions (reducing the cost of these resources relative to coal) and the development of energy efficiency technologies (reducing electricity demand below currently projected levels). In all likelihood, these changes will improve the economics of coal alternatives just as ever-tightening emission caps are worsening the economics of coal plants.

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[4] For CO_2 price projections see Synapse Energy Economics, "Climate Change and Power: Carbon Dioxide Emissions Costs and Electricity Resource Planning," May 18, 2006. Online at *http://www.synapse-energy.com*.

[5] European Environment Agency, "Climate Change and a European Low-Carbon Energy System," Copenhagen, 2005. Online at *http://reports.eea.eu.int/eea_report_2005_1/en/Climate_change-FINAL-web.pdf*.

Given these highly foreseeable trends, why are so many utilities still proposing to lock themselves into capital-intensive coal plants rather than investing in options that do not expose them to such financial risk? These utilities may be betting on their ability to pass the risk on to ratepayers in the form of higher electric rates—the same way they routinely pass through environmental compliance costs today. Utilities holding this belief have little incentive to assess and avoid the risks of future CO_2 regulation. That places on state utilities regulators an enhanced responsibility to assess for themselves the risks associated with gambling huge amounts of money on a large, multi-decade source of CO_2 emissions just as the nation is about to launch a large, multi-decade effort to reduce CO_2 emissions that will surely target coal power.

Utilities may also be ignoring these political developments under the reckless assumption that any plant built before a federal CO_2 cap is adopted will be allocated allowances for free. This gamble ignores the growing opposition to granting such a windfall to utilities (particularly those that could avoid new allowance costs by simply investing in alternatives to coal). The Northeast Regional Greenhouse Gas Initiative (RGGI) model rule, for example, requires that at least 25 percent of allowances be auctioned rather than allocated,[6] and Vermont, the first Northeast state to pass enabling legislation, requires *all* allowances to be auctioned.[7] In fact, 28 different stakeholders in the RGGI model rule draft—including businesses, consumer groups, environmental organizations, state agencies, and an electricity distribution company—supported auctioning 50 to 100 percent of allowances.[8]

At the federal level, Senators Pete Domenici (R-NM) and Jeff Bingaman (D-NM) issued a white paper describing the design elements of a mandatory system to reduce emissions. The paper notes that auctioning off all allowances would minimize the costs to the U.S. economy as a whole, streamline the administrative process, and avoid unintended competitive advantages and windfall profits for certain market participants.[9] A recent Wall Street study also predicts that the United States will have an auction-based rather than allocation-based cap-and-trade system.[10]

If regulators do authorize the construction of a new coal plant, they should notify the utility up front that it will not be allowed to pass future CO_2 compliance costs on to ratepayers. The last time the nation's utilities embarked on a large-scale campaign to build new baseload plants (plants that operate most of the time) was the 1960s and 1970s; the result was scores of abandoned nuclear projects and a great deal of excess generating capacity. Disputes over whether ratepayers or utility shareholders should pay for these

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[6] Regional Greenhouse Gas Initiative (RGGI) Model Rule, subpart XX-5.3. Online at *http://www.rggi.org/docs/model_rule_8_15_06.pdf*.

[7] The Vermont law (H. 860) is online at *http://massclimateaction.org/RGGI/VTRGGISignedMay06.pdf*.

[8] Environment Northeast, Natural Resources Defense Council, and Pace Law School Energy Project, "Summary of Comments on the RGGI Model Rule Draft," 2006.

[9] Sen. Pete V. Domenici and Sen. Jeff Bingaman, "Design Elements of a Mandatory Market-Based Greenhouse Gas Regulatory System," February 2006.Online at *http://www.nam.org/s_nam/bin.asp?CID=43&DID=236483&DOC=FILE.PDF*.

[10] Hugh Wynne, "U.S. Utilities: The Prospects for CO_2 Emissions Limits in the United States and Their Implications for the Power Industry," Bernstein Research, April 19.

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investment mistakes led to a series of decisions requiring shareholders to pay for at least a portion of the losses. Those decisions stressed the importance of forcing utilities to assume financial risk in order to give them an incentive to track events that could increase the cost of construction projects and to reassess the viability of those projects as conditions warrant.

Given the momentum now driving the nation toward CO_2 limits—and the substantial impact such limits will have on the cost of coal power—it has never been more critical to ensure that utility managers are staying abreast of current developments. Placing the financial risk of future CO_2 costs on shareholders, clearly and up front, will create that incentive. This regulatory approach is not only fully consistent with rate-making principles, but also builds on the lessons learned from the expensive investment mistakes of the past.

I. Scientific evidence clearly establishes the need for policies limiting CO_2 emissions now and reducing them dramatically over a period of decades.

A. The scientific consensus about the reality of global warming is strong and growing stronger.

The world scientific community spoke with one voice recently to deliver an unprecedented and remarkably pointed message to world leaders. Eleven of the world's most respected national science academies, including the U.S. National Academy of Sciences (NAS), issued this joint statement in anticipation of the 2005 G8 Summit:

> *"Climate change is real. There will always be uncertainty in understanding a system as complex as the world's climate. However, there is now strong evidence that significant global warming is occurring."*[11]

The statement called on world leaders to acknowledge that "the threat of climate change is clear and increasing," and urged all nations "to take prompt action to reduce the causes of climate change."[12]

The NAS is generally considered America's preeminent scientific association. It was chartered by Congress in 1863 and tasked with the role of advising the nation on scientific matters. Its 2,000 members—all elected to the academy in recognition of their distinguished achievements in original research—include the nation's most respected scientists; roughly 10 percent have won a Nobel Prize.[13] When the Bush administration

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[11] The "Joint Science Academies' Statement: Global Response to Climate Change" was issued by the NAS and its counterpart academies in Brazil, Canada, China, France, Germany, India, Italy, Japan, Russia, and the United Kingdom. Online at *http://nationalacademies.org/onpi/06072005.pdf*.

[12] Ibid.

[13] See the NAS website: *http://www.nasonline.org/site/PageServer?pagename=ABOUT_main_page*.

took office in 2001, it asked the NAS for confirmation that our heat-trapping emissions are causing global warming, and it received that confirmation.[14]

This joint statement follows a growing number of statements and reports reflecting concern about global warming from the NAS, the American Geophysical Union, the American Association for the Advancement of Science, the American Meteorological Society—indeed every scientific association in the nation whose membership has expertise directly relevant to the issue.[15] The consensus on the reality of climate change is so strong that a review of 928 papers published in peer-reviewed scientific journals between 1993 and 2003 did not find a single paper that disagreed with the consensus view.[16]

The scientific consensus has been gaining strength at the international level as well. Since 1988, thousands of scientists have been part of a formal process—under the auspices of the Intergovernmental Panel on Climate Change (IPCC)—for methodically and collectively looking at the climate science and publishing reports to help the world's policy makers determine the scope of the global warming threat. The IPCC has published three major assessments to date (1990, 1995, and 2001), each time expressing greater concern about the certainty and potential danger of global warming.[17] Given the record-breaking warmth the planet has continued to experience since the 2001 IPCC report and subsequently published scientific assessments,[18] it is widely expected that the IPCC's upcoming 2007 report will continue that trend.[19]

Evidence that we are changing the climate and that the planet is responding in worrisome ways is now so strong that many who have dismissed global warming in the past have recently changed positions. Prominent members of the media who formerly declared themselves skeptical of the threat have quite publicly "switched sides."[20] Even

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[14] NAS, "Climate Change Science: An Analysis of Some Key Questions," 2001. Online at *http://fermat.nap.edu/books/0309075742/html*.

[15] Ibid. Also see NAS, "Understanding and Responding to Climate Change: Highlights of National Academies Reports," 2006 (online at *http://dels.nas.edu/basc/Climate-HIGH.pdf*); American Geophysical Union, "Human Impacts on Climate," December 2003 (online at *http://www.agu.org/sci_soc/policy/climate_change_position.html*); Atlas of Population and Environment by the American Association for the Advancement of Science, "Climate Change" (online at *http://www.ourplanet.com/aaas/pages/atmos02.html*); American Meteorological Society Council, "Climate Change Research: Issues for the Atmospheric and Related Sciences," February 9, 2003, *Bulletin of the American Meteorological Society* 84, 508–515 (online at *http://www.ametsoc.org/POLICY/climatechangeresearch_2003.html*).

[16] Naomi Oreskes, "Beyond the Ivory Tower: The Scientific Consensus on Climate Change," *Science*, December 3, 2004, 1686. Online at *http://www.sciencemag.org/cgi/content/full/306/5702/1686*.

[17] Intergovernmental Panel on Climate Change (IPCC), "16 Years of Scientific Assessment in Support of the Climate Convention," December 2004. Online at *http://www.ipcc.ch/about/anniversarybrochure.pdf*.

[18] For example, see Scientific Symposium on Stabilisation of Greenhouse Gases, "Avoiding Dangerous Climate Change," Executive Summary of the Conference Report, February 1-3, 2005, 2. Online at *http://www.defra.gov.uk/environment/climatechange/internat/dangerous-cc.htm*.

[19] Roger Harrabin, "Consensus Grows on Climate Change," BBC News, March 1, 2006. Online at *http://news.bbc.co.uk/1/low/sci/tech/4761804.stm*.

[20] Gregg Easterbrook recently wrote in the *New York Times*, "[a]s an environmental commentator, I have a long record of opposing alarmism. But based on the data I'm now switching sides regarding global

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ExxonMobil, which has for years disputed the mainstream climate science more aggressively than any corporation in America, now admits "that the accumulation of greenhouse gases in the Earth's atmosphere poses risks that may prove significant for society and ecosystems. We believe that these risks justify actions now, but the selection of actions must consider the uncertainties that remain."[21] The company continues to exaggerate the uncertainties, to fund groups that cast doubt on the science (to the growing dismay of investors[22]), and to resist government regulation, but the science is now so strong that it can no longer deny that the risks justify an immediate response.[23]

B. The evidence establishes that global warming is already harming the planet, and that we face much greater levels of damage in the century ahead.

The basics of global warming science have been understood for a long time. Heat-trapping or "greenhouse" gases, of which CO_2 is the most important, allow the sun's light to penetrate to Earth's surface, where some of it is absorbed and converted into heat. These gases then prevent that heat from radiating back out to space, thereby keeping the planet warm enough to support life.

When we burn fossil fuels, the carbon in those fuels is converted into CO_2; since coal contains the most carbon, it creates the most CO_2 for every unit of energy released.[24] Humans have emitted enough CO_2 to raise background concentrations of this critical heat-trapping gas by about one-third above pre-industrial levels, and concentrations continue to rise.[25] Once concentrations rise, it takes centuries for natural processes to bring them back down again.[26]

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warming, from skeptic to convert." ("Finally Feeling the Heat," May 24, 2006. Online at *http://select.nytimes.com/gst/abstract.html?res=F40B1EF63B5A0C778EDDAC0894DE404482*; subscription required). A few days earlier, Michael Shermer wrote in *Scientific American*, "environmental skepticism [on climate change] was once tenable. No longer. It is time to flip from skepticism to activism." ("The Flipping Point: How the Evidence for Anthropogenic Global Warming Has Converged to Cause this Environmental Skeptic to Make a Cognitive Flip," June 2006, 28. Online at *http://www.sciam.com/article.cfm?articleID=000B557A-71ED-146C-ADB783414B7F0000&sc=I100322*.)

[21] ExxonMobil, 2005 Corporate Citizenship Report, May 2006, 22. Online at *http://www.exxonmobil.com/Corporate/Citizenship/citizenship.asp*.

[22] Andrew Logan and David Grossman, "ExxonMobil's Corporate Governance on Climate Change," CERES and Investor Network on Climate Risk, May 2006, 2. Online at *http://www.ceres.org/pub/docs/Ceres_XOM_corp_gov_climate_change_052506.pdf*.

[23] Other major oil companies publicly accepted the reality of climate change years ago, and are more direct in their recognition of the risks it poses. The head of BP Amoco said to the British House of Lords in 2002, "Very few people now deny that climate change is a serious risk to the whole of the world" (online at *http://www.bp.com/genericarticle.do?categoryId=98&contentId=2000291*). Also see the climate statements on the websites of Royal Dutch Shell (*www.shell.com*) and Chevron (*www.chevron.com*).

[24] Coal contains nearly 90 percent more carbon per unit of energy than natural gas. However, a new conventional (supercritical) coal power plant produces nearly 150 percent more CO_2 than a new natural gas combined-cycle power plant, which is much more efficient. Based on data from EIA, *Assumptions to Annual Energy Outlook 2006*, Table 38, March 2006, 73. Online at *http://www.eia.doe.gov/oiaf/aeo/assumption/pdf/0554(2006).pdf*.

[25] IPCC Third Assessment Report (TAR), Climate Change 2001: Report of Working Group 1, Summary for Policymakers, 7. Online at *http://www.ipcc.ch*.

[26] Ibid, 17.

In recent years, scientific concern over global warming has grown both because our understanding of Earth's climate has improved and because the warming trend has continued. The National Aeronautics and Space Administration (NASA) reports that 2005 was the warmest year on record.[27] The five warmest years have all occurred since 1997 (including each of the last four years).[28] In 2001 the IPCC concluded that global average temperatures rose 0.6 degree Celsius (1.1 degrees Fahrenheit) in the twentieth century.[29] However, due to steady warming in this century, total warming over the last 100 years is now up to 0.8 degree Celsius (1.4 degrees Fahrenheit), with most of that increase (0.6 degree Celsius or 1.1 degree Fahrenheit) occurring in just the last 30 years.[30] Scientists have a high level of confidence that the present time is warmer than any period in at least 400 years.[31]

Scientists have been looking for natural causes that would explain the steep warming trend of recent years and have been unable to find them; indeed, it appears that natural causes alone (e.g., solar variation and volcanic activity) should have led to stable or slightly cooler average global temperatures in recent decades.[32] Computer models can only duplicate the recent warming by including today's phenomenally high concentrations of heat-trapping gases, especially CO_2.[33] Figure 1 compares today's CO_2 levels with those occurring over the last 400,000 years. New ice core data go back even further, and show that global CO_2 levels are 27 percent higher than they have been at any time in the past 650,000 years.[34]

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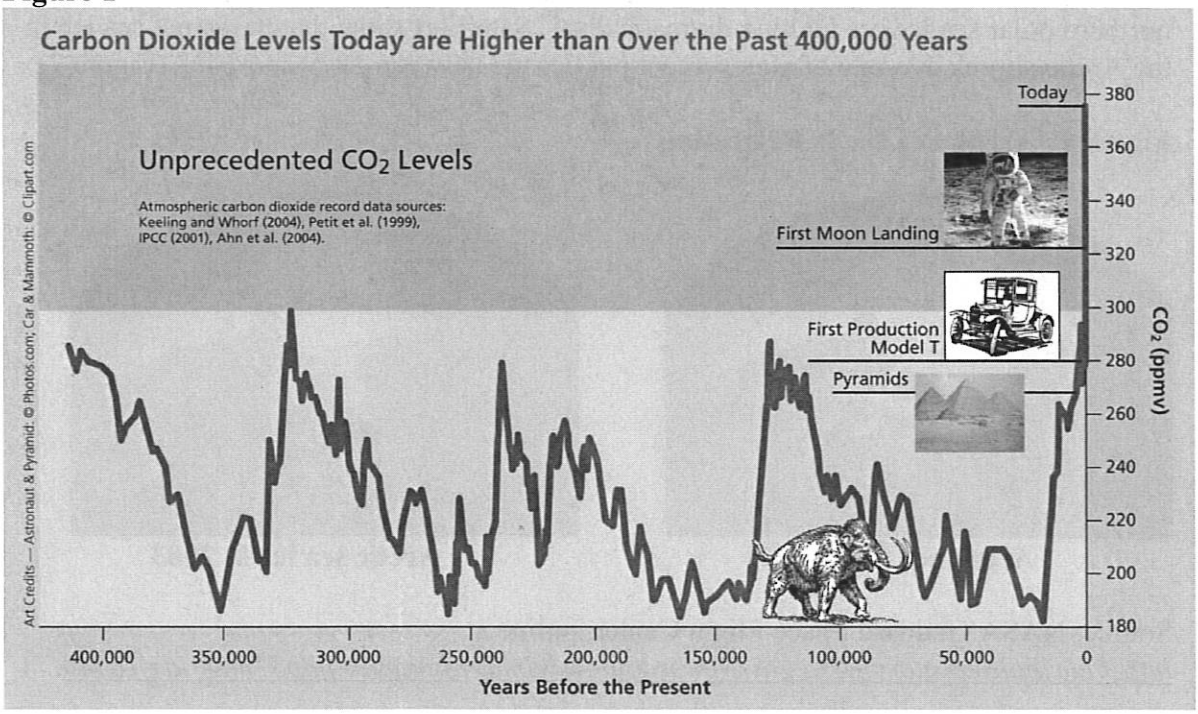
[27] National Aeronautics and Space Administration (NASA), "2005 Warmest Year in Over a Century," January 24, 2006. Online at http://www.nasa.gov/vision/earth/environment/2005_warmest.html.
[28] Ibid.
[29] IPCC TAR, Summary for Policymakers, 2.
[30] NASA, 2006.
[31] National Research Council, *Surface Temperature Reconstructions for the Last 2000 Years*, National Academies Press, 2006, 3. Online at http://www.nap.edu/catalog/11676.html#toc.
[32] IPCC TAR, Summary for Policymakers, 10–11.
[33] Ibid.
[34] Urs Siegenthaler, et al., "Stable Carbon Cycle-Climate Relationship during the Late Pleistocene," 2005, *Science* 310:1313–1317.

Figure 1



Sources: UCS, "Past, Present and Future Temperatures: the Hockeystick FAQ," online at *http://www.ucsusa.org/global_warming/science/hockeystickFAQ.html*.

Other geologic evidence indicates that current CO_2 levels are probably higher than at any time in the last 20 million years.[35] Projections show that in the years ahead, unless actions are taken to reduce emissions, CO_2 levels could rise to 750 parts per million by volume (ppmv) or higher[36]—well beyond the scale used in Figure 1. In other words, we have already dramatically increased the atmospheric concentrations of a gas that plays a critical role in determining Earth's climate, and much more dramatic changes lie ahead if current trends continue.

The consequences of global warming are now evident around the world, and in many respects Earth is responding to the warming at a faster rate than scientists predicted just a few years ago. The effects of climate change are now visible in most ecosystems and appearing more rapidly than predicted.[37] Recent studies have suggested a link between global warming, higher sea surface temperatures, and an unexpected increase in hurricane strength.[38] Mountain glaciers are in widespread retreat, enormous ice shelves in

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[35] IPCC TAR, Summary for Policymakers, 7.
[36] Ibid., 14.
[37] Hans Joachim Schellnhuber, ed., *Avoiding Dangerous Climate Change*, Chapter 12, Cambridge University Press, 2006. Online at *http://www.defra.gov.uk/environment/climatechange/internat/dangerous-cc.htm*.
[38] Kerry Emanuel, "Increasing Destructiveness of Tropical Cyclones Over the Past 30 Years," August 4, 2005, *Nature* 436:686 (online at *http://www.nature.com/nature/journal/vaop/ncurrent/abs/nature03906.html*); Georgia Institute of Technology, "Hurricanes are Getting Stronger, Study Says," press release, September 15, 2005 (online at

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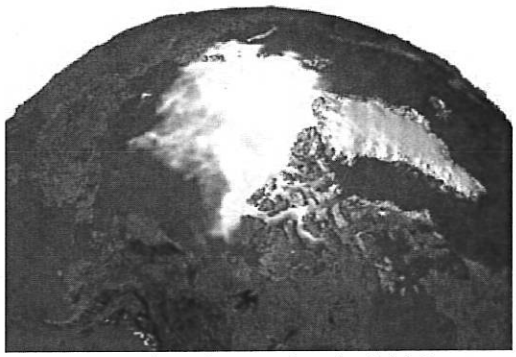
Antarctica have collapsed with surprising suddenness, and Arctic permafrost and northern polar sea ice are melting dramatically.[39] Satellites show that perennial sea ice in the Arctic shrunk at a rate of nine percent per decade between 1979 and 2003 (Figure 2).

Figure 2: Arctic Sea Ice Is Retreating

Arctic sea ice in 1979



Arctic sea ice in 2003

Source: NASA Goddard Space Flight Center, online at *http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=16340*.

Earth's response to the warming we have experienced thus far increases concerns about how the planet will respond to the much greater warming expected in the century ahead. The IPCC's 2001 assessment predicts warming of another 1.5 to 5.8 degrees Celsius (2.7 to 10.4 degrees Fahrenheit) by 2100.[40] Figure 3 compares this warming with observed temperatures during the previous century and with estimated temperatures of the last 1,000 years.

The range of warming estimates for the next century reflects uncertainties about Earth's climate system as well as uncertainty about the future rate at which heat-trapping gases will be emitted. Recent studies of how natural systems release more heat-trapping gases in response to warming, amplifying the effect of human-made emissions, suggest the 2001 predictions may be conservative.[41]

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http://www.gatech.edu/news-room/release.php?id=654); National Center for Atmospheric Research, "Global Warming Surpassed Natural Cycles in Fueling 2005 Hurricane Season, NCAR Scientists Conclude," press release, June 22, 2006.

[39]IPCC TAR, Summary for Policymakers, 4; Arctic Climate Impact Assessment: Impacts of a Warming Arctic, Cambridge University Press, 2004 (online at *http://amap.no/acia*); Ice shelf collapses described by the National Snow and Ice Data Center (online at *http://nsidc.org/sotc/iceshelves.html*).

[40] IPCC TAR, Summary for Policymakers, 13.

[41]Margaret S. Torn and John Harte, "Missing Feedbacks, Asymmetric Uncertainties, and the Underestimate of Future Warming," 2006, *Geophysical Research Letters* 33:L10703; Lawrence Berkeley National Laboratory, "Feedback Loops in Global Climate Change Point to a Very Hot 21st Century," press release, May 22, 2006 (online at *http://www.lbl.gov/Science-Articles/Archive/ESD-feedback-loops.html*); American Geophysical Union, "Greenhouse Gas/Temperature Feedback Mechanism May Raise Warming Beyond Previous Estimates," press release, May 22, 2006 (online at *http://www.agu.org/sci_soc/prrl/prrl0617.html*).

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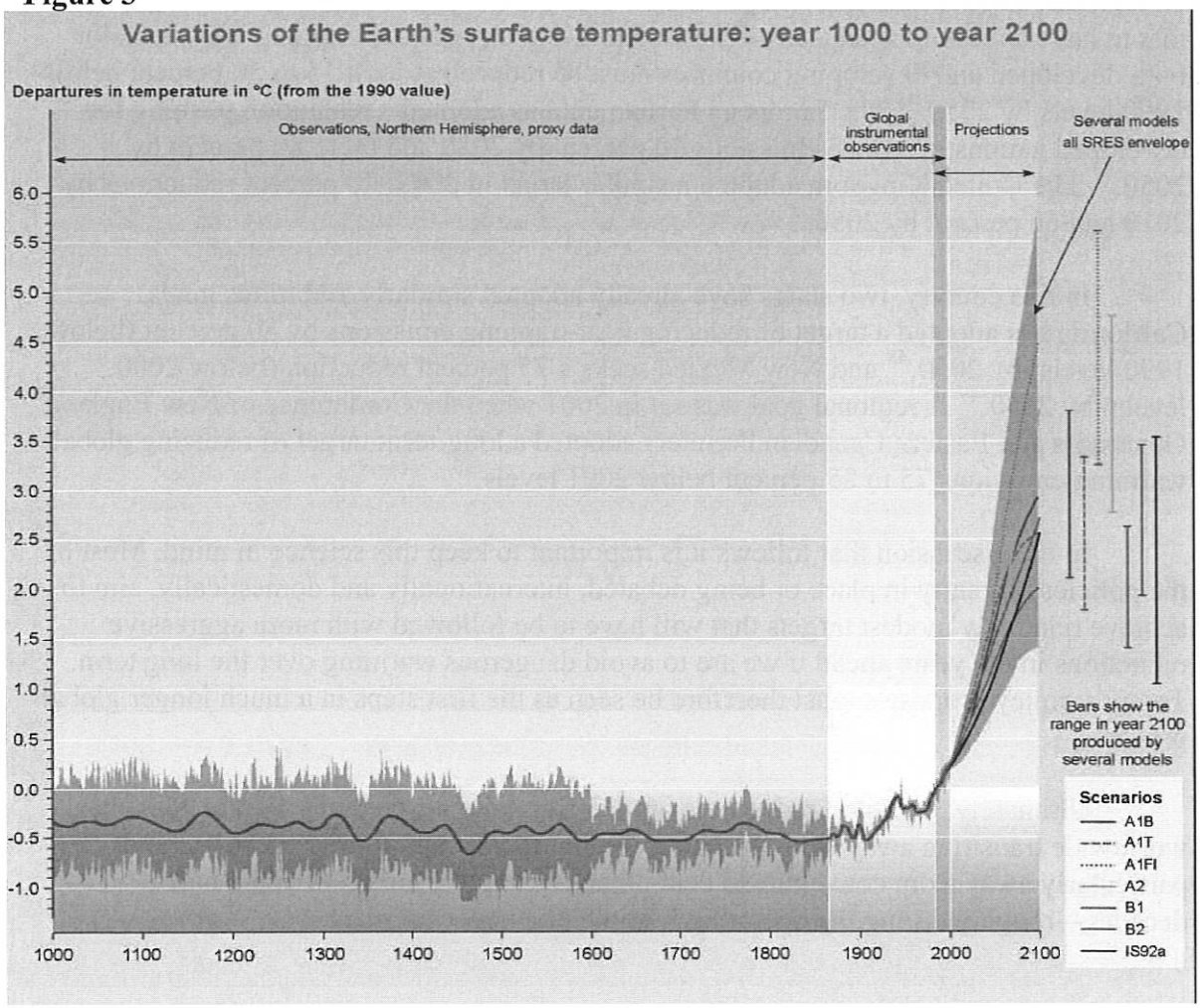
Moreover, the NAS and others warn that future warming could occur in abrupt and unpredictable ways. Evidence of past climate changes show the planet has a history of quickly lurching from one climate pattern to another in a way that would make it far harder for nature and society to adapt.[42]

Figure 3



Source: IPCC, "Climate Change 2001:Synthesis Report," Summary for Policymakers, 34.

C. Evidence indicates that dramatic reductions in CO_2 levels will be required in the decades ahead.

Currently, much of the scientific and policy discussion occurring globally focuses on how deeply and quickly CO_2 emissions need to be cut in order to avoid triggering dangerous global warming.[43] The international community has been treaty-bound to work

[42]National Research Council, *Abrupt Climate Change: Inevitable Surprises*, National Academies Press, 2002. Online at http://www.nap.edu/catalog/10136.html?onpi_newsdoc121101.
[43] Scientific Symposium on Stabilisation of Greenhouse Gases, 2005.

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toward this goal since the Framework Convention on Climate Change was adopted in 1992 and ratified by 188 nations (including the United States).[44]

Evidence of the dangers associated with warming greater than two degrees Celsius above pre-industrial levels has been compelling enough to persuade the European Union (EU) to adopt the goal of limiting planetary warming to this level.[45] Studies show that to have a reasonable chance of achieving this goal, net heat-trapping emissions for both developed and developing countries must be reduced at least 15 to 50 percent below 1990 levels by 2050.[46] The European Parliament has adopted a resolution pushing for developed nations to reduce emissions 30 percent by 2020 and 60 to 80 percent by 2050.[47] The United Kingdom adopted a similar target in 2003: 20 percent reductions by 2010 and 60 percent by 2050.

In this country, two states have already adopted similarly ambitious goals. California has adopted a target of reducing heat-trapping emissions by 80 percent (below 1990 levels) by 2050,[48] and New Mexico seeks a 75 percent reduction (below 2000 levels) by 2050.[49] A regional goal was set in 2001 when the Conference of New England Governors and Eastern Canadian Premiers adopted a long-term target of reducing global warming emissions 75 to 85 percent below 2001 levels.[50]

In the discussion that follows it is important to keep this science in mind. Most of the policies currently in place or being debated, internationally and domestically, aim to achieve relatively modest targets that will have to be followed with more aggressive reductions in the years ahead if we are to avoid dangerous warming over the long term. Today's policy proposals must therefore be seen as the first steps in a much longer global process.

Ultimately, emission reductions of the magnitude needed will require a historic, worldwide transition away from the energy technologies that we rely on today, and particularly away from conventional coal plants, during the next four and a half decades—roughly during the operating lifetime of a new coal plant.

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[44] Framework Convention on Climate Change," Article 2. Online at *http://unfccc.int/resource/docs/convkp/conveng.pdf*.
[45] European Environment Agency, 2005, 10.
[46] European Environment Agency, 2005, 7 and Chapter 3.
[47] European Parliament Resolution on Climate Change, January 18, 2006. Online at *http://www.europarl.europa.eu/omk/sipade3?PUBREF=-//EP//TEXT+TA+P6-TA-2006-0019+0+DOC+XML+V0//EN&L=EN&LEVEL=1&NAV=S&LSTDOC=Y&LSTDOC=N*.
[48] Executive Order S-3-05, June 1, 2005. Online at *http://www.climatechange.ca.gov/index.html*.
[49] Office of Governor, State of New Mexico, "Governor Bill Richardson Announces Historic Effort to Combat Climate Change," press release, June 9, 2005. Online at *http://www.governor.state.nm.us/press/2005/june/060905_3.pdf*.
[50] New England Governors/Eastern Canadian Premiers, "Climate Change Action Plan 2001," August 2001. Online at *http://www.neg-ecp-environment.org/page.asp?pg=46*.

II. The global warming policy response is mounting at every level.

A. Other developed nations are deepening their commitments to emission cuts.

The global policy response to climate change has increased along with scientific concern. As noted above, in 1992 the United States and most other nations entered into the Framework Convention on Climate Change. That treaty commits developed nations to adopt policies limiting global warming emissions, but its emission reduction target is not binding.[51] The world community then negotiated the Kyoto Protocol, under which developed nations must reduce their emissions an average of five percent below 1990 levels by the period 2008 to 2012. The protocol went into effect in February 2005 despite the United States' refusal to ratify it.

Almost every other developed nation did ratify Kyoto, so that currently nearly half of the global economy is committed to emission reductions under its provisions.[52] Many nations, particularly within the EU, have already adopted mandatory emission limits. The EU itself is limiting CO_2 emissions with a multinational cap-and-trade system, a market-based regulatory approach pioneered in the United States (see part II, section C), and the European Parliament has also endorsed steep, long-term emission reductions.

The United States' refusal to ratify Kyoto or otherwise limit its global warming emissions leaves it nearly isolated within the developed world—a conspicuous position for a country that is the world's richest and also emits roughly one-quarter of the world's heat-trapping emissions, far more than any other nation.[53] The only other developed country that has refused to be bound by Kyoto is Australia.[54]

Over the years, pressure has mounted on the United States to reduce its emissions. At the 2005 G8 Summit, climate change was at the top of the agenda, and the United States was persuaded to sign a statement pledging to "act with resolve and urgency" in reducing emissions.[55] In November 2005, the European Parliament passed a resolution stating that it "[d]eplores the non-implementation by the current U.S. administration" of the Framework Convention and America's failure to ratify Kyoto.[56]

Industrial nations currently subject to the Kyoto limits helped sustain the protocol's momentum by agreeing in December 2005 to negotiate deeper cuts in global

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[51] Framework Convention on Climate Change, article 4, section 2(a).
[52] Innovest Strategic Value Advisors, "Carbon Disclosure Project 2005," 19. Online at *http://www.cdproject.net/aboutus.asp*.
[53] EPA, Global Warming Emissions: Inventory. Online at *http://yosemite.epa.gov/OAR/globalwarming.nsf/content/EmissionsInternationalInventory.html*.
[54] The status of each nation's ratification of the Kyoto Protocol is available on the United Nations Framework Convention on Climate Change website (*http://unfccc.int/essential_background/kyoto_protocol/status_of_ratification/items/2613.php*).
[55] Gleneagles Communiqué, "Climate Change, Energy, and Sustainable Development," July 2005. Online at *http://www.fco.gov.uk/Files/kfile/PostG8_Gleneagles_Communique.pdf*.
[56] European Parliament, "Winning the Battle Against Global Climate Change," (2005/2049(INI)), November 16, 2005. Online at *http://www.europarl.eu.int/news/expert/infopress_page/064-2439-320-11-46-911-20051117IPR02438-16-11-2005-2005-false/default_en.htm*.

warming emissions for the years after Kyoto compliance ends in 2012.[57] As these and other nations deepen and extend their commitments to mandatory emission cuts, pressure will continue to increase on the United States to do likewise.

B. U.S. states, regions, and cities are enacting their own climate policies.

In the absence of federal limits on heat-trapping emissions, many states have moved forward with their own climate-related policies, including cap-and-trade systems now emerging on both coasts. The most developed of these is the Regional Greenhouse Gas Initiative (RGGI) being undertaken by several northeastern and mid-Atlantic states. In December 2005, Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont formally agreed to launch the nation's first regional program imposing a mandatory cap on heat-trapping emissions from power plants.[58] In April 2006, Maryland joined RGGI as well.[59] Under the agreement, beginning in 2009, the states will stabilize power plants' CO_2 emissions and then cut them 10 percent by 2019.[60] The RGGI model rule was adopted in August 2006 to implement the agreement.[61]

On the West Coast, the California legislature passed a bill on August 31, 2006 that sets in place the nation's most comprehensive, economy-wide global warming emissions reduction program. The bill requires the state's global warming emissions to be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on global warming emissions that will be phased in starting in 2012. The bill would also coordinate the efforts of various state agencies, including a pending proceeding at the Public Utilities Commission to establish a load-based cap on the three large investor-owned utilities as well as other jurisdictional utilities in the state. Governor Schwarzenegger has indicated that he will sign the bill into law.[62]

California has also taken the lead in fighting climate change by requiring utilities to make aggressive investments in energy efficiency as well as factor future CO_2 regulatory costs into their resource choices (see part V, section A) and by pursuing a performance standard for global warming emissions that would prevent the procurement of power from conventional coal plants.[63] Other efforts California has taken to reduce global warming emissions include the adoption of motor vehicle standards requiring a 30

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[57] Union of Concerned Scientists, "World Moves Forward on Global Warming, Bush Administration Stays Behind," press release, December 10, 2005. Online at *http://www.ucsusa.org/news/press_release/world-moves-forward-on-global-warming-MONTREAL.html*.

[58] See the RGGI website (*www.rggi.org*).

[59] *New York Times*, "Pollution Pact Gets Maryland as 8th Member," April 7, 2006. Online at *http://select.nytimes.com/search/restricted/article?res=FA0E15FD3A540C748CDDAD0894DE404482*.

[60] RGGI Memorandum of Understanding.

[61] Regional Greenhouse Gas Initiative (RGGI) Model Rule. Online at *http://www.rggi.org/docs/model_rule_8_15_06.pdf*.

[62] *Sacramento Bee*, "Schwarzenegger, lawmakers strike deal on greenhouse gases," August 31, 2006. Online at http://www.sacbee.com/content/politics/story/14312261p-15214839c.html.

[63] California PUC, "Policy Statement on Greenhouse Gas Performance Standards," April 12, 2006. Online at *http://www.cpuc.ca.gov/word_pdf/REPORT/50432.doc*.

percent reduction in CO_2 emissions from vehicles by the period 2013 to 2016.[64] As of June 2006, 10 other states plus Canada—representing approximately one-third of automobile sales in North America—had adopted California's standards.[65]

These efforts are part of a wider trend among states to respond to global warming. Twenty states and the District of Columbia, for example, have already adopted renewable energy standards covering approximately 40 percent of the electricity used in the United States,[66] partly in response to global warming. Massachusetts, New Hampshire, Oregon, and Washington have already passed laws limiting power plant CO_2 emissions or requiring plant owners to purchase offsets.[67] California, Oregon, and Washington have also joined forces on the West Coast Governors' Global Warming Initiative, which involves a variety of steps for reducing global warming emissions.[68]

The policy response to climate change is also accelerating at the local level. Mayors of more than 270 cities, representing more than 48 million Americans, have endorsed the US Mayors Climate Protection Agreement. Under this agreement they commit to working within their own communities to achieve the emission reduction targets of the Kyoto Protocol, and to urge the federal government to adopt a global warming emission trading system.[69] More than 150 local governments participate in another initiative to inventory their heat-trapping emissions, develop emission reduction targets, and implement policies to meet them.[70]

All of these state and local efforts increase the calls for and the likelihood of a climate response at the federal level, which would avoid a patchwork of different standards around the nation.

C. Congress is moving toward mandatory cap-and-trade CO_2 limits.

Momentum behind mandatory federal limits on CO_2 emissions continues to grow in Congress. In 2005, the Senate (with bipartisan support) passed a resolution finding that accumulating global warming emissions are causing temperatures to rise beyond natural variability and posing a "substantial risk" of rising sea levels and more frequent and severe droughts and floods. It states that "mandatory steps will be required to slow or stop the growth" of global warming emissions and that "Congress should enact a

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[64] California Air Resources Board, "Climate Change Emission Control Regulations." Online at *http://www.arb.ca.gov/cc/factsheets/cc_newfs.pdf*.

[65] See the California Clean Cars Campaign website (*http://www.calcleancars.org/news.html#senators*).

[66] Minnesota also has a renewable energy requirement for one utility, Xcel Energy (see *http://www.ucsusa.org/clean_energy/renewable_energy/page.cfm?pageID=47*). Also see Ryan H. Wiser, "Meeting Expectations: A Review of State Experience with RPS Policies," Lawrence Berkeley National Laboratory, March 2006. Online at *http://eetd.lbl.gov/ea/ems/reports/awea-rps.pdf*.

[67] Massachusetts Department of Environmental Protection, "Emissions Standards for Power Plants," 310 CMR 7.29; New Hampshire Revised Statutes Annotated. "Multiple Pollutant Reduction Program," Chapter 125-O; Washington Revised Code, "Carbon Dioxide Mitigation," Chapter 80.70; Oregon Revised Statutes, Carbon Dioxide Emissions Standard, § 469.503.

[68] West Coast Governors' Global Warming Initiative. Online at *http://www.ef.org/westcoastclimate*.

[69] US Mayors Climate Protection Agreement. Online at *http://www.seattle.gov/mayor/climate/*.

[70] Cities for Climate Protection. Online at *http://www.iclei.org/index.php?id=1118*.

comprehensive and effective national program of mandatory, market-based limits and incentives on emissions of greenhouse gases." The program goal would be to eventually reverse the growth of such emissions in a way that would not harm the U.S. economy and would encourage comparable action by major trading partners.[71] In May 2006, an identically phrased resolution was adopted with bipartisan support by the powerful House Appropriations Committee.[72]

It is widely understood that by using the phrase "mandatory, market-based limits," the Senate was referring to a particular kind of regulatory approach known as cap-and-trade. Under such a program, a cap would be established limiting how many tons of CO_2 could be emitted nationwide, and the same number of "allowances" would be issued, each one granting its owner the right to emit one ton of CO_2.

A market price for CO_2 allowances would emerge as operators begin buying and selling them. In practice, power plants that could reduce CO_2 emissions at a lower cost than the market price of an allowance would do so; those that could not would purchase additional allowances to cover their emissions. This system of regulation was pioneered in 1990 to reduce power plants' emissions of sulfur dioxide and other pollutants that cause acid rain, and it proved so successful and efficient that virtually every proposal to regulate CO_2—whether international, regional, or federal—has included some form of cap-and-trade.[73]

As of July 2006, there are at least seven proposals[74] under consideration that would establish a cap-and-trade system for CO_2, including the Climate Stewardship and Innovation Act (S. 1151) introduced by Senators John McCain (R-AZ) and Joseph Lieberman (D-CT) and a proposal sponsored by Senator Jeff Bingaman (D-NM) modeled after a proposal of the National Commission on Energy Policy (NCEP).[75] The Senate Energy and Natural Resources Committee also conducted extensive hearings on the design features of a cap-and-trade system based on the NCEP model in April 2006, accepting comments from many different stakeholders. Many members of the power industry participated in these hearings, including companies that support mandatory regulations and those that, while still opposed to mandatory limits, now consider them inevitable and want to have a say in shaping them (see part III). Two of the most

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[71] Sense of the Senate on Climate Change, H.R.6 §1612, Energy Policy Act of 2005. This resolution passed by a vote of 54-43.

[72] See Senate Committee on Energy and Natural Resources, "Chairman Domenici and Senator Bingaman React to House Committee Vote on Climate Change," press release, May 10, 2006. Online at *http://energy.senate.gov/public/index.cfm?FuseAction=About.Subcommittee&Subcommittee_ID=7*.

[73] Another regulatory option, though one with much less political momentum, is enactment of a carbon tax. By setting a price on CO_2 emissions, the effect on coal plant risks would be the same as a cap-and-trade system that results in equivalent allowance prices, and the arguments in this paper would still apply.

[74] In addition to those mentioned in the text, these proposals include the Clean Air Planning Act of 2006 (S. 2724) introduced by Senator Thomas Carper (D-DE); the Keep America Competitive Global Warming Policy Act of 2006 (H.R. 5049), introduced by Representatives Tom Udall (D-NM) and Tom Petri (R-WI); and the Strong Economy and Climate Protection Act, announced and circulated for discussion by Senator Dianne Feinstein (D-CA) but not yet introduced.

[75] The NCEP proposal is set forth in "Ending the Energy Stalemate" (online at *http://www.energycommission.org/site/page.php?report=13*).

ambitious bills -- the Global Warming Pollution Reduction Act (S. 3698) introduced by Senator Jim Jeffords (I-VT) and the Safe Climate Act (H.R. 5642) introduced by Representatives Henry Waxman (D-CA) and Maurice Hinchey (D-NY)-- would aim to reduce heat-trapping emissions 80 percent below 1990 levels (in line with scientific estimates of what is needed to avoid dangerous global warming).[76]

Political support for a cap-and-trade system is extremely broad, encompassing major U.S. environmental advocacy groups and those in industry that support CO_2 regulation in general. This method of regulation has even been explicitly endorsed by a substantial segment of the U.S. evangelical Christian movement. Several dozen evangelical leaders recently issued a statement declaring that the need for action on global warming is urgent and calling for national legislation requiring CO_2 reductions through "cost-effective, market-based mechanisms such as a cap-and-trade program." They stress that we need urgent action because we are making long-term decisions today that will determine CO_2 emissions in the future, including "whether to build more coal-burning power plants that last for 50 years rather than investing more in energy efficiency and renewable energy."[77]

Utilities may be ignoring these political developments under the reckless assumption that any plant built before a cap-and-trade system is adopted will be allocated allowances for free. This gamble ignores the growing opposition to granting such a windfall to utilities (and particularly those who could avoid new allowance costs by simply investing in alternatives to coal).

The RGGI model rule, for example, requires that at least 25 percent of allowances be auctioned rather than allocated, and Vermont, the first Northeast state to pass enabling legislation, requires auctioning 100 percent of allowances.[78] In fact, 28 different stakeholders in the RGGI model rule draft, including businesses, consumer groups, environmental organizations, state agencies, and an electricity distribution company, supported auctioning 50 to 100 percent of allowances.[79] The proceeds from such an auction would be used to fund investments in energy efficiency, renewable energy, and other low-carbon energy technologies, as well as direct rebates to consumers.

On the federal level, Senators Bingaman and Pete Domenici (R-NM) issued a white paper describing the design elements of a mandatory system to reduce CO_2 emissions. The paper notes that auctioning off all allowances would minimize the costs to the U.S. economy as a whole, streamline the administrative process, and avoid unintended competitive advantages and windfall profits for certain market participants.[80]

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[76] See Senator Jeffords' website (*http://jeffords.senate.gov/~jeffords/press/06/07/072006climatebill.html)* and Representative Waxman's website (*http://www.house.gov/waxman/safeclimate/index.htm*).
[77] Evangelical Climate Initiative, "Climate Change: An Evangelical Call to Action." Online at *http://www.christiansandclimate.org/statement*.
[78] RGGI Model Rule. A bill pending in Massachusetts would begin with 50 percent auctioning and increase 10 percent a year (reaching 100 percent auctioning in year six). New York Attorney General Eliot Spitzer is calling for 100 percent auctioning. For more information, see *http://massclimateaction.org/RGGI.htm*.
[79] Environment Northeast, Natural Resources Defense Council, and Pace Law School Energy Project, 2006.
[80] Domenici and Bingaman, 2006.

A recent Wall Street study further predicts that the United States will have an auction-based rather than allocation-based cap-and-trade system.[81]

In short, not only is it now virtually inevitable that a federal program limiting CO_2 emissions will be approved in the next few years, but it is also fairly certain that this program will take the form of a cap-and-trade system under which every ton of CO_2 emitted will come with a cost, determined by the forces of supply and demand for CO_2 allowances.

D. Coal plants will certainly be covered by future climate regulations.

While the scope of a federal program limiting global warming emissions is under active discussion, every climate bill that has been proposed would cover CO_2 emissions from coal plants—for good reason. Coal plants are by far the largest individual sources of CO_2 emissions, representing nearly one-third of U.S. energy-related CO_2 emissions (the entire power sector accounts for 39 percent of such emissions). Coal plants emit about the same amount of CO_2 as all petroleum-based emissions from cars, trucks, trains, and planes combined, which represent another third of U.S. energy-related CO_2 emissions. The remaining third comes from a variety of technologies and sources including, most notably: industrial use of petroleum, natural gas, and coal; residential use of natural gas; and the electricity sector's use of natural gas.[82]

Not only are coal plants a dominant source of CO_2, but they are also relatively few in number compared with the millions of sources in other sectors, making them far easier for any federal program to regulate. A single new 500 MW conventional coal plant, for example, can emit the annual CO_2 equivalent of more than 600,000 cars.[83] All of the federal regulatory proposals described above would limit CO_2 emissions from coal plants; the only question is whether they would also attempt to regulate other sectors of the economy as well.

Additionally, analysis by the U.S. Energy Information Administration (EIA) shows that the electricity sector accounts for many of the most cost-effective reduction options.[84] While power plants account for 39 percent of U.S. energy-related CO_2 emissions, they have the potential to account for somewhere between 66 and 85 percent

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[81] Wynne, 2006.

[82] EPA, 2006; EIA, 2005. Energy-related emissions of CO_2 represent 97 percent of total U.S. emissions of CO_2.

[83] According to the EPA, annual vehicle emissions are about 13,500 lbs/vehicle; see the EPA Personal Greenhouse Gas Calculator (*http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterToolsGHGCalculator.html*). Power plant CO_2 emissions of 4.1 million tons for a new 500 MW plant are based on the Public Service Commission of Wisconsin's Final Environmental Impact Statement for Weston Unit 4 Power Plant, Volume 1, July 2004, 145 (online at *http://psc.wi.gov/utilityinfo/electric/cases/weston/document/Volume1/W4_FEIS.pdf*).

[84] EIA, "Energy Market Impacts of Alternative Greenhouse Gas Intensity Reduction Goals," March 2006. Online at *http://www.eia.doe.gov/oiaf/servicerpt/agg/pdf/sroiaf(2006)01.pdf*.

of energy-related CO_2 emission reductions according to computer models designed to show the least expensive options for complying with various CO_2 regulations.[85]

The most significant change from the EIA's "business-as-usual" scenario to its carbon reduction scenarios is the resulting impact on coal generation. In the business-as-usual scenario, approximately 174 gigawatts (GW) of new coal capacity (the equivalent of 290 new 600 MW coal plants) are added by 2030. By contrast, in the two deepest carbon reduction scenarios EIA analyzed, *not a single new conventional coal plant is added beyond those already under construction.*[86] In other words, the construction of any additional conventional coal plants would make it more expensive to achieve the carbon reduction targets.[87]

III. The power industry increasingly supports federal CO_2 limits.

Over the years, most of the power industry has been strongly opposed to federal CO_2 limits from power plants, but that attitude has been changing rapidly, especially in 2006. Many prominent power companies now openly support the federal regulation of CO_2 from coal plants. The chief executive of Duke Energy, one of the nation's largest coal-burning utilities, has said of global climate change, "From a personal perspective I can think of no more pressing global issue." He went on to say:

> *"From a business perspective, the need for mandatory federal policy in the United States to manage greenhouse gases is both urgent and real. In my view, voluntary actions will not get us where we need to be. Until business leaders know what the rules will be—which actions will be penalized and which will be rewarded—we will be unable to take the significant actions the issue requires."*[88]

Duke's website states, "Congress needs to establish a national, economy-wide greenhouse gas mandatory program as soon as possible."[89]

The head of Exelon has stated, "We accept that the science on global warming is overwhelming. There should be mandatory carbon constraints."[90] And the head of PNM

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[85] Ibid., 18.

[86] Ibid., 22. In the deepest carbon reduction scenario, approximately 103 GW of existing coal capacity (171 plants) is retired, and 17 GW of new integrated-gasification combined-cycle (IGCC) capacity with carbon capture and sequestration equipment is added.

[87] UCS does not consider all of EIA's assumptions and methods realistic, nor do we believe its scenarios achieve the lowest possible cost. EIA has typically underestimated the potential of energy efficiency, combined heat and power, and renewable energy to reduce emissions at lower costs (see UCS, *Clean Energy Blueprint*, 2001). However, EIA's modeling is still useful for demonstrating how changes in one variable (e.g., imposition of carbon reduction targets) affect the economics of another (e.g., building new conventional coal plants) under a consistent set of assumptions.

[88] Paul Anderson, "Being (and Staying in Business): Sustainability from a Corporate Leadership Perspective," speech to CERES Annual Conference, April 6, 2006. Online at *http://www.duke-energy.com/news/mediainfo/viewpoint/PAnderson_CERES.pdf*).

[89] "Climate Change: Duke Energy Position on U.S. Climate Change Policy." Online at *http://www.duke-energy.com/environment/policies/climate_change*.

Resources said at Senate hearings, "We believe now is the time for a healthy debate at the federal level on climate change, and we support the move to a mandatory program."[91]

Many other power companies have expressed their support for federal CO_2 limits through coalition statements. In 2003, for example, Calpine, Con Edison, Keyspan, Northeast Utilities, PG&E Corporation, PPL Corporation, Public Service Enterprise Group, and Wisconsin Energy signed onto the CERES Consensus Statement, which called on the federal government to "develop a national, mandatory, market-based program" limiting global warming emissions.[92] In April 2006, the Clean Energy Group's Clean Air Policy Initiative submitted comments to the Senate Committee on Energy and Natural Resources supporting the adoption of a cap-and-trade program for the electricity sector.[93] Entergy, Exelon, and Florida Power & Light thereby added their names to those publicly calling for such a law.[94]

In sum, five of the nation's 10 largest private power producers (Calpine, Duke, Entergy, Exelon, and Florida Power & Light), accounting for more than 15 percent of U.S. electricity generation,[95] now support mandatory limits on CO_2 from power plants. Another (Progress) acknowledged in a 2006 special report to shareholders that the evidence for climate change is sufficient to warrant "action" by the "public sector," which the company believes should cover all sectors of the economy.[96] Executives from three of the remaining companies in the top 10 (American Electric Power, Southern Company, and Xcel), accounting for another 12 percent of U.S. power generation, have acknowledged that federal limits on CO_2 are coming, even if they do not support them.[97]

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[90] John W. Rowe, August 16, 2004, quoted in *Business Week*. Online at http://www.businessweek.com/print/magazine/content/04_33/b3896001_mz001.htm?gl.

[91] Jeff Sterba, April 4, 2006, quoted in the *Albuquerque Tribune*. Online at http://www.abqtrib.com/albq/nw_national_government/article/0,2564,ALBQ_19861_4594645,00.html.

[92] CERES, "Electric Power, Investors and Climate Change: A Call to Action," September 2003. Online at http://www.ceres.org/pub/docs/Ceres_electric_power_calltoaction_0603.pdf.

[93] Michael J. Bradley, April 4, 2006. Online at http://energy.senate.gov/public/_files/ExecutiveSummariesforwebsite.pdf.

[94] In addition, three signatories of the CERES Consensus Statement (Calpine, PG&E, and Public Service Enterprise Group) are part of the Clean Energy Group Clean Air Policy Initiative.

[95] The nation's 10 largest private power producers in 2004, in order of megawatt hours produced, were American Electric Power, Southern Company, Exelon, FPL Group, Entergy, Dominion, Duke Energy, Progress Energy, Calpine, and Xcel Energy. (Duke Energy has since moved up in the rankings by merging with Cinergy). See CERES, NRDC, and PSEG, "Benchmarking Air Emissions of the 100 Largest Electric Power Producers in the United States—2004," April 2006. Online at http://www.nrdc.org/air/pollution/benchmarking/default.asp.

[96] Progress's vague statement on the need for action on global warming has been interpreted by the trade press as a call for carbon regulation. See "Progress Energy calls for US carbon regulation," March 31, 2006, *Carbon Finance Online* (online at www.carbonfinanceonline.com; subscription required); also see "2006: Progress Energy's Report to Shareholders: An Assessment of Global Climate Change and Air Quality Risks and Actions" (online at http://www.progress-energy.com/environment/climatechange.asp).

[97] See Dale E. Heydlauff (American Electric Power), quoted in "Global Warming," August 16, 2004, *Business Week* (online at http://www.businessweek.com/print/magazine/content/04_33/b3896001_mz001.htm?gl); David Ratcliffe (Southern Company), quoted in "U.S. Utilities Urge Congress to Establish CO_2 Limits," Bloomberg.com (online at http://www.bloomberg.com/apps/news?pid=10000103&sid=a75A1ADJv8cs&refer=us); and

This expectation is widely shared in the industry: a 2004 national survey of electricity generating companies found that 60 percent of respondents expected mandatory limits on CO_2 within 10 years, and about half expected such limits within five years.[98]

The industry leaders quoted above echo the rising call for CO_2 limits by companies in other industries, including some of the nation's largest corporations. Wal-Mart calls climate change "an urgent threat not only to our business but also to our customers, communities, and the life support systems that sustain our world."[99] Both Wal-Mart and GE expressed support for CO_2 limits in April 2006 Senate hearings,[100] and Ford Motor Company and Hewlett-Packard joined 22 other multinational corporations in a 2005 statement urging leaders of the G8 nations to adopt cap-and-trade or other market-based mechanisms to limit global warming emissions.[101]

When a significant share of industry speaks out in favor of environmental regulations, including several major companies in the industry sector likely to be most heavily regulated, it is a strong sign that such regulations are near at hand. It is quite possible that CO_2 limits will be in place and operational before the same could be said for a proposed coal plant currently in the regulatory approval process.

IV. The private financial community is pushing companies to disclose and reduce their exposure to future climate regulation.

Concern is undeniably growing among investors and lenders over the financial risks of future CO_2 constraints. For example, the Investor Network on Climate Risk (INCR) was launched in 2003 as a coalition of institutional investors managing $600 billion in assets; by early 2006, it included a much wider array of investors managing more than three trillion dollars in assets.[102] The Carbon Disclosure Project, an investor coalition undertaken on the international level to obtain global warming emission data from 1,900 multinational corporations, now represents investors managing $31 trillion in assets—three times more than in 2003.[103]

The INCR stresses the regulatory risk faced by U.S. companies with high global warming emissions, calling federal carbon constraints "only a matter of time."[104] It has

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Wayne Brunetti (Xcel), quoted in "Xcel Energy expects US carbon regulations," September 9, 2004, PointCarbon (online at *http://www.pointcarbon.com/article.php?articleID=4459&categoryID=147*).

[98] PA Consulting Group, "PA survey finds that US generating companies expect mandatory carbon dioxide regulations within 10 years," press release, October 22, 2004. Online at *http://www.paconsulting.com/news/press_release/2004/pr_carbon_dioxide_regulations.htm*.

[99] Wal-Mart website (*http://walmartstores.com/GlobalWMStoresWeb/navigate.do?catg=347*).

[100] Raymond Bracy (Wal-Mart) and David Slump (GE Energy), comments to Senate Energy and Natural Resources Committee, April 4, 2006. Online at *http://energy.senate.gov/public/_files/ExecutiveSummariesforwebsite.pdf*.

[101] "Statement of the G8 Climate Change Roundtable," World Economic Forum, June 9, 2005. Online at *http://www.weforum.org/pdf/g8_climatechange.pdf*.

[102] Investor Network on Climate Risk (INCR) website (*http://www.incr.com/index.php?page=2*).

[103] Carbon Disclosure Project website (*http://www.cdproject.net/aboutus.asp*).

[104] INCR website, "INCR Overview." Online at *http://www.incr.com/index.php?page=9*.

called on companies in the electricity sector to estimate how future heat-trapping emission limits will affect their businesses and to identify steps they are taking to reduce those effects.[105] In doing so, a board member of the nation's largest public pension fund said, "Ignoring the impact of carbon on the environment and on corporate bottom lines would be fiscally irresponsible and a disservice to investors, taxpayers and the environment."[106]

Investors are particularly concerned with the financial wisdom of building new coal plants in the United States given the growing momentum here for federal CO_2 limits. Several of the nation's largest institutional investors recently warned TXU that the "future cost of carbon could alter the prudence" of the utility's plan to invest in new coal plants, and that TXU was "potentially exposing itself to unprecedented compliance costs" given the long lifespan of coal plants. It urged TXU to disclose to shareholders "how it has accounted for the 'future cost of carbon' in its resource planning for these plants."[107]

Many of the nation's largest banks and investment firms have recently announced more aggressive climate policies. Bank of America, for example, has launched a formal effort to assess and limit its risk from financing emission-intensive industries, including a commitment to reduce emissions from its public energy and utility portfolio seven percent by 2008.[108] JP Morgan Chase sees climate change as a "critical issue" with "potentially very serious consequences for both ourselves as well as our clients." In a recent speech, its director of environmental affairs said, "for the new power projects we are beginning to quantify the financial costs of those greenhouse gas emissions and incorporating that into our financial analysis of the transaction," and went on to note that looking at those costs is "going to have a big impact."[109] The head of global projects for Lehman Brothers has also addressed a cap on global warming emissions by saying, "There's a consensus that something's coming," adding that, "people are very much focused on how that's going to affect economics."[110]

Wall Street is also beginning to assess the impact new laws would have on particular power companies. Bernstein Research recently released a report describing the growing momentum toward CO_2 regulation, concluding that, "Regardless of which party wins the 2008 presidential elections . . . it is probable that the next administration will favor mandatory national limits on CO_2 emissions."[111] The report went on to identify the

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[105] INCR website, "Ten Point Investor Action Plan." Online at *http://www.incr.com/index.php?page=20*.
[106] Phil Angelides, quoted in "Investors Call on Power Sector and Wall Street to Focus Attention on Financial Risks From Climate Change," CERES website, April 13, 2005. Online at *http://www.ceres.org/news/news_item.php?nid=108*.
[107] INCR website, "Investors Concerned About TXU's Aggressive Coal Strategy," May 16, 2006. Online at *http://www.incr.com/index.php?page=ia&nid=178*.
[108] Bank of America website, "Bank of America Climate Change Position." Online at *http://www.bankofamerica.com/newsroom/presskits/view.cfm?page=climateandforests*.
[109] Amy Davidson, "Financial Institutions: Challenges and Opportunities," speech to the Earth Institute, Columbia University, March 29, 2006. Online at *http://www.earthinstitute.columbia.edu/sop2006/transcripts/tr_davidsen.html*.
[110] John Veech, quoted in "Analysts View Energy Policy Act through Climate Change Lens," August 30, 2005, *SNL Generation Markets Week*.
[111] Wynne, 2006.

utilities facing the greatest financial risk: "unregulated coal-fired generators supplying markets where gas is the predominant price setting fuel,"[112] which cannot pass the added costs of an emission cap on to consumers. The assumption, of course, is that regulated utilities *will* be able to pass future compliance costs on to ratepayers—an assumption we challenge below (see part VI), but which does reflect current regulatory practice.

This attitude reveals why, at least for the moment, some sectors of the financial community are still willing to help regulated utilities build new coal plants even when they know that such plants will be substantially more expensive in the carbon-constrained world ahead. Wall Street is not concerned with protecting ratepayers—that will be a job for state regulators.

V. Future costs of CO_2 regulation must be part of any realistic estimate of a new coal plant's operating costs.

A. CO_2 costs are increasingly factored into risk planning by utilities, regulators, and regional planners.

Representatives of three utilities explained in a 2005 trade journal article the importance of assessing and managing CO_2 risk:

> *"The financial risk associated with likely future regulation of carbon dioxide emissions is becoming a focus of utilities' and regulators' risk management efforts, as they recognize the imprudence of assuming that carbon dioxide emissions will not cost anything over the 30-year or longer lifetime of new investments. Utilities can help protect their customers and shareholders from this financial risk by integrating an estimated cost of carbon dioxide emissions into their evaluation of resource options, and selecting the overall least-cost portfolio of resources. Utilities can learn from the experience that some utilities have gained at managing this risk to ensure that today's investments do not lock customers or shareholders into much higher costs tomorrow if greenhouse gases are regulated."*[113]

A recent Lawrence Berkeley National Laboratory analysis of western U.S. utilities' resource planning practices found the practice of quantifying CO_2 risk to be widespread: "Given the potential for future carbon regulations to dominate environmental compliance costs, seven of the twelve utilities in our sample . . . specifically analyzed the risk of future carbon regulations on portfolio selection."[114] State regulators have since ordered three additional utilities to include CO_2 costs in their planning, leaving only two

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[112] Ibid, 2.

[113] Karl Bokenkamp (Idaho Power), Hal LaFlash (Pacific Gas & Electric), Virinder Singh (Pacificorp), and Devra Bachrach Wang, "Hedging Carbon Risk: Protecting Customers and Shareholders from the Financial Risk Associated with Carbon Dioxide Emissions," July 2005, *The Electricity Journal* 18(6): 11–24.

[114] Mark Bolinger and Ryan Wiser, "Balancing Cost and Risk: The Treatment of Renewable Energy in Western Utility Resource Plans," Lawrence Berkeley National Laboratory, August 2005. Online at *http://eetd.lbl.gov/ea/EMS/reports/58450.pdf*.

utilities (out of the 12 sampled) that continue to ignore CO_2 risks.[115] In its most recent resource plan, Northwestern Energy (formerly Montana Power) says it is "the mainstream practice of utility planners to factor a carbon tax into their models."[116]

California, Oregon, and Washington require utilities to factor CO_2 costs into their resource plans, and Montana ordered one utility, Northwestern Energy, to do so in its 2005 plan.[117] The California PUC actually chose a specific CO_2 value and requires the three investor-owned utilities in the state to use that value when evaluating bids (which has a direct, ongoing effect on resource selection outside the planning context).[118]

In 2005, the Northwest Power and Conservation Council (often referred to as the Northwest Council) issued a resource plan that incorporates estimates of future CO_2 values beginning in 2008.[119] This is worth noting not only because the 20-year plans developed by this federally created regional agency cover the entire Northwest, but also because most energy planning is conducted by utilities rather than independent planners who have no financial incentive to select one type of resource over another.

B. A useful range of CO_2 price forecasts is emerging from the literature.

Over the last few years, federal cap-and-trade proposals before Congress have spawned numerous analyses using computer models to simulate the market response to these regulations. For example, the EIA, the U.S. Environmental Protection Agency, the Massachusetts Institute of Technology (MIT), and the Tellus Institute have all modeled the effects of proposed legislation resulting in varying CO_2 cost projections.[120] The

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[115] Ibid., 62.

[116] Northwestern Energy, "2005 Electric Default Supply Resource Procurement Plan," Volume 2, Chapter 1, 25.

[117] See Bolinger and Wiser, 2005, 57 (note 75) and 60; Washington Administrative Code, section 480-100-238; and California PUC, "Interim Opinion on E3 Avoided Cost Methodology," April 22, 2004 (online at *http://www.cpuc.ca.gov/PUBLISHED/AGENDA_DECISION/45195.htm#TopOfPage*).

[118] California PUC, "Interim Opinion on E3 Avoided Cost Methodology," Decision 05-04-024, Proceeding 04-04-025, 29 and 89. Online at *http://www.cpuc.ca.gov/PUBLISHED/AGENDA_DECISION/45195.htm*. Also see UCS testimony submitted in this proceeding (online at *http://www.ucsusa.org/clean_energy/clean_energy_policies/testimony-on-accounting-for-californias-global-warming-gas-costs.html*).

[119] Northwest Power and Conservation Council, "The Fifth Northwest Electric Power and Conservation Plan," 2005, Volume 1, 19. Online at *http://www.nwcouncil.org/energy/powerplan/plan/Default.htm*.

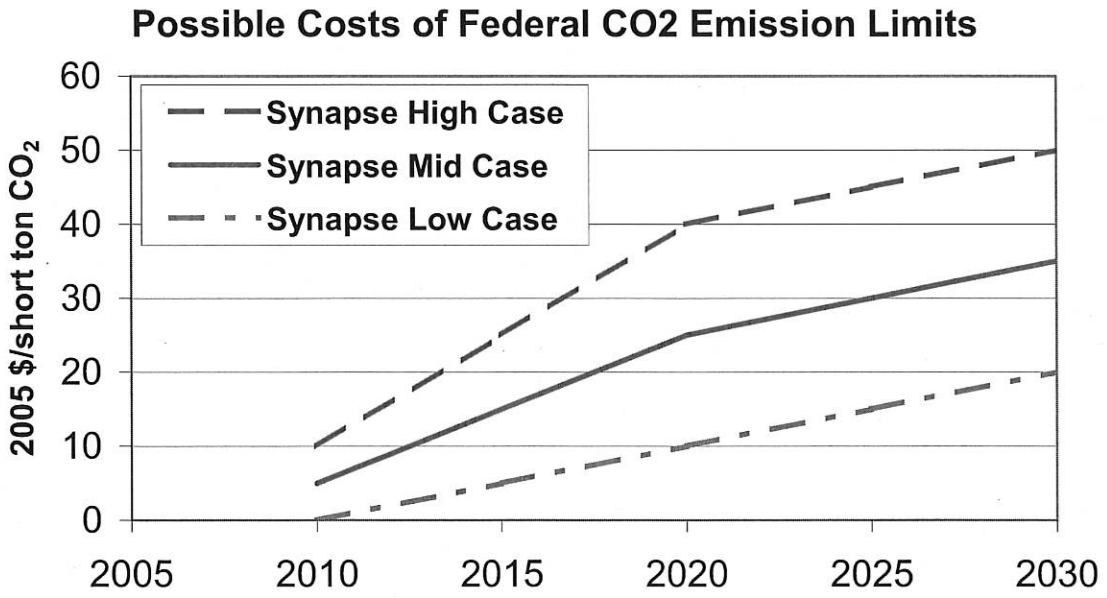
[120] See EIA, "Energy Market Impacts of Alternative Greenhouse Gas Intensity Targets," March 2006; "Impacts of Modeled Recommendations of the National Commission on Energy Policy," April 2005; "Analysis of Senate Amendment 2028, the Climate Stewardship Act of 2003," May 2004; "Analysis of S.139, the Climate Stewardship Act of 2003," June 2003;(online at *http://www.eia.doe.gov/oiaf/service_rpts.htm*); EPA, "Multi-Pollutant Legislative Analysis: The Clean Power Act," October 2005; and "Multi-Pollutant Legislative Analysis: The Clean Air Planning Act," October 2005 (online at *http://www.epa.gov/airmarkets/mp/index.html*); Massachusetts Institute of Technology Joint Program on the Science and Policy of Global Change, "Emissions Trading to Reduce Greenhouse Gas Emissions in the United States: The McCain-Lieberman Proposal," June 2003 (online at *http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt97.pdf*); Tellus Institute, "Analysis of the Climate Stewardship Act Amendment," June 2004 (online at *http://www.tellus.org/energy/publications/McCainLieberman2004.pdf*).

domestic policy option that has been subjected to the most analysis is the Climate Stewardship Act proposed by Senators McCain and Lieberman.

Another more recent policy proposal analyzed by the EIA is one developed by the NCEP. This approach focuses on reducing emission "intensity" (emissions per dollar of gross domestic product) rather than total emissions, but like all cap-and-trade proposals it would still impose a cost on CO_2 emissions.

In May 2006, Synapse Energy Economics conducted a review of the cost projections of 10 such modeled analyses, as well as the emerging policy response to climate change and recent scientific and political developments.[121] This review resulted in the high, mid-range, and low CO_2 cost projections shown in Figure 4.

Figure 4



Source: Johnston et al., 2006. [122]

While Synapse warns that the real cost of CO_2 is unlikely to follow a smooth path, the company believes its projections "represent the most reasonable range to use for planning purposes, given all of the information we have been able to collect and analyze bearing on this important cost component of future electricity generation."[123] When

[121] Lucy Johnston, Ezra Hausman, Anna Sommer, Bruce Biewald, Tim Woolf, David Schlissel, Amy Roschelle, and David White, "Climate Change and Power: Carbon Dioxide Emissions Costs and Electricity Resource Planning," Synapse Energy Economics, May 18, 2006. Online at *http://www.synapse-energy.com*.
[122] Ibid., p. 40.
[123] Ibid., 39.

Synapse's cost projections are levelized[124] over 30 years to 2005 dollars, the low CO_2 cost projection is $8.50/ton, the mid-range projection is $19.60/ton, and the high projection is $30.80/ton.[125]

Estimates of the price of future CO_2 allowances vary depending on a variety of factors, including the emission reduction target, the availability of offsets, whether international trading is allowed, the implementation timeline, and the existence of complementary policies such as energy efficiency programs and renewable electricity standards.[126] Two assumptions are particularly important and merit additional discussion here: the emission reduction target and the rate of technological progress.

First, all the analyses are based on relatively modest changes in U.S. emissions. The Climate Stewardship Act, for example, aims to return U.S. CO_2 emissions to 2000 levels over the period 2010 to 2015.[127] The NCEP proposal, which has been at the forefront of Senate hearings to design a cap-and-trade system, would slow the rate of emission growth but not reverse it.[128] None of the federal proposals that underlie these CO_2 cost estimates actually claim to deliver emission cuts sufficient to stabilize global CO_2 concentrations at a level that would avoid dangerous climate change.[129] Even the Kyoto Protocol, which would have required the United States to cut emissions seven percent below 1990 levels by the period 2008 to 2012, is only intended to be a first step leading to greater reductions later.[130]

As discussed in part I, section C, the science indicates that in order to prevent dangerous climate change, developed nations will need to reduce CO_2 emissions as much as 60 to 80 percent by 2050. Therefore, whatever federal policy to limit CO_2 emissions is initially adopted will have to be quickly followed with increasingly tighter caps if we are to put ourselves on a path toward climate stabilization in the decades ahead.

Much tighter national caps than those that have been analyzed would—all other things being equal—have the effect of driving CO_2 prices higher than the studies project. However, at some point, rising CO_2 prices would make low- or zero-carbon technologies competitive, leveling out the increase in CO_2 costs. How quickly that point is reached depends on a second important assumption: how quickly these technologies will develop. Most of the studies that provide the basis for the published cost projections (particularly

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[124] "Levelized" cost means "The present value of the total cost of building and operating a generating plant over its economic life, converted to equal annual payments. Costs are levelized in real dollars (i.e., adjusted to remove the impact of inflation)." EIA Glossary, *http://www.eia.doe.gov/glossary/glossary_l.htm*.

[125] Johnston, et al., 2006,, 41.

[126] Ibid, 35–39.

[127] See Pew Center on Global Climate Change, "Summary of the 2003 Climate Stewardship Act." Online at *http://www.pewclimate.org/policy_center/analyses/s_139_summary.cfm*.

[128] Johnston et al., 2006, Figure 5.1.

[129] The newly introduced bills discussed in part II.C aiming for 80 percent reductions below 1990 levels by 2050 have not yet been the subject of analysis and are not reflected in cost projections.

[130] Climate Change Secretariat, "Caring for Climate: A Guide to the Climate Change Convention and the Kyoto Protocol," United Nations Framework Convention on Climate Change, 2003, 25. Online at *http://unfccc.int/resource/cfc_guide.pdf*.

those by the EIA) make very pessimistic assumptions about the cost and performance of renewables, efficiency, and other alternative technologies, both today and in the years ahead.[131] Moreover, they assume that there will be no new policies requiring or providing incentives for greater use of these technologies, despite growing support for such policies at both the state and federal level.

Using more optimistic assumptions about the costs, performance, and policy support for these clean energy technologies would have the effect of reducing CO_2 prices below projected levels (or keeping them from rising as much as they otherwise would in response to ever-tightening caps).[132] In this way, the rapid development of coal alternatives would have the paradoxical effect of reducing the future costs of coal power. Of course, if utilities and regulators use these more optimistic assumptions about the development of low-carbon energy in forecasting CO_2 prices, they must use the same assumptions when determining whether it would be cheaper in the long run to simply invest in low-carbon alternatives rather than building new coal plants. Optimism about alternative technologies to coal may reduce the estimated cost of coal plants by keeping future CO_2 allowance prices low, but that same optimism undermines the economic logic of building a new coal plant in the first place.

The CO_2 price projections by Synapse are roughly consistent with the range of projections being used by utilities and the Northwest Council in their resource plans, though without encompassing the highest and lowest of those values. Table 1 shows the range of numbers in use.[133] (In some cases, these values are discounted by the utility with a probability weighting when actually used in planning.)

Table 1: CO_2 Emission Trading Assumptions for Various Years (in 2005 dollars)

PG&E*	$0-9/ton (start year 2006)
Avista 2003*	$3/ton (start year 2004)
Avista 2005	$7 and $25/ton (2010) $15 and $62/ton (2026 and 2023)
Portland General Electric*	$0-55/ton (start year 2003)
Xcel-PSCCo	$9/ton (start year 2010) escalating at 2.5%/year
Idaho Power*	$0-61/ton (start year 2008)
Pacificorp 2004	$0-55/ton
Northwest Energy 2005	$15 and $41/ton
Northwest Power and Conservation Council	$0-15/ton between 2008 and 2016 $0-31/ton after 2016

Source: Johnston et al., 2006, Table 6.1.

[131] For example, see Steve Clemmer (Union of Concerned Scientists), "Renewable Energy Modeling Issues in the National Energy Modeling System," presentation at the National Renewable Energy Laboratory Energy Analysis Seminar, Washington, DC, December 9, 2004. Online at *http://www.nrel.gov/analysis/seminar/docs/2004/ea_seminar_december_9.ppt*.

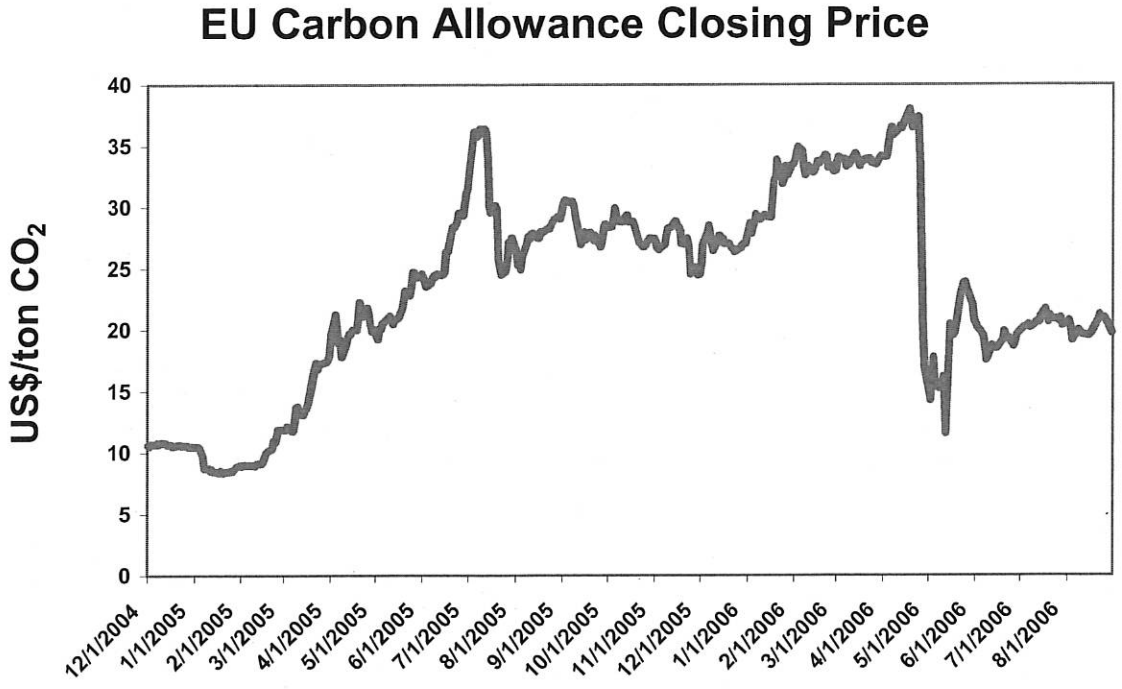
[132] The studies reviewed by the Tellus Institute used more optimistic assumptions and included complementary policies for energy efficiency and renewable energy technologies. The resulting CO_2 cost projections were closer to the Synapse mid-range projections and leveled off more in the later years of the forecast. See Tellus Institute, 2004.

[133] Ibid., 30.

Not included in Table 1 is the estimate of future CO_2 regulatory costs that California requires its utilities to assume in resource selection. At eight dollars per ton in 2004, rising by only five percent annually (less than the rate at which Synapse's projections rise), California's estimate begins near the high end of the Synapse analysis but move toward the low end in later years.[134]

Wall Street analysts Bernstein Research recently modeled the impact of a CO_2 allowance requirement on the earnings of several U.S. coal-fired generators, choosing nine dollars per ton of CO_2 as the price on which to base its analysis. It also considered a $28/ton CO_2 price based on the allowance prices recently prevalent under the European Union's cap-and-trade system, which reached levels as high as $35/ton during the past year.[135] As Figure 5 shows, CO_2 prices dropped sharply in May on news that many companies emitted less CO_2 than expected, suggesting that large emitters had been allocated too many allowances.[136] Prices have since partially rebounded.

Figure 5



Source: EU: PointCarbon.com using an average exchange rate for 2005 of 1.25 U.S. dollars per euro.

There are great uncertainties associated with predicting the future cost of CO_2 allowances, but this holds true for many other aspects of utility planning—especially

[134] See Bolinger and Wiser, 2005, 60.
[135] Wynne, 2006, 11–17.
[136] Reuters, "EU undershoots emissions cap that critics call lax," May 12, 2006. Online at *http://today.reuters.com/News/CrisesArticle.aspx?storyId=L12101022*.

when considering the wisdom of investing in capital-intensive power plants that typically operate for a half-century or more in a rapidly changing world. The most prudent way to assess and minimize this risk is to consider the impact of a reasonable range of CO_2 cost projections (such as those described above) on a proposed coal plant. The one CO_2 price projection certain to be wrong is zero.

C. Reasonable projections of CO_2 prices would greatly increase the cost of coal power.

CO_2 allowance prices in the ranges discussed above would significantly increase the price of power from new coal plants. How much CO_2 allowance prices raise the cost of generating electricity from coal depends on the efficiency of the plant in question, but generally speaking, new coal plants emit roughly one ton of CO_2 per megawatt hour (MWh) of electricity produced.[137] This means, for example, that a CO_2 price of $10 per ton would increase a plant's costs by $10/MWh (or one cent per kilowatt-hour). Figure 6 shows how the cost of coal-fired electricity would rise in response to different CO_2 prices, starting with the EIA's estimated average base price of $47.50/MWh for new pulverized coal plants placed into service in the upper Midwest in 2015.[138]

Applying the Synapse levelized CO_2 cost projections to a coal plant increases the cost of energy from the EIA's average coal plant by the amounts and percentages shown in Table 2. For example, the cost of energy from an average coal plant would be 40 percent higher over its operating lifetime assuming mid-range CO_2 costs starting at five dollars per ton in 2010 and rising to $35 per ton by 2030.

Table 2: Increase in Energy Cost Based on Projected CO_2 Cost

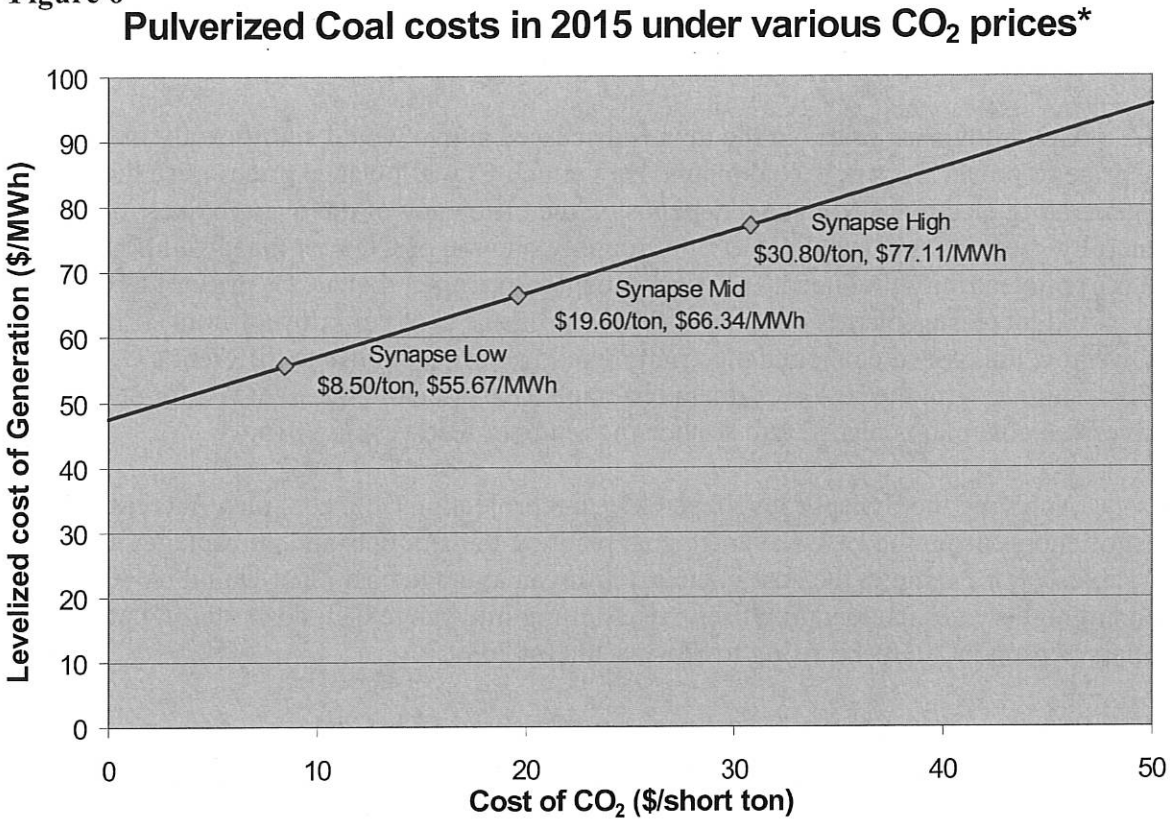
Price of CO_2 Allowance (levelized)	Cost of energy	Percent increase above base price
Base price (no CO_2 cost)	$47.50/MWh	–
Low projection: $8.50/ton	$55.67/MWh	17%
Mid-range projection: $19.60/ton	$66.34/MWh	40%
High projection: $30.80/ton	$77.11/MWh	62%

[137] Coal has a carbon intensity of 220 pounds per million British thermal units (Btu) and a new supercritical pulverized coal plant has a heat rate of 8,742 Btu per kilowatt-hour in 2005 (220 lbs/million Btu x 8,742 Btu/kWh/2,000 lbs/ton x 1,000 kWh/MWh/1,000,000 = 0.96 ton of CO_2 per MWh). See EIA, *Assumptions for Annual Energy Outlook 2006*, 2006.

[138] EIA, "NEMS EMM Factors for AEO06," spreadsheet, 2006. The costs are representative of a new coal plant built in the Midwest. Recent data indicates that EIA's base price for coal may be low. EIA's figure assumes overnight capital costs of $1,235/kW for a new plant. By comparison, the engineering firm Black and Veatch assumes overnight capital costs of $1,730/kW, based on the average cost of over 60 coal plant projects under construction or with air permits. (Source: Personal Communication with Ric O'Connell, Black and Veatch, August 20, 2006.) Using these capital costs, along with EIA's other assumptions, would raise the base cost of energy to $58/MWh.

Any utility proposing to build a coal plant would be reckless to make such a long-term investment without fully assessing a variable that could easily increase costs by $86 million per year on average, or $4.3 billion over a 50-year period, for a 600 MW coal plant.[139] The risk of future carbon constraints is far too great to ignore.

Figure 6



Source: EIA, "NEMS EMM Factors for AEO06," spreadsheet, 2006, and Johnston et al., 2006. The costs are representative of a new coal plant built in the Midwest.

D. Given the carbon-constrained world ahead, renewables and efficiency will generally be a much better investment than new coal plants.

In many cases, coal plants are already more expensive than cleaner options. This is particularly true with respect to investments in energy efficiency and wind turbines (in locations with favorable winds). With mid-range estimates of future CO_2 costs adding close to $20/MWh (or two cents per kilowatt-hour) to the cost of energy from a coal plant, cleaner options will cost less than coal in an even wider range of cases.

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[139] Based on an estimate by Synapse for the Big Stone II coal plant under a mid-range CO_2 cost projection. See David A. Schlissel and Anna Sommer, direct testimony to the South Dakota PUC, case no. EL05-022, May 19, 2006, 24. Online at *http://www.state.sd.us/puc/commission/dockets/electric/2005/el05-022/testimonyschlisselsommer.pdf*.

While the exact cost comparisons will vary by location, two recent analyses compare coal plants with cleaner options in a carbon-regulated world, and in these analyses new conventional coal plants cannot compete. The first such analysis is a massive exercise in regional resource planning recently conducted by the Northwest Council.[140] With no financial stake in the outcome to skew its planning judgment, the council's fifth 20-year plan (adopted in December 2004) is a useful contribution to resource planning.

Among other things, the plan ranks various supply- and demand-side options on a cents-per-kilowatt-hour scale. The Northwest Council identifies 25 different conservation and renewable options that cost less than the cheapest new coal plant (even in Montana, a coal-producing state).[141] The plan looks at many different scenarios and various price estimates for future CO_2 costs (though these estimates pre-date recent developments such as the Senate resolution calling for carbon regulation).[142]

The plan concludes that much more investment in conservation is warranted even though the Northwest has already made relatively high investments in conservation over the years.[143] Overall, the Northwest Council's approach of identifying options that are both low-cost and low-risk yielded a plan that greatly increases investment in conservation and wind and *does not include any new conventional coal plants* for the region throughout the 20-year planning period.[144] While the council's cost estimates may not directly apply to other regions, they provide a valuable example of how conventional coal plants become uncompetitive compared with energy efficiency and renewable energy when independent resource planners use realistic assumptions about the future and factor in carbon risk.

The second relevant analysis was conducted by Synapse Energy Economics, which in May 2006 submitted testimony critiquing a resource comparison that a coalition of utilities seeking to build a conventional coal plant submitted to South Dakota regulators.[145] The utilities did not compare the proposed 600 MW Big Stone II plant with a comparable investment in energy efficiency, nor did Synapse. However, the utilities did compare Big Stone II with the alternative of building 600 MW of wind power along with a 600 MW natural gas combined-cycle plant. Not surprisingly, the utilities' wind/gas alternative was more expensive than Big Stone II, since it assumed only 600 MW of wind power and unnecessarily assumed that the wind turbines required 100 percent backup from natural gas to compensate for the wind's intermittent nature.

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[140] Northwest Power and Conservation Council, 2005.
[141] Ibid., Table OV-2, 26–27.
[142] Ibid., 19. The Northwest Council assumes CO_2 costs of between zero and $15 per ton beginning in 2008, and between zero and $30 per ton beginning in 2016.
[143] Ibid., 4, 29–31.
[144] Ibid., 29.
[145] David A. Schlissel and Anna Sommer, direct testimony to the South Dakota PUC, case no. EL05-022, May 26, 2006. Online at *http://www.state.sd.us/puc/commission/dockets/electric/2005/el05-022/testimonyschissel052606.pdf*.

Synapse reworked the comparison by increasing the amount of wind power to 800 and 1200 MW, reducing the amount of natural gas to levels that would be needed to provide an equivalent amount of electric generation and capacity (300 to 480 MW) as the coal plant,[146] and factoring in its low, mid-range, and high CO_2 cost estimates (described in part V, section B). Synapse also completed a sensitivity analysis of a few key variables including the continued existence of the federal production tax credit for wind, a capacity value for wind (which affects the amount of natural gas capacity needed), and whether the utilities were investor-owned or publicly owned.

Under all of the CO_2 price forecasts, the analysis showed that all of the high-wind (1,200 MW) scenarios were approximately the same or less costly than the 600 MW coal plant, even without the federal production tax credit and using a very conservative capacity value for wind. Under the most likely mid-range CO_2 price forecast, Big Stone II cost 27 to 71 percent more than the high-wind scenarios, across the entire range of assumptions.[147]

The analysis also showed that all of the wind/gas alternatives had lower costs than the 600 MW coal plant under both the mid-range and high CO_2 price forecasts. Coal fared remarkably poorly in these comparisons even though Synapse did not correct all of the utilities' assumptions that underestimated the cost of coal and overestimated the cost of wind.[148] In addition, the Big Stone II co-owners recently announced that the capital costs for the project have increased by 50 percent—from $1.2 billion to $1.8 billion.[149] Using these new costs, and incorporating energy efficiency into the alternatives analysis, would make the alternatives even more economically viable than described above.

Both the Northwest Council and Synapse analyses show coal unable to compete financially with other options available today when future carbon constraints are considered. In the future, coal is likely to be even less competitive, because policies designed to combat global warming will not just make coal more expensive but will surely accelerate improvements in cleaner technologies. Unlike conventional coal plants, many energy efficiency and renewable energy technologies are still relatively new. As they break out of niche markets and achieve greater economies of scale, improvements in price and performance will follow. Utilities that invest heavily in coal today are therefore

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[146] Ibid., 14. Synapse explains in its testimony that, by accepting the utilities' assumption that any dedicated backup plants would be built to support wind power, its analysis overstates the cost of the wind options.
[147] Ibid., Tables 1 and 2, 17. (A corrected version of these tables with slight alterations to the originally-filed numbers is online at *http://www.state.sd.us/puc/commission/dockets/electric/2005/el05-022/corrected062306.pdf*.)
[148] Ibid., 13–16. Synapse explains in its testimony its decision not to correct several of the utilities' original assumptions that bias the analysis against wind. For example, while the tax and financing advantages of public utilities were reflected in the cost of Big Stone II, they were not reflected in the cost of wind. Synapse corrected the utilities' assumption that wind had zero capacity value, but it conservatively assumed that wind resources have a capacity value of only 15 or 25 percent (despite recent utility studies showing that wind in the region has a capacity value between 27 and 34 percent). Synapse also used the utilities' value of $12/MWh for the production tax credit, despite data from the EIA showing a value of $21/MWh.
[149] Associated Press, "Higher cost for SD power plant won't help ND chances, exec says," August 4, 2006. Online at *http://www.kxma.com/getARticle.asp?ArticleId=30517*.

not only running unnecessary financial risks, but also losing the flexibility to take full advantage of the technological opportunities ahead.

E. Retrofitting a pulverized coal plant to limit CO_2 emissions is feasible, but will be very expensive.

Coal plants emit far more CO_2 than any pollutant that is federally regulated today. By way of example, the Final Environmental Impact Statement for the Weston 4 coal plant in Wisconsin lists potential mercury emissions of 78 pounds per year, sulfur dioxide emissions of about 2,300 tons per year, and nitrogen oxide emissions of about 1,600 tons per year. CO_2 emissions, by comparison, are projected to be 4,100,000 tons per year.[150] Collecting and disposing of CO_2 emissions therefore pose much greater technological challenges than those faced by coal plants to date.

It is considered technologically possible to capture 80 to 90 percent of the CO_2 from a conventional coal plant by scaling up methods currently in use to produce CO_2 for beverage and chemical applications.[151] However, the costs—in terms of energy consumed by the capture process and added capital and operating expenses—would be very high. The energy penalty of adding such technology to the plant would equal 24 to 40 percent of the energy produced by the plant.[152] A recent MIT study estimates that adding CO_2 capture technology to a conventional coal plant and disposing of the CO_2 in geological formations would increase the plant's levelized cost by nearly $30/MWh or 74 percent.[153]

Thus, there is no technological solution that can be reasonably expected to buffer a conventional coal plant from the financial risk associated with CO_2 regulation. Whether the plant operator ultimately pays for emission allowances or installs technology to capture and dispose of the CO_2, it runs a high risk of greatly increased costs.

VI. Regulators should protect ratepayers from future CO_2 costs by refusing to authorize new coal plants; alternatively, they should clearly place the risk of future CO_2 costs on utility shareholders rather than on ratepayers.

Currently, a utility's environmental compliance costs are routinely passed through to ratepayers as a cost of providing electricity. In particular, costs of buying pollution allowances (such as the sulfur dioxide allowances coal operators purchase today) are considered operating expenses recoverable through rates. This regulatory pattern of

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[150] Public Service Commission of Wisconsin, Weston Unit 4 Power Plant Final Environmental Impact Statement, Volume 1, July 2004, 134 and 145. Online at *http://psc.wi.gov/utilityinfo/electric/cases/weston/document/Volume1/W4_FEIS.pdf*.

[151] IPCC, "Carbon Dioxide Capture and Storage," 121. Current unit capacities would have to be increased by a factor of between 20 and 50 for deployment at a 500 MW coal plant.

[152] Ibid, Summary for Policymakers, 4.

[153] Ram C. Sekar, John E. Parsons, Howard J. Herzog, and Henry D. Jacoby, "Future Carbon Regulations and Current Investments in Alternative Coal-Fired Power Plant Designs," MIT Joint Program on the Science and Policy of Global Change, December 2005, 4.

treating pollution allowance costs as operating expenses means that utilities may feel confident that they can also recover any future CO_2 allowance costs through their rates.

Such confidence, however, means a utility operating in a regulated environment has little incentive to assess CO_2 allowance costs in a serious way, even when contemplating major new long-term investments. From a societal standpoint, this is a financial disaster waiting to happen; the financial risks of building a new coal plant are very high, but the party making the investment is not deterred because it does not feel at risk.

It is, of course, up to state regulators to make sure this financial disaster is avoided and that ratepayers are protected. By far the best way to do that is to deny approval of the proposed coal plant and encourage the utility to pursue less financially risky alternatives.

However, if regulators do approve construction of a proposed plant, they should ensure that the utility has an incentive to minimize this risk as it emerges by warning it that future CO_2 allowance costs will not be recoverable through rates. This is particularly important given how rapidly climate change policy is evolving and how long it takes to build a coal plant. Because utilities would for some time have the ability to cancel or downsize new plants in response to the growing risk of CO_2 costs, regulators should give them the incentive to monitor and respond to that risk. Shifting the risk of future CO_2 regulations onto utilities may be inconsistent with current rate treatment of pollution allowances, but it is fully consistent with underlying ratemaking principles and the case law related to investments in new baseload plants.

In the late 1960s and 1970s, many of the nation's utilities believed two things that turned out to be wrong: that electricity demand would keep growing at a fast rate and that nuclear power would be an inexpensive way to meet that demand. These mistaken beliefs resulted in substantial excess baseload capacity in the early 1980s (largely from unneeded coal plants), many abandoned nuclear plants, and disputes around the nation about whether the costs of these mistakes should be paid by utility shareholders or ratepayers.

The regulatory decisions made during this era typically allocated at least a share of excess costs to shareholders, and articulated standards intended to give utilities a stronger incentive to avoid such unwise investments in the future.[154] Now that utilities are again in the midst of a baseload power plant construction boom based on risky assumptions, these standards are again highly relevant.

Two complementary regulatory approaches emerge in these disputes: the "prudent investment approach" and the "shared costs approach." Both approaches are intended, in part, to create incentives for utilities to continually rethink their investment decisions in

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[154] For overviews of these cases see Richard J. Pierce, Jr., "The Regulatory Treatment of Mistakes in Retrospect: Canceled Plants and Excess Capacity," 132 *U. Pa. L. Rev.* 497 (1984); "Abandoned Nuclear Plant Recovery," 83 *ALR*4th 183 (1991); and Roger D. Colton, "Excess Capacity: Who Gets the Charge from the Power Plant?" 34 *Hastings L.J.* 1133 (1983).

light of emerging events (rather than sticking to a chosen path even when subsequent developments clearly make that path unwise).

Under the prudent investment approach all or part of a utility's investment can be excluded from rates if any decision made by the utility in relation to that investment is found to be imprudent. This could include the decision to build a power plant and the subsequent decision not to cancel it after changing circumstances show the project to be unwise.[155]

While this principle has often been invoked by utilities seeking to recover from unsuccessful investments that appeared to be prudent when they were initially made,[156] the principle is also intended to protect ratepayers from unwise utility decisions.[157] Over the years, regulators have denied rate recovery for some enormous investments judged to be imprudent, including costs related to abandoned nuclear power plant construction plans[158] and coal plants that were built but created excess capacity.[159]

To determine whether an investment was prudent, courts consider what a utility knew or should have known when the investment was made, and any alternative generating options that were available at the time. The inquiry not only focuses on the initial decision to build a plant, but also on the subsequent, ongoing decisions to continue pursuing construction even after events such as the adoption of a new regulatory approach greatly increased cost estimates beyond those originally projected. As parts I through V show, building a coal plant without reasonably factoring in the substantial financial risk associated with coming climate laws is clearly imprudent. On these grounds alone, regulators would be justified in disallowing rate recovery of CO_2 costs.

However, an investment need not be deemed imprudent for recovery to be disallowed. The U.S. Supreme Court has explicitly upheld the authority of state regulators to limit a utility's recovery for an investment that appeared prudent at the time it was made but ultimately proved unwise.[160] States have considerable discretion to set rates that appropriately balance the interests of shareholders and ratepayers, and some have adopted approaches that divide financial risks between these parties. State regulators have particularly used this shared costs approach in cases of excess capacity built as a result of inaccurate demand forecasts, because they concluded that placing all the risk on ratepayers is unfair and creates the wrong incentives for utility management. In 1982, for example, Iowa regulators refused to pass on to ratepayers all the costs a utility incurred in building what later proved to be excess generating capacity, even though the decision to build was reasonable when made. The Iowa commission explained its reasoning this way:

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[155] See Pierce, supra, p. 7.
[156] See Duquesne Light Co. v. Barasch, 488 U.S. 299, 109 S.Ct. 609 (1989).
[157] Verizon Communications Inc. v. FCC, 535 U.S. 467, 122 S.Ct. 1646, 1659 (2002).
[158] See e.g., Association of Businesses Advocating Tariff Equity v. Public Service Commission, 527 N.W.2d 533 (Mich. App. 1994); In Re Interstate Power Company, 416 NW2d 800 (Minn. App. 1987); Re Boston Edison Co., 46 PUR4th 431 (Mass DPU, 1982), aff'd 455 NE2d 414.
[159] Gulf Power Company v. Florida Public Service Commission, 453 So.2d 799 (Fla. 1984);
[160] Duquesne Light Co. v. Barasch, 488 U.S. 299, 109 S. Ct. 609 (1989).

"In the real world of competitive enterprise, management officials must continuously rethink prior decisions as new events unfold. Those who fail to stay on top of current events lose out to their competition. Iowa utilities should also maintain surveillance over costs associated with a particular decision, and in the absence of the kind of incentive provided by a competitor, the responsibility falls upon us to provide the requisite incentive."[161]

The Wisconsin Supreme Court agreed with Iowa's shared costs approach and recognized the authority of Wisconsin regulators to apply it in the same context.[162] Pennsylvania regulators applied similar reasoning in an excess capacity case, noting that while the investments were prudent and the excess capacity was no fault of the utility or its investors, "neither was it the fault of ratepayers. Under these circumstances there must be some sharing of the risk associated with bringing these large plants on line."[163]

North Dakota regulators took a similar approach in response to excess capacity created by a coal plant, refusing to allow all the costs to be passed on to ratepayers. Though they did not deem the utility's investment imprudent, regulators felt it was "unreasonable to expect ratepayers to completely absorb the risk" of excess capacity, and that "there must be some risk placed on the utility and there must be some incentive for the pool and the individual utility member to continuously strive for accurate and precise management" of investments in baseload capacity. [164]

Both the prudent investment approach and the shared costs approach recognize the importance of giving utilities a strong incentive to avoid making investment mistakes, especially when building expensive, long-lived baseload plants. And both lines of cases stress how important it is for utility management to keep track of changes that affect the wisdom of the utility's investment during the period after a plant receives regulatory approval but before construction is completed.

These cases grew out of an era (the 1970s) when utilities making large investments in baseload capacity were surprised by events beyond their control—primarily the OPEC embargo, which led to slower growth in energy demand, and the Three Mile Island accident, which resulted in stricter safety standards and higher construction costs. Once again, utilities are making huge investments in baseload power, but this time the global changes that threaten the economic viability of these investments are far more predictable than they were in the past. Indeed, they are looming, and they threaten to substantially increase the cost of energy from new coal plants. It is even more critical today that utilities be given a strong incentive to track regulatory developments and continually re-examine their construction decisions in light of those developments.

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[161] Re Iowa Public Service Company, 46 PUR4th 339, 368-69 (IA Commerce Commission, 1982).
[162] Madison Gas and Electric Company v. Public Service Commission of Wisconsin, 325 N.W.2d 339 (Wis. 1982).
[163] Pennsylvania Public Utility Commission v. Philadelphia Electric Co., 37 PUR4th 381, 387 (Pa. Public Utility Commission, 1980).
[164] Re Montana-Dakota Utilities Co., 44 PUR4th 249, 255 (N.D. PSC 1981); see also Re Otter Tail Power Company, 44 PUR4th 219 (N.D. PSC 1981).

Regulators can create such an incentive by determining, as a condition of plant approval, that future CO_2 costs will be borne by utility shareholders rather than ratepayers.

VII. Conclusion

The fight against global warming will unquestionably change the laws, economics, and technology of power production and use. Many different groups have a role to play in helping ensure our society responds sensibly to these changes.

- Utilities should factor future CO_2 costs into their resource planning and procurement, aggressively pursue conservation, efficiency and renewable energy, and at the very least defer making major coal plant construction decisions until they have a clearer picture of the regulatory risks and technological opportunities ahead.

- Regulators should insist that utilities take the above steps. They should also protect ratepayers by refusing to authorize the construction of new conventional coal plants, which are premised on the regulatory conditions of the past, not those of the future. At the least, they should warn utility managers that shareholders will bear the risk that coal investments will result in excess carbon costs.

- Investors and shareholders should recognize the inevitability of CO_2 regulations and understand that utilities that behave imprudently by building coal plants despite these costs would, under existing regulatory principles, be prevented from recovering at least a portion of such costs in their rates. Shareholders should question utility management closely on how they are assessing and managing carbon risks, and require reporting and accountability. Long-term investors should favorably regard companies who are proactively considering and managing these risks effectively.

- Ratepayers and consumer groups should realize that the utilities building new coal plants will seek to recover all their costs, including CO_2 regulatory costs, from ratepayers. While legal principles support denying rate recovery of these costs, history shows that these cases are extremely contentious and expensive. A far better way for ratepayers and consumer groups to protect themselves from such financial risk is by resisting the construction of new conventional coal plants in the first place and by supporting investments in cleaner alternatives such as efficiency and renewable energy.

Building a major energy resource – especially one that costs as much and lasts as long as a coal plant -- is unavoidably an exercise in predicting the future. It cannot be prudently done without objectively analyzing the trends and potential risks that will shape the decades ahead. In the case of new coal plants, the critical trends are undeniable and moving with unstoppable momentum: CO_2 levels are rising to levels unseen on the planet in millions of years, global temperatures are setting new records, scientific

evidence showing that our current energy path is leading to dangerous climate changes is mounting, and the policy response at every level of government is accelerating. To assume in the face of these trends that a new coal plant could be put into service and allowed to emit millions of tons of CO_2 for free for the next few decades is reckless, to say the least. New conventional coal plants in the age of global warming are not just bad policy – they are a bad investment, and one we cannot afford to make.

KANSAS TAXPAYERS NETWORK **web:www.kansastaxpayers.com**
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Wichita, KS 67208 **Fax 316-684-7527**
February 7, 2008

Testimony Opposing H.B. 2711

By Karl Peterjohn, Executive Director

H.B. 2711 would restore a legal environment where it would be possible to build an expansion at the Holcomb coal fired electrical power plant in western Kansas. This is a laudable goal and KTN supports this intent. It is a terribly sad comment on the sad state of the rule of law in Kansas that this legislation is even necessary.

This legislation contains a fatal flaw. A new carbon charge is contained within this bill. It is for all intents and purposes a new tax (sections 10-12). H.B. 2711 creates a new charge on electrical generation using coal in certain circumstances. Sadly, this establishes a terrible precedent.

While KTN supports the building of the power plant, we strongly oppose the creation of any new Kansas taxes. At a time when energy prices have been rising rapidly, the idea of adding any additional costs would be a problem for Kansans who are struggling to pay for energy, higher food, and taxes. This legislation begins the process of taxing energy.

There are many other carbon dioxide emitters who would not be initially taxed under this legislation. Let me list some of the other generators of carbon dioxide in Kansas: the living, breathing people of Kansas—including every legislator and conferee on this bill all exhale carbon dioxide; other mammals; motorized vehicles and motors in general; wood fired fireplaces; energy users from ethanol, petroleum refining, manufacturing, and industry in general. Eventually, the proponents for carbon taxes will want to see new charges placed on everything emitting carbon dioxide but the largest sources, coming from Mother Nature cannot be taxed.

The people of Kansas do not need any new taxes. The people of Kansas do not need higher taxes to be passed through to them in the form of a higher cost for their purchases of energy in all its myriad forms. When the first income tax was being debated in Washington in the early part of the 20th century, an effort was made to place a lid of 10 percent on the maximum rate for any income tax. Sadly, this effort to create this limit failed in congress.

The initial federal income tax was imposed only on a small segment of the population. In less than a decade the income tax metastasized into a huge burden impacting almost all Americans and has largely continued to do so to this day. H.B. 2711 creates a similar type of charge and raises the risk of history repeating itself in a way that would be very harmful to the Kansas economy and to the people of this state. KTN strongly urges this committee to remove this new charge from H.B. 2711.

HOUSE ENERGY AND UTILITIES
DATE: 2/7/2008
ATTACHMENT 19

Statement of Jack Glaves
Regarding Senate Bill 515 and House Bill 2711
on behalf of DCP Midstream
February 7, 2008
to the
House and Senate Utility Committees

I represent DCP Midstream, the parent company of National Helium (NH), the single largest consumer on the old Aquila/WPK system in southwest Kansas. That system was acquired by Sunflower Electric Power Corporation through its separate entity known as Mid-Kansas Electric Company (MKEC).

Please refer to the attached "talking points", from our perspective, for a summary of the issues involved.

The Kansas Corporation Commission (KCC) has recognized that Section 34 of Senate Bill 515 and House Bill 2711 is problematic, but the proposed amendment, in our view, does not suffice to ensure continued regulatory overview for the protection of the former Aquila customers.

Section 34 of SB 515 and HB 2711 de-regulates the involved cooperatives, including MKEC and, potentially, Southern Pioneer Electric Company, which are the contracting parties with my client in a pending 5 year service agreement for the NH plant near Liberal, under which it takes electric service at tariff prices as well as other services. That plant has an estimated electrical cost requirement, over the five year term, of approximately $85 million.

If adopted as currently written, Sunflower, MKEC and other cooperatives on these systems could be de-regulated. MKEC which, by order of the KCC, adopted the old Aquila rates would not be regulated by the KCC, if it elects to de-regulate, after the

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effective date of this bill. Under this legislation until such time as the service territory in question is "spun down" there would be no regulation of these utilities.

In the case of National Helium, this regulatory free status would continue until the transfer to Southern Pioneer of the Aquila assets from MKEC would occur. It is uncertain when that transfer will take place and could, in any event, be obviated by Southern Pioneer electing to change its business status to one which would make it a entity subject to the Electric Cooperative Act (K.S.A. 17-4601) which, under Section 34, relieves them of KCC jurisdiction.

The bottom line is that Section 34 affords the opportunity for a substantial regulatory gap for all of the former Aquila customers that are not "members" of Southern Pioneer since it is not currently a cooperative and thus not subject to the "opt out" provision of Section 34(g). All of the reasons for utility regulation are ignored for these customers that would be left to fend for themselves.

Section 34 of SB 515 and HB 2711 needs serious consideration. We believe the KCC proposal is inadequate to safeguard the old Aquila system customers. Section 34 should be eliminated or modified to clearly preserve KCC jurisdiction to assure compliance with existing orders, stipulations and agreements or directives pertaining to the acquired Aquila assets for the benefit of the affected customers.

We stand ready to assist in this endeavor, but we need time to receive considered judgment by all concerned in order to formulate a reasonable solution.

Respectfully submitted:

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Jack Glaves
DCP Midstream

NATIONAL HELIUM PROPOSES THE FOLLOWING CHANGE TO THE KANSAS CORPORATION COMMISSION DRAFT PROPOSAL OF FEBRUARY 5, 2008 –

Section 34(f)

Nothing in this section shall be construed to affect the single certified service territory of a cooperative or the authority of the state corporation commission, as otherwise provided by law, over a cooperative with regard to service territory, charges, fee or tariffs for transmission services, sales of power for resale other than sales between a cooperative as defined in subsection (a), that does not provide retail electric service and an owner of such cooperative, wire-stringing, transmission line siting, and COMPLIANCE WITH THE EXISTING ORDERS, RULINGS, STIPULATIONS AND AGREEMENTS, OR DIRECTIVES OF THE KANSAS CORPORATION COMMISSION IN EFFECT PRIOR TO THE EFFECTIVE DATE OF THIS ACT, NOR AFFECT THE CONTINUING JURISDICTION OF THE STATE CORPORATION COMMISSION OVER RETAIL SALES TO NON-MEMBER CUSTOMERS OF A COOPERATIVE OR A SUBSIDIARY OR AFFILIATE THEREOF, pursuant to K.S.A. 66-131, 66-183, 66-1,170 et seq., or 66-1,177 et seq., and amendments thereto

Testimony re: HB 2711

Mr. Chairman, Members of the Committee

I regret that I am unable to meet with you this morning to discuss HB 2711. My name is Lee Gerhard, I reside at 1628 Alvamar Drive, Lawrence, Kansas. I was your state geologist for thirteen years before retiring from that position. I have spent much of the last fifteen years investigating and studying climate change. I have produced one book and about twenty publications on the topic in professional journals and on the internet. I am one of the "experts" who reviews and critiques the reports of the Intergovernmental Panel on Climate Change, and as such, I assume I share the last Nobel Peace Prize.

I am not testifying in support of or in opposition to HB 2711, but only to give scientific information regarding section 10. I have found the notion that carbon dioxide emissions from human activities is the major factor in climate change to be false.

There are three points I wish to make:

First, climate naturally changes all the time, in both directions and at many scales of intensity and range. All geologists know that, all scientists should acknowledge that. That climate is changing does not imply any cause.

Second, to establish that there is a human influence on climate, it is necessary to prove:

1. That the climate is changing at a rate greater than that which has occurred over recent geologic and historic time.
2. A close correlation between temperature change and greenhouse gas concentrations.
3. The extremes of temperature we experience are not within the natural limits already experienced by humanity and the collected biota of the world.

None of these statements are true.

Third, there is a close and long term correlation between solar activity and earth temperature.

The U.S. Department of Energy has calculated that the human contribution to the annual carbon budget is only about 4.3%.

The effect of human contribution to the carbon dioxide concentration and greenhouse effect in the atmosphere is only about 0.22%

The sum of these statements is that there is no scientific reason to attempt to manage carbon emissions. Those who argue otherwise should provide empirical data to support their views. I have not been able to locate any such data in the fifteen years that I have been focusing on this issue. Computer models predict scenarios, but they are models, subject to assumptions and so far have not been able to p replicate past climate.

This is a complicated topic, and not easily covered in a few words. The bottom line is that no changing of human activities will result in any effect on climate. There must be benefits gained from the costs of these attempts.

Several of my colleagues believe that the best way to resolve this conflict is to litigate, so that all participants are under oath and subject to cross-examination.

I thank you for taking the time to read and consider these comments.

N. B. I have a power point presentation lasting approximately 40 minutes that outlines how earth temperature is controlled, and what effect natural and human efforts affect our climate. I would be pleased to present this in an executive briefing session

I have attached two publications that might be of interest to the committee and several graphics.

Gerhard, Lee C., 2004, Climate Change: Conflict of observational science, theory, and politics: American Association of Petroleum Geologists Bulletin, v. 88, p. 1211-1220).

Gerhard, Lee C., 2006, Comment: Testing Global Warming Hypotheses: Geotimes, v. 51, n. 9, September, 2006, p. 7 (47).

Graphics attached as a powerpoint:

1. Ice core data showing how the Earth is gradually cooling, and that the temperature rises and falls very rapidly. This data gives a historical perspective of past temperature changes. Note the Earth is slowly cooling. And has been for 8000 years, but whether it is cooling or warming is a function of what time span is used to make the assertion. Chart from Davis and Bohling, 2001.

2. That show that the effect of carbon dioxide is logarithmic, and that doubling carbon dioxide would make little difference to Earth temperature. Curves show that as carbon dioxide increases, the effect of each increase is diminished, and that even doubling carbon dioxide would likely only increase earth temperature by 0.22 C (normal wet atmosphere). Data from Dr. Richard Lindzen, M.I.T.

3. That carbon dioxide is a minor constituent of the greenhouse effect, and thus, human additions have little or no effect. Data from Hieb and Hieb, 2003.

4. Despite rising carbon dioxide, global temperature is cooling or stable. Data from Hadley Center, England.

5. Solar variability correlates well with historical and current temperature changes. Carbon dioxide growth seems unrelated to temperature. Data from various sources as noted.

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Global Warming

Lee Gerhard

Global climate change has been a natural phenomenon driven by natural processes for 4.5 billion years. Nevertheless, cultural pressures exist to identify a human cause for current global climate change.

As Peter Flawn, President Emeritus of the University of Texas, recently wrote, "All geologists early in their careers are introduced to solving problems through multiple working hypotheses — of deriving solutions from the data rather than, as is common among some social scientists, settling upon a solution consistent with the reigning theory and supporting it with data selectively chosen." Although many geologists have expressed concern about the paucity of data supporting supposed human-driven climate change, scientific tests to falsify the hypothesis have been lacking.

The first step toward restoring the rigor of science in the global climate debate occurred when, on June 22, a committee of the National Academy of Sciences presented the results of its directed study of the science behind the infamous "hockey stick." Published by Michael Mann and colleagues, the hockey stick study — which statistically interpreted tree ring data as demonstrating unprecedented current warming relative to the past 1,000 years — failed to capture and denied the existence of the "medieval climate optimum," a warming event beginning 1,100 years ago. The hockey stick was the basis for the U.N. Intergovernmental Panel on Climate Change's statement that "there is discernible human impact on climate."

Vindicating the original criticism of past-published researchers, the National Academy report identifies the failure of the hockey stick to model climate beyond the past 400 years, as evidenced by its inability to reflect the medieval climate optimum. The optimum has been extensively documented by recorded human history and proxies, but cannot be explained by computer models based on equations that assume that greenhouse gases dominate climate change. These same models predict massive increases in Earth's atmospheric temperature because of the additions of a small percentage of human-derived carbon dioxide.

Data, records and proxies demonstrate that the medieval climate optimum, along with the cyclic and preceding Roman-era warm event and current modern warming event, are natural events. It now remains to be discovered what processes are driving climate change.

Geologists are the scientists who study Earth's past, and the past can be the key to the present. When insufficient empirical evidence exists to understand climate change in the present, then geologists must visit the past to understand operating processes.

> Understanding climate change requires application of the scientific method.

Understanding climate change requires application of the scientific method. Testing hypotheses against data and observations will provide answers that can become the basis of responsible public policy decisions. Resolving the global climate change argument requires testing three hypotheses.

The first hypothesis is that climate naturally and constantly has changed throughout Earth's history, growing both warmer and cooler, and at many rates and scales. This hypothesis is supported by recorded human history and all paleoclimate evidence, and confirms that natural climate changes are the rule, not the exception. That hypothesis is now established theory.

It is incumbent on the geoscience profession to better communicate this fundamental principle. Statements that the Arctic is warming, or that ice is melting, or that summer temperatures are higher can each be true, but they do not imply any specific cause of such changes. Some in the media, government and even academic organizations follow those statements with, "so that proves that humans are causing climate change." But that statement does not follow and is not true.

The remaining two hypotheses are contradictory. One is that human greenhouse gas emissions are the major driver of global climate change. The other is that natural processes are the major driver of global climate change. Scientists must use observations and data to test each hypothesis.

Testing greenhouse-gas drivers requires that we first determine in the past how such drivers have worked. Examination of ice-core data documents that in the past, temperatures have risen, and carbon dioxide levels have followed, lagging behind major interglacial warming by up to hundreds of years. Speculation is that the carbon dioxide rise is a result of degassing of the world's oceans. Mapping carbon dioxide levels against global temperature changes over the last 250 years demonstrates the same relationship — that as temperature rises, decades to centuries later, carbon dioxide rises.

Despite this pattern, many people will argue that a significant portion of the modern temperature rise is due to human greenhouse gas emissions. Yet the human contribution to total global greenhouse gases is so small as to be *de minimis*. The sum of these observations and correlations falsify the hypothesis that human additions to greenhouse gases are a significant climate driver.

The alternative hypothesis is that natural processes are responsible for most climate change. Much refereed scientific literature documents the role of orbital forcing over millennia to hundreds of thousands of years, solar variability in climate changes over decades to millennia and smaller events, such as volcanism and meteorite impacts over years to decades. The positioning of continents relative to oceans and resulting currents may drive climate over millions of years. Current climate modeling efforts need to accommodate and extend these myriad natural processes. The outputs of global climate quantitative computer models have not been rigorously tested against data except against the medieval climate optimum, against which they have failed.

We don't yet fully understand how the sun dominates millennial to decadal climate

Comment continues on page 47

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nascent science of astrobiology would fill a whole book about a subject for which there is no data. Disappointingly, Ward does it primarily by redefining life "as we know it" to be a subset of life on Earth. Viruses and the putative RNA world are considered alien life forms. These definitions allow Ward to argue that we already know of several types of alien life and he then proposes a taxonomic system for cataloging them.

This all seems more semantic than enlightening, and the reader might be justified in feeling that there has been a bit of bait and switch. But then Ward does go through the usual suspects for truly alien life, including silicon- and ammonia-based life — a useful review, but nothing new.

He still presents no plausible suggestion for how life might work other than "life as we know it." Perhaps the lumpers are right. Or perhaps our imaginations are too limited, and we need more than one example before we see the pattern.

Ward fills most of the rest of the book with a review of the search for life in our solar system, focusing on Mars and Europa, but also touching on Mercury and the moon. This approach could be how we get more data points. On these worlds, we might find a second genesis of life, or the remnants of such life. But our search for life on these worlds is "following the water," so even if we find alien life it is likely to be based on carbon and water. Still, we can hope that it might be different enough to show us a general pattern.

The style of this book is very much first person. Ward is involved in the research he writes about, and his enthusiasms and prejudices are clearly evident.

This personal perspective is most clear in his discussions of the people involved in the Search for Extraterrestrial Intelligence (SETI). He is disingenuous in his criticism of SETI, stating that the money would be better spent on ecological problems on Earth and arguing that "no one but the religious" doubts that there is intelligent life beyond the Earth. He then advocates the search for life in our solar system and the human exploration of Mars and Titan using arguments that would equally apply to SETI. These turf battles are to be expected in the competition for limited funding, but it is disappointing when they appear in trade books.

At its best, *Life As We Do Not Know It* is a current review of our understanding of the life on this planet from the perspective of searching for life elsewhere. The important lesson is how limited we are because we have only one example of life on which to base our search. Clearly the way forward is to search, and the search for "life as we do not know it" should be conducted on all fronts, even ones we don't even know enough to know which of the many search strategies will work best.

McKay is a planetary scientist at NASA Ames Research Center, where his research deals with the search for life beyond the Earth and studies of life in extreme cold and dry environments.

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change. But for decades we did not understand how continental drift could occur, so many scientists denied it did occur. We may have a grand experiment ahead of us. NASA researchers have projected a major solar minimum (solar cycle 25) for the period of about 2020 to 2030. If that occurs, and Earth's temperature decreases, solar energy will have been established as a major driver of climate. If the temperature increases during a major solar minimum, the human impact of climate will have been substantiated. In either case, science will prevail.

Gerhard is a senior scientist emeritus at the Kansas Geological Survey in Lawrence, where he is also former director. Graphical information upon which this comment is based can be downloaded from: www.kansasenergy.org/climatechange.htm.

Political Scene continued from page 17

The two very different standards for determining regulated wetlands in the divided concurring opinions and the fact that five of nine justices accepted the Corps' scientific criteria of a wetland leaves the lower courts with uncertainty about how to reconsider these cases. Somehow they will have to determine what a "significant nexus" between a wetland and navigable water means on a case-by-case basis.

In the meantime, the Corps will be revising their wetland regulations again, while Congress is considering two bills that would define navigable waters differently. Concern about how these definitions of natural systems will affect the environment does not stop with the Clean Water Act because other laws, such as the Oil Pollution Act of 1990, also use the same definition of waters and would be affected by any changes.

Concern about defining scientific concepts in jurisprudence also does not stop with clean water. The Supreme Court has decided to hear a case on the Clean Air Act, which will consider whether carbon dioxide is a pollutant, and this case is likely to be even more contentious. To avoid putting scientific or policy matters into the hands of the courts, Congress must more clearly define laws based on scientific understanding, and federal agencies must better articulate their regulations and scientific definitions, based on the input of all stakeholders, including the scientists.

Rowan is director of the American Geological Institute's Government Affairs Program. E-mail: rowan@agiweb.org.

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GEOHORIZONS

Climate change: Conflict of observational science, theory, and politics

Lee C. Gerhard

ABSTRACT

Debate over whether human activity causes Earth climate change obscures the immensity of the dynamic systems that create and maintain climate on the planet. Anthropocentric debate leads people to believe that they can alter these planetary dynamic systems to prevent what they perceive as negative climate impacts on human civilization. Although politicians offer simplistic remedies, such as the Kyoto Protocol, global climate continues to change naturally. Better planning for the inevitable dislocations that have followed natural global climate changes throughout human history requires us to accept the fact that climate will change, and that human society must adapt to the changes.

Over the last decade, the scientific literature reported a shift in emphasis from attempting to build theoretical models of putative human impacts on climate to understanding the planetwide dynamic processes that are the natural climate drivers. The current scientific literature is beginning to report the history of past climate change, the extent of natural climate variability, natural system drivers, and the episodicity of many climate changes.

The scientific arguments have broadened from focus upon human effects on climate to include the array of natural phenomena that have driven global climate change for eons. However, significant political issues with long-term social consequences continue their advance. This paper summarizes recent scientific progress in climate science and arguments about human influence on climate.

INTRODUCTION

Separating science from its use in public policy is not always possible. Discussions of science that is in the public purview cannot be

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Lee C. Gerhard has a career of academic, government, and industry leadership. Gerhard is the senior editor and author of the 2001 book *Geological Perspectives of Global Climate Change*, published by AAPG. A petroleum geologist, his current research interest is mitigating significant conflicts between earth resource development and environmental quality and public education about resource issues. He is an honorary member of AAPG.

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restricted to the science alone. Scientists are required to place their work in its public context. Current continuing debate over whether humanity is changing the Earth's climate is an example of a debate in which science plays a secondary role to social policy and international economics. It is also a debate complicated by the mystique of computer modeling that obscures observational science. The purpose of this paper is to update the reader on the latest in scientific studies of climate change and to discuss roles of natural variability in the context of modern climate change.

The issue, simply stated, is that the Earth's climate has likely been warming over the last 150 yr, roughly coincident with the industrial revolution and with the end of an abnormal cold spell commonly referred to as the Little Ice Age. With the warming has come an increase in atmospheric carbon dioxide, some of which is attributable to human oxidation of carbon-based fuels, both fossil and biomass. The cause, the effects, and the relative scale of climate variation are in dispute. Polarized arguments are human versus natural climate change, small amount of warming versus unprecedented warming, and fossil fuel greenhouse gas-driven change versus natural drivers, largely solar and orbital. The suggested solution for human-driven climate change is elimination of fossil fuels from the global energy mix, particularly in industrialized countries. The solutions for the effects of natural climate change are adaptation and planning.

The people of the world who are most vulnerable to climate change (i.e., those on low-lying islands, in coastal areas subject to storm surge, on the margins of expanding deserts, etc.) have been led to believe that human beings can control climate through science, engineering, and technology according to political and economic needs. Obvious trends showing oceanic flooding, increased heat, desertification, and ecosystem changes are seen as preventable by the simple mechanism of decreasing human use of carbon-based energy. I suggest that the efforts of human beings cannot modify the enormous amount of solar energy driving Earth's dynamic climate system, regardless of how much science, technology, and engineering are currently available.

There are political forces at work that seek to exploit fears of human control of the Earth's climate as a device to transfer wealth and to effect social policies. Strong social forces and a very large amount of human ego are committed to ignoring rational science.

Our job as scientists is to test climate change arguments against observations and data and to advance data-driven science. This paper attempts to put some of the major arguments into scientific focus. I encourage readers to form their own opinions of the issues, then to test them against data and observations.

SCIENTIFIC BACKGROUND

Scientific research into climate change has progressed rapidly in recent years (see the references cited). One of the most difficult concepts to communicate to the media and to government has been demonstrating that the Earth's climate has changed frequently and radically in the recent past, without any input from humans. Recently, we have come to understand that there is superb correlation between the sun's activity and the Earth's climate. The works of Hoyt and Schatten (1997) and Bond et al. (2001) are of particular note and are discussed in detail in this paper. The recent literature is replete with additional studies correlating solar and orbital variability with climate change; some are cited here. These studies have been largely ignored in the popular press and in political circles.

There are many smaller climate drivers of natural origin in addition to the sun, such as volcanic eruptions, meteorite impacts, oceanographic circulation changes, orbital variations, tectonic uplift, and relative positioning of continents (Gerhard et al., 2001; Gerhard and Harrison, 2001). The Earth's climate is constantly changing, either cooling or warming, and natural swings in average temperature at the surface are huge over many timescales from 11-yr-long sunspot cycles to geologic time spans (Bluemle et al., 2001).

However, many non-earth scientists believe that humans are causing climate change, based on the theory that increasing greenhouse gases in the atmosphere, in part because of use of fossil fuels, contribute to climate change, thereby adding to, in their minds, human modification of other dynamic Earth processes.

The argument that human civilization induces climate change is derived from computer models of greenhouse theory (general circulation models [GCM]; among the best known are the Hadley Center model in the United Kingdom and the National Oceanographic and Atmospheric Administration model in the United States). Although these models are complex mathematical simulations of atmosphere behavior according to greenhouse theory, they have not been able to replicate past climates and climatic change prior to the Little Ice Age (Mann et al., 1999) and are simplistic representations of what is currently understood about climate behavior (Soon et al., 2001a, b). Nonetheless, the models

have vigorously pursued support from non-earth scientists and the media. The result is public policy proposals to control greenhouse gases to control changes in the Earth's climate (the Kyoto Protocol) without substantial credible scientific evidence to support the assertion that greenhouse gases from human activity are significant drivers of the Earth's climate.

Regarding computer models, A. Byrnes (2003, personal communication), a Kansas Geological Survey research scientist and a professionally well-known petrophysicist who frequently employs computer reservoir models, summed the current climate modeling controversy as follows:

> In multivariate phenomena, many variables do not exert independent influence. Observations made of multivariate phenomena are usually correct but present information about the phenomena from different perspectives; that is, they each test different hypotheses, make different assumptions, and hold different variables or boundary values constant. As with the three blind men describing an elephant, each is telling the truth, but each provides a completely different view. It is common to construct models that are internally consistent within the boundaries of a defined problem but which are not required to be externally consistent, where the model results may not explain but are not in conflict with observations outside the model. Fully accurate models must be able to explain, or at minimum not conflict with, all data, or there must be a valid reason for rejecting or ignoring data that are inconsistent with the model.

The viewpoint of earth scientists is that there is overwhelming geologic evidence that natural variability in Earth's climate greatly exceeds human-induced effects (Lamb, 1995; Bluemle et al., 2001; Gerhard et al., 2001), and that there is no current technology to control that natural variability. Correlation of sun intensity cycles, orbital variations, and geologic factors establish that Earth's climate is fundamentally beyond human control (Hoyt and Schatten, 1997; Bond et al., 2001; Davis and Bohling, 2001).

The Recent Literature

In recent years, the tone of scientific literature has evolved from arguments that attempted to demonstrate human effects on climate to studies that document natural climate drivers.

What many consider the baseline reference on assessing human versus natural climate control is the data compilation of Lamb (1995), a professor at the University of East Anglia. Although he was concerned about human climate modification, his book is a compendium of human measurements of climate through recorded human history, using quantifiable proxies such as artifacts, tax records, and food records. He identified the Medieval Climate Optimum, the Little Ice Age, and many other dramatic shifts in climate, documenting them with real human experiences. Included in these documents are the stories of Viking settlements on Greenland during the Medieval Climate Optimum (and consequent European discovery of North America) and their extirpation during the onset of the Little Ice Age, glacial waxing that destroyed aqueducts, records of vineyards in locations in England that are now too cold to support them, and population migrations that correspond to climate changes. Empirical data and first-order climate proxies reported in Lamb's work must be honored by any climate model that attempts to replicate the past 1500 yr. An additional review of past climate information is also provided by Bluemle et al. (2001) (Figure 1) over 60 m.y., with significant changes over the last 1000 yr (Figure 2).

The latest Intergovernmental Panel on Climate Change (IPCC, a United Nations sponsored organization) report (Houghton et al., 2001) argues that there was no Medieval Climate Optimum, based on a controversial tree-ring data paper (Mann et al., 1999). The IPCC interpretation of discernible human impact on climate is based on the elimination of demonstrable natural major climate change over the last 2000 yr, but Mann et al.'s conclusions are contrary to the human experiences recorded by Lamb (1995). Since then, Esper et al. (2002), also using tree-ring data, demonstrated that there was significant warming and cooling during the past two millennia and demonstrated that current temperature change is consistent with past changes during recorded human history. Another critique of the Mann et al. paper is that of Daly (2000), who argued the methodology and conclusions of the Mann et al. paper. Broecker (2001) also found evidence that the Medieval Warm Period was a global event, using borehole temperatures, that these warm and cold cycles last about 1500 yr, and that the change in temperature is about 2°C. Soon et al. (2003) have developed a synopsis of literature about the past 1000 yr and argue forcefully for the global extent of

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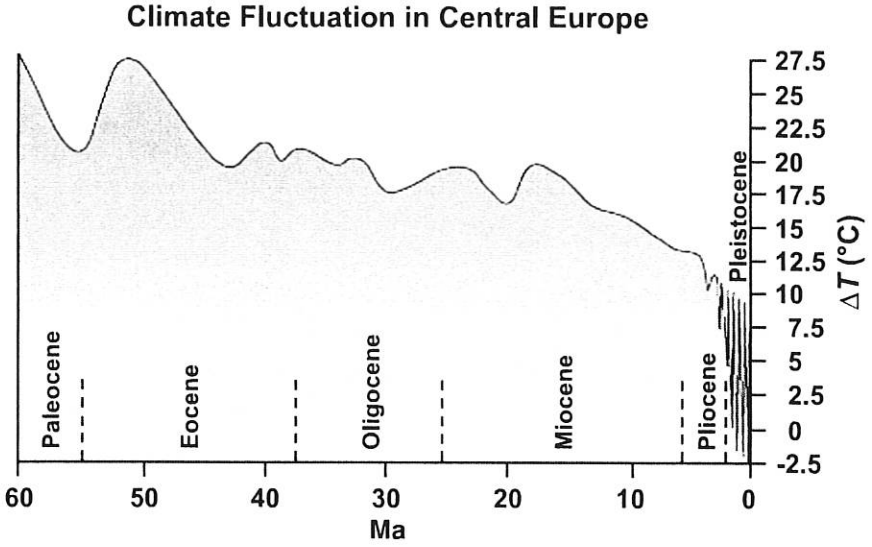

Figure 1. Climate change over 60 m.y., showing how climate has cooled naturally since the Cretaceous and the large oscillations of temperature during the Pleistocene. From Bluemle et al., 2001; used with permission from AAPG, whose permission is required for further use.

the Medieval Climate Optimum and subsequent Little Ice Age. They also tested the 20th century as "nominally the warmest of the last millennium" and "warmest year of the last millennium" (Mann et al., 1999, as cited in Soon et al., 2003, p. 29) and found that they are neither the warmest nor particularly unique. Observations such as these run counter to computer models, but are the basis for any rational scientific discussion of climate change. Recently, McIntyre and McKittrick (2003) replicated the Mann et al. study, demonstrating that

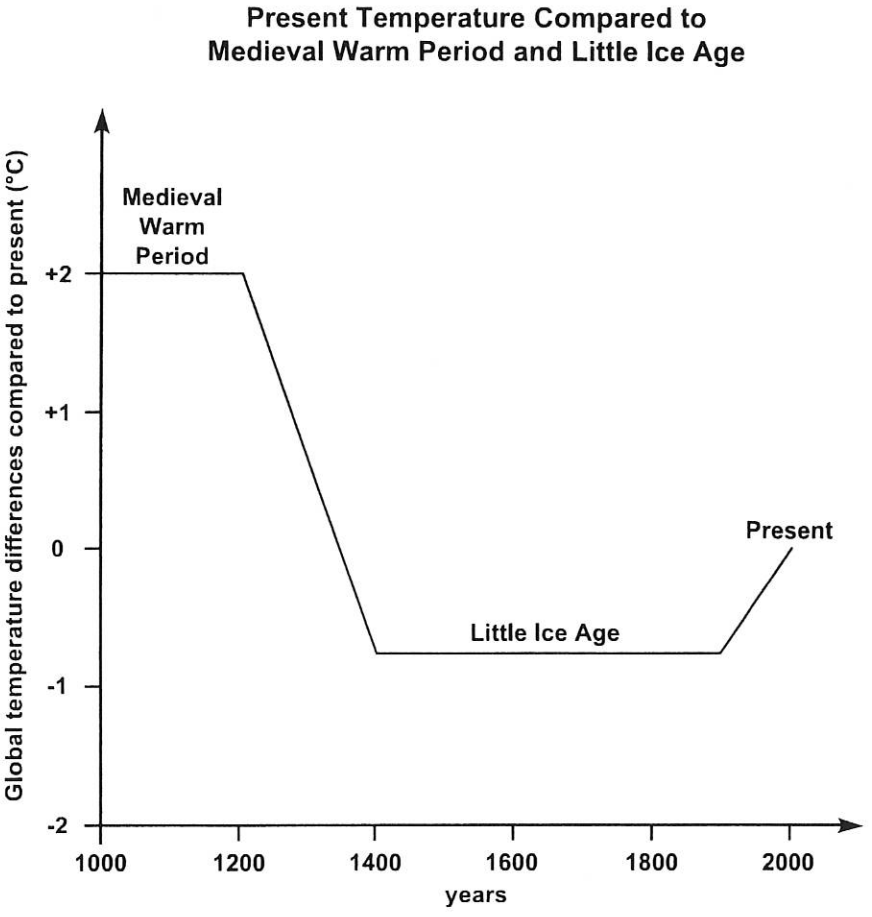

Figure 2. Simplified diagram of natural climate change over the last 1000 yr, showing that the Earth's climate has been warmer in the last 1000 yr than today, long before any human industrial development. Graph indicates that today's temperatures are considerably less than that of the Medieval Warm Period. Graph supplied by David Wojick.

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the data used by Mann et al. are not consistent with the Mann et al. conclusions. Their paper has elicited numerous responses and has generated more discussion of the quality of the science underlying the IPCC reports (Houghton et al., 2001) than anything published heretofore.

Arguments that increased greenhouse gases are driving climate change require that temperature changes follow greenhouse gas changes, and computer models require that polar climates reflect these changes first (Doran et al., 2002). Fischer et al. (1999) demonstrated that carbon dioxide concentrations tend to lag climate change by as much as 400 yr through Phanerozoic history, thus arguing that historically, carbon dioxide concentration increase is a resultant, instead of a driver, of climate change. Doran et al. (2002) demonstrate that Antarctica is cooling instead of warming, indicating that greenhouse gases are not driving global climate. Davis and Bohling (2001) show that modern temperatures have been rising evenly and steadily since 1840, well before any industrial carbon dioxide emissions. Carbon dioxide was double present levels at 60 Ma and was likely 17 times present-day levels during the glacial episodes of the very late Precambrian (Moore et al., 1996), 500 Ma (commonly referred to as "Snowball Earth"). Most recently, Royer et al. (2004) argue on the basis of models that the carbon dioxide concentration of the atmosphere oscillated in parallel to global temperature, as indicated by extended glacial episodes with low concentrations of carbon dioxide. Although they use this correlation as evidence that carbon dioxide drives climate, they do not speculate on the origin of carbon dioxide concentration changes. Cooling during glacial episodes diminishes vegetative growth, and cooler oceans absorb carbon dioxide. Coupled with data showing a lag of carbon dioxide rise to temperature rise (Fischer et al., 1999, who demonstrated a multihundred-year lag of carbon dioxide adaptation to temperature change), there is little to sustain the opinion that carbon dioxide concentration is a major driver of global climate.

In the lower troposphere, atmospheric temperature change should be an early warning of greenhouse gas impacts on Earth's climate. There is continuing debate over whether this zone is warming, cooling, or stable, but the overwhelming data suggest stability (National Research Council, 2000; Christy, 2003; Santer et al., 2003). Recent arguments that corrections of balloon and satellite data may reflect a tiny amount of warming (Santer et al., 2003) contrasted with the findings of the National Research Council (2000). Temperature changes in the lower troposphere are so slight (± 0.1 °C) as to be unresolved noise, whatever their direction (Christy, 2003).

Arguments of greenhouse gas climate forcing results in increased severe weather events have been examined by Starkel (2002), who could not identify any increase in storm events based on statistical analysis of fluvial runoff events through the Holocene; there is no evidence that severe weather events have increased in the 20th century and some suggestion that they have actually decreased (Gulev et al., 2001; see also Crisci et al., 2002). Despite the evidence, the popular myth of increased severity of storm events continues in the media and in other non-earth sciences (Rombeck, 2004).

The role of orbital variations on climate has been addressed by several scientists. Zahn (2002) reviews recent literature to document that Milankovitch orbital variations are linked to climate change periodicity, whereas Preto et al. (2001) interpret orbital variations in carbonate buildups of the Middle Triassic.

Modern literature abounds with good observations and measurements. Few lend credence to any measurable human impact on Earth's climate, but many demonstrate great natural variability of climate.

What Known Dynamic Processes Might Drive Natural Climate Variability?

Recently, we have come to understand that there is superb correlation between the sun's activity and the Earth's climate. Hoyt and Schatten (1997) present historical sunspot activity and climate change correlations over the last few centuries showing correlation of lower temperature with lower sunspot activity. This culminates in the Maunder Minimum of sunspot activity that correlates with the Little Ice Age (see also Pekarek, 2001).

Among many recent papers detailing the effects of orbital and solar variability on Earth's climate through time, perhaps the most significant is that of Bond et al. (2001). Bond et al. measured the cosmogenic nucleides ^{10}Be (from Greenland ice cores) and ^{14}C (from tree rings), whose abundance is inversely proportional to irradiance, interpreting a correlation of Heinrich events of ice rafting (ice drifts) indicating warming to cooling episodes over nearly 12,000 yr. The ^{14}C data extend to the Little Ice Age, whereas the ^{10}Be data extend to about 3000 yr ago. The graphical correlations demonstrate 1500-yr-long climate cycles and are, in my judgment, the most important piece of evidence demonstrating solar dominance of climate change (Figure 3).

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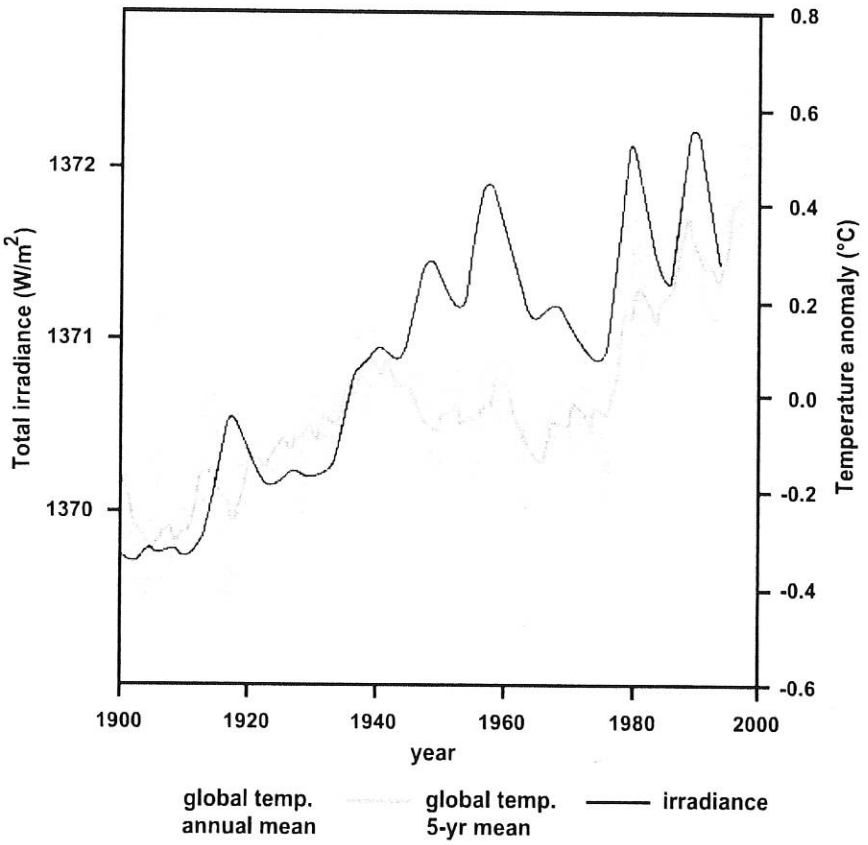

Figure 3. A graph of the 20th century solar variability and Earth's temperature. Solar data provided by Gerard Bond, Columbia University. Temperature data from Goddard Institute for Space Studies. This plot demonstrates the close correlation between the Earth's temperature and solar activity for the 20th century. Less positive correlation during World War II may reflect data-quality gaps and increased dust because of that conflict and atmospheric atomic testing. Irradiance is solar input, expressed as watts per square meter. The discrepancy in the 1940s may be caused by the effects of dust and smoke added to the atmosphere by World War II (see Koren et al., 2004, who attribute cooling to smoke inhibition of cloud formation in the Amazon).

Arguments that the variation in solar intensity is insufficient to produce measurable climate change have been answered by Carslaw et al. (2002). In their review article, Carslaw et al. point out that solar effects are multiplied by clouds, generated through solar variability. There is also a major climate role for orbital variations (see Khodri et al., 2001; Naish et al., 2001; Zahn, 2002, for examples).

Petit et al. (1999) demonstrated that natural forcing, likely orbital and solar, have created about 100,000-yr glacial cycles in Antarctica, based on the study of the Vostock ice core, with companion increases in carbon dioxide. Although they interpret that carbon dioxide helped drive the climate cycles, it is apparent that the two curves are either synchronous, or that temperature change predates carbon dioxide increases. An interpretation that the carbon dioxide increase reflects natural warming and thus greater vegetation emissions is equally valid. Naish et al. (2001) state that the temperature was 3–4°C higher than present at the Oligocene–Miocene boundary, and that the greenhouse gas levels were at least twice ambient. Fischer et al. (1999) demonstrated that there is a multihundred-year lag of carbon dioxide adaptation to temperature change, and that carbon dioxide grows in concentration after onset of temperature rise, thus suggesting that the second interpretation of the Vostock data is the more correct.

Davis and Bohling (2001) and Kotov (2001) argue that both past and present trends suggest that the future climate will be natural continuing warmth, followed by descent into colder, perhaps glacial, conditions (Figure 4). As Davis and Bohling point out, one can make the argument that climate is either cooling or warming, depending on the time span used to make the assessment. Their data demonstrate that the overall long-term trend is cooling, but episodes of warming and cooling alternate frequently and sometimes very quickly.

In summary, current science has identified solar and orbital variability as the major driver of Earth's climate changes, modified both by other natural processes and perhaps modified by human intervention through increased greenhouse gas emissions. Although theory still considers greenhouse gases as significant contributors to climate change, the only positive correlation between a process and climate change is between solar (and orbital) variability and climate change, as documented by

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Bond et al. (2001) and others. These climate drivers cannot be purposefully deflected nor climate modified with current technology.

THE POLITICAL ISSUE

The primary political device for climate control, the Kyoto Protocol, purports to keep the Earth's temperature from increasing by greatly reducing the use of fossil fuels energy in industrialized countries, particularly the United States, while permitting unrestrained uses of fossil energy in developing countries. The backers of the Kyoto Protocol do not convincingly argue that such draconian measures will make a measurable difference in climate, but they do admit it will create huge increases in the cost of energy (Energy Information Administration, 1998; see also AAPG position paper, Climate Change Policy, http:dpa.aapg.org/gac/papers/climate_change.cfm). It will likely restrict access of Americans to sufficient energy to maintain our current standard of living. Proponents argue that caution demands that we take these measures just in case the theory is correct (Oil & Gas Journal, 2000; Foster et al., 2000).

One of the major discussion points in the public climate debate has been the ultimate effect of climate change on human endeavors, from rising sea levels to crop growth rates. The human contribution to climate change is very small and will likely not be identifiable within the background of natural change. The total projected human addition to the carbon budget is about 5% (Energy Information Administration, 1998), of which industrialized world contribution is about 60%. Because

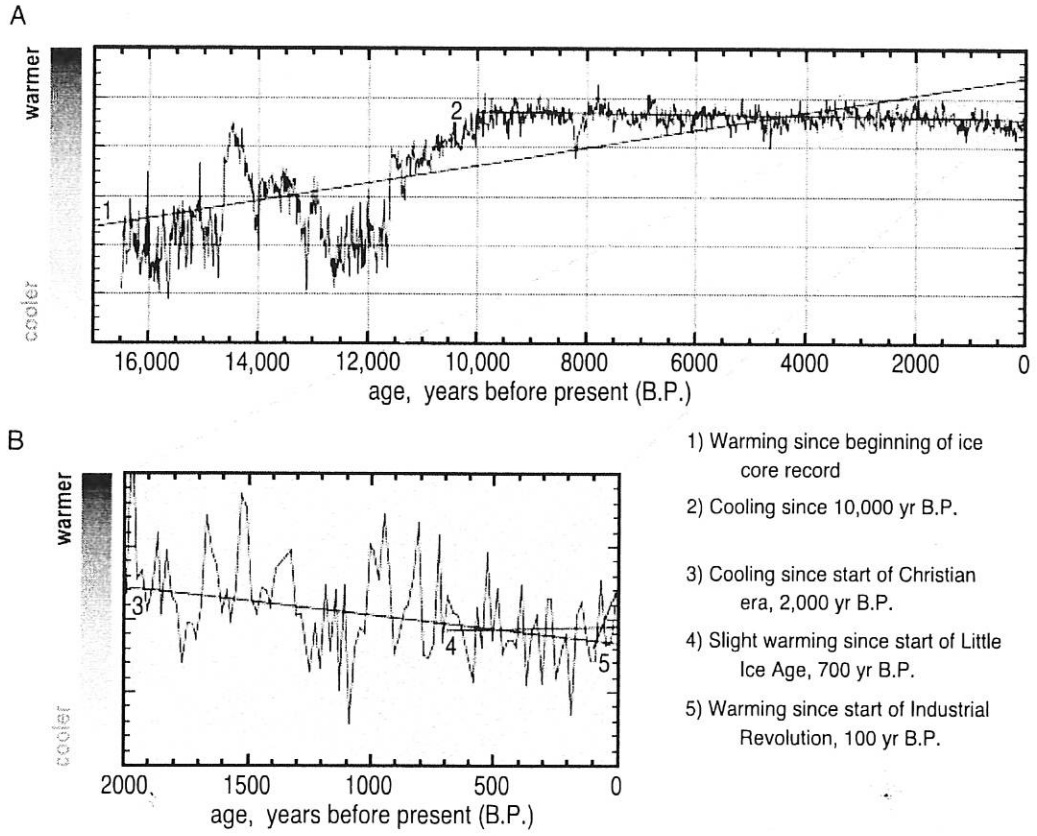

Figure 4. Climate changes over time, naturally. This diagram shows that one can argue either warming or cooling by choosing the length of time over which the observation is made. Most climate models do not attempt to replicate climate changes that occurred prior to the Little Ice Age because they cannot be explained by greenhouse gas changes. (A) Climate change over the last 17,000 yr. Climate has been highly variable over this time span, with general cooling for about 10,000 yr. Variability in the curve permits interpretation of either cooling or warming depending on the time span chosen. (B) Climate change over the last 2000 yr, illustrating the same variability over a shorter time span, with more detail. An increase in O_{16}/O_{18} ratio of 0.07% in marine sediments corresponds approximately to a fall in water temperature of 1°C (Moore et al., 1996). From Davis and Bohling (2001); used by permission of AAPG, whose permission is required for further use.

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most of the carbon dioxide produced cannot be captured, it cannot be sequestered. There is no alternative method of generating the energy needs of modern society exclusive of fossil energy. Rightly or wrongly, people are truly worried about future effects of climate change, no matter why it occurs, and because there is no current technically possible way to control natural climate change, these effects will occur, despite huge investment by government in schemes to reduce carbon contribution to the atmosphere. Sequestration, emissions limits, and possible alternative energy sources cannot alter natural climate change. Increases in total energy consumption have absorbed increases in alternative energy generation, so that alternative energy is slightly decreasing.

Continuing arguments that humans change climate and that people can stop climate change through a political process condemns the people who will be adversely affected by any climate change to suffer those effects. The only alternative action the world can take is to plan now for climate adaptation and mitigation for its growing population. Delays in planning and mitigation are caused by the mistaken and unrealistic assumption that politics can alter global natural processes (Jenkins, 2001).

A REAL PRECAUTIONARY PRINCIPLE

True precaution requires that the world's peoples be made aware that natural processes are at work that may raise sea levels, flood lowlands, and gradually shift climatic zones northward. Alternatively, the Earth may be over because of a slide back into glacial conditions. To hold out hope that human intervention in energy use can alter that scenario is to insure that humans will suffer the results of climate change because technically feasible mitigation was not adopted. It is incumbent upon us to insure that public policy begins the planning to meet this contingency, focused on mitigation of climate change, instead of the hope that we will be able to stop it.

Columnist George Will (2003, p. 7B) recently wrote that "Geology has joined biology in lowering mankind's self esteem. Geology suggests how mankind's existence is contingent on the geological consent of the planet." Not the other way around. Climate will change, either warmer or colder, over many scales of time, with or without human interference. It is incumbent upon us to plan for and to mitigate climate changes, for we cannot alter the scenario, but we can minimize human misery resulting from such change.

RESEARCH NEEDS TO RESOLVE DEBATE

There are several research gaps in the debate. First and most important, the general circulation models should be opened to all scientists so as to include modeling of natural variability based on observations. A global time-temperature curve covering the last 10,000 yr would be a helpful addition to the record and can be developed in a conference setting to debate proxies and develop a baseline of global climate change. We need to investigate processes by which solar and orbital variability affect climate. Testing of GCM against the historical record is highly desirable. Finally, we must conduct research into the best mitigation methods to minimize negative human impacts of climate change, no matter what the source. This research will require funding that is not now available.

AUTHOR'S NOTE

I published my first paper on climate change in 1996 (Gerhard, 1996). In that paper, I commented on the similarities between the climate debate and the debate that established the science of geology. Geognosy, the Wernerian theory of the Earth, had held sway for decades before it was demolished by empirical observations that led to Hutton's concept of Uniformitarianism. The old Wernerian hypothesis is comparable to today's computer modeling of greenhouse gas control of climate change, in that its adherents try to prove it correct, instead of testing the validity of the hypothesis. Geognosy ultimately was shown to be without merit.

We have had similar such issues in our science since then. The two most obvious are the continental drift theory and evolution. Continental drift theory took 50 yr to establish against theoretical geophysical objections that there was no mechanism by which this could occur; therefore, the empirical observations were without merit. The empirical observations ultimately proved the theory. This debate led to plate tectonic understanding and to the establishment of a unified field theory of Earth behavior and history. The current public debate over evolution, in which there is large-scale public resistance to science because of religious and human egotistical premises, despite the massive information and observations that support the concept, is another example of the problem. We find antievolutionists trying to advance a more palatable "theory" of divine intervention.

I find it amazing that the huge amount of observations, data, and information about how climate changes is ignored in order to continue the hunt for a human imprint on climate change. Why is it that we spend so much time and resources trying to prove a theory of greenhouse gas climate control instead of testing the hypothesis? We would serve science in public policy better if we would bring the scientific method to the quasipolitical argument over climate change.

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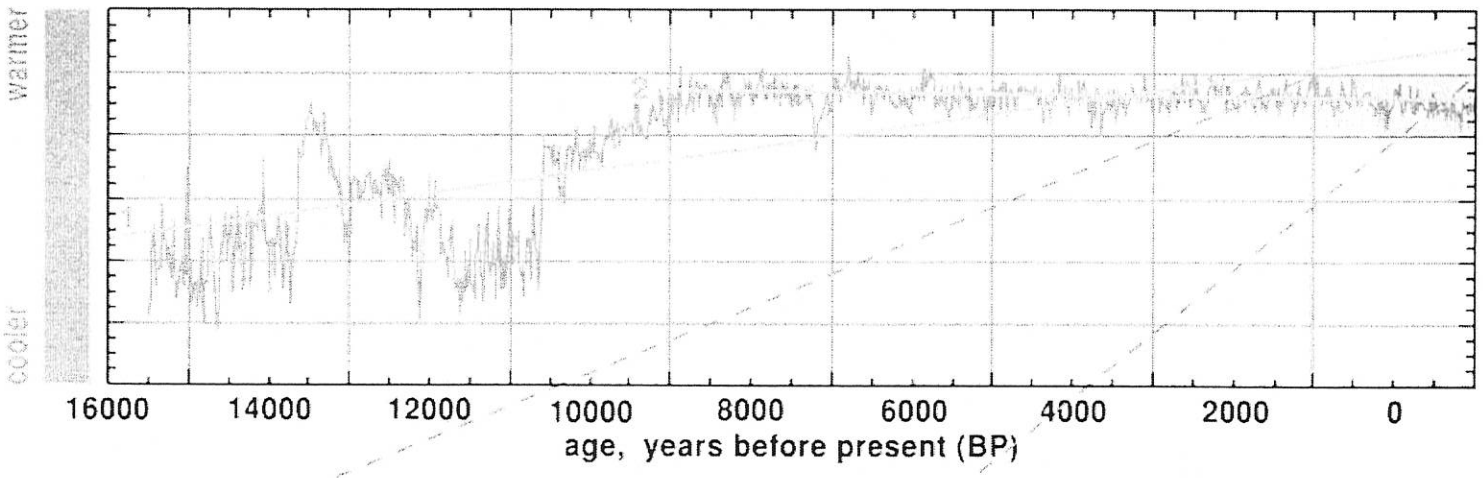
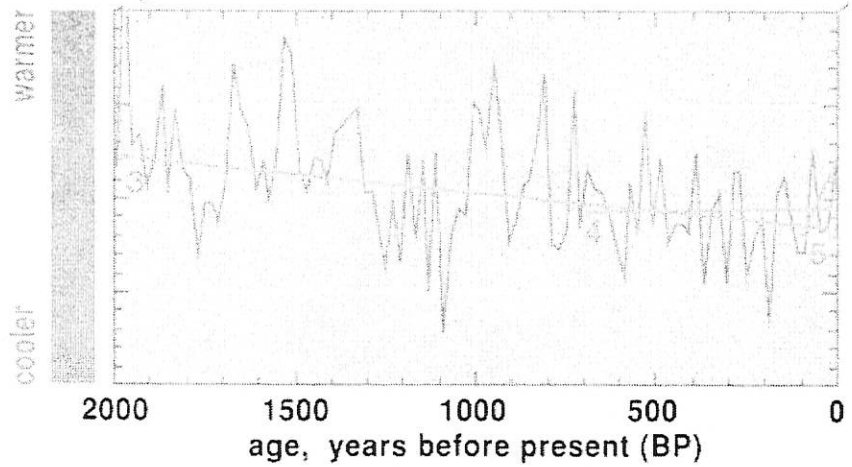
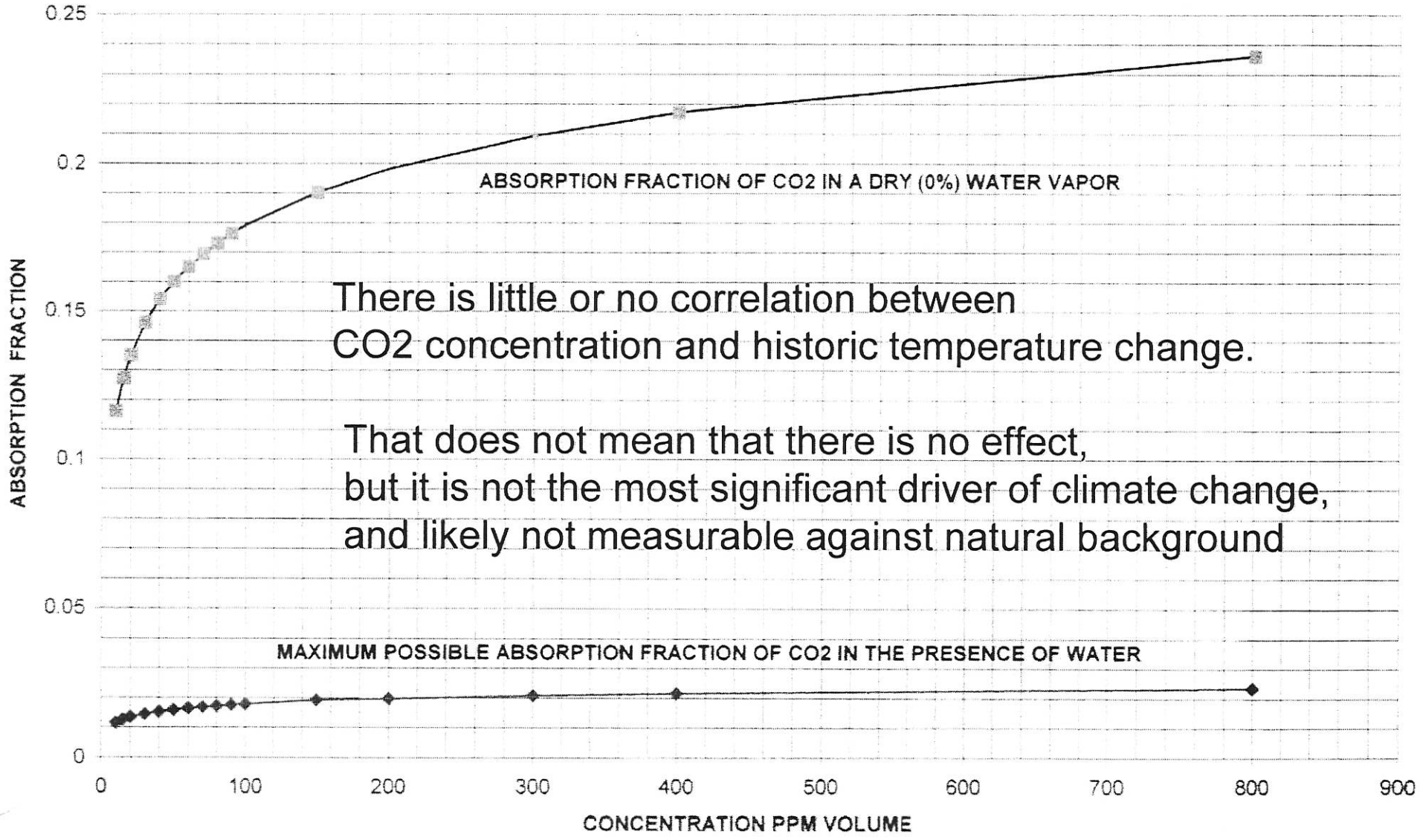
Earth temperature history from Greenland ice core data





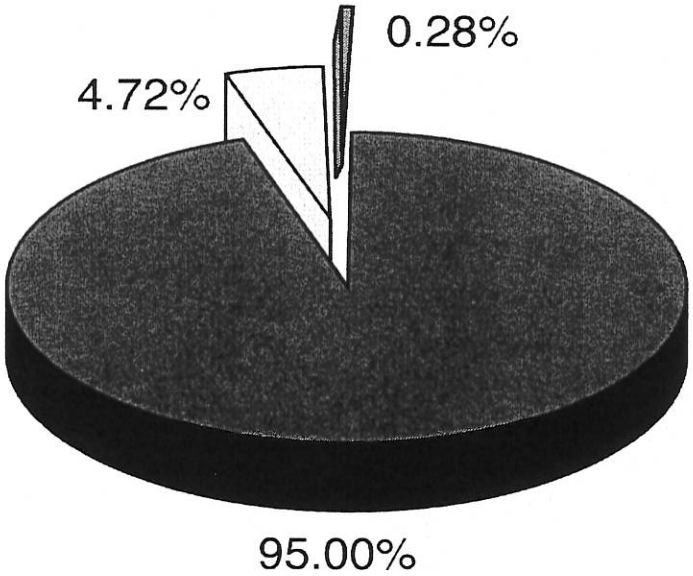
1. Warming since beginning of ice core record
2. Cooling since 10,000 BP
3. Cooling since start of Christian era, era, 2,000 BP
4. Slight warming since start of Little Ice Age, 700 BP
5. Warming since start of Industrial Revolution, 100 BP

Absorptivity of CO_2 in the atmosphere
Dry = max **0.64°**; Wet = max **0.22°**



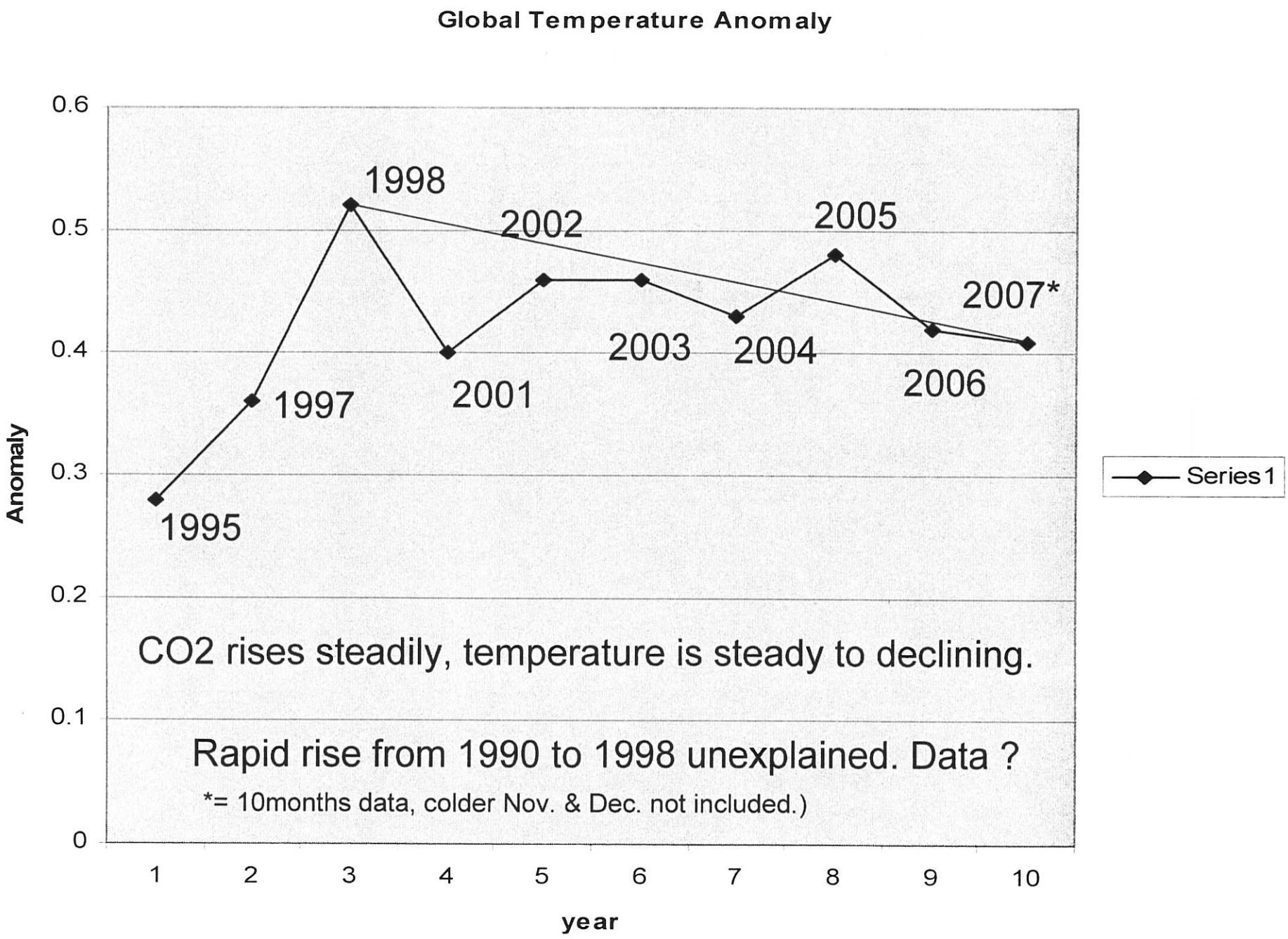
Sources of Greenhouse Gases

Contributions to the "Greenhouse Effect" expressed as % of total



- Water vapor (not droplets)
- Ocean biologic activity, volcanoes, decaying plants, animal acivity, etc.
- Human additions

NOTE: "Contributions" are defined as concentrations adjusted for GWP (global warming potential, relative to CO_2)


Global Temperature Anomaly
0.6
0.5
0.4
0.3
0.2
0.1
0
Anomaly
1998
2002
2005
2007*
1997
2001
2003
2004
2006
1995
CO2 rises steadily, temperature is steady to declining.
Rapid rise from 1990 to 1998 unexplained. Data ?
*= 10months data, colder Nov. & Dec. not included.)
1
2
3
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5
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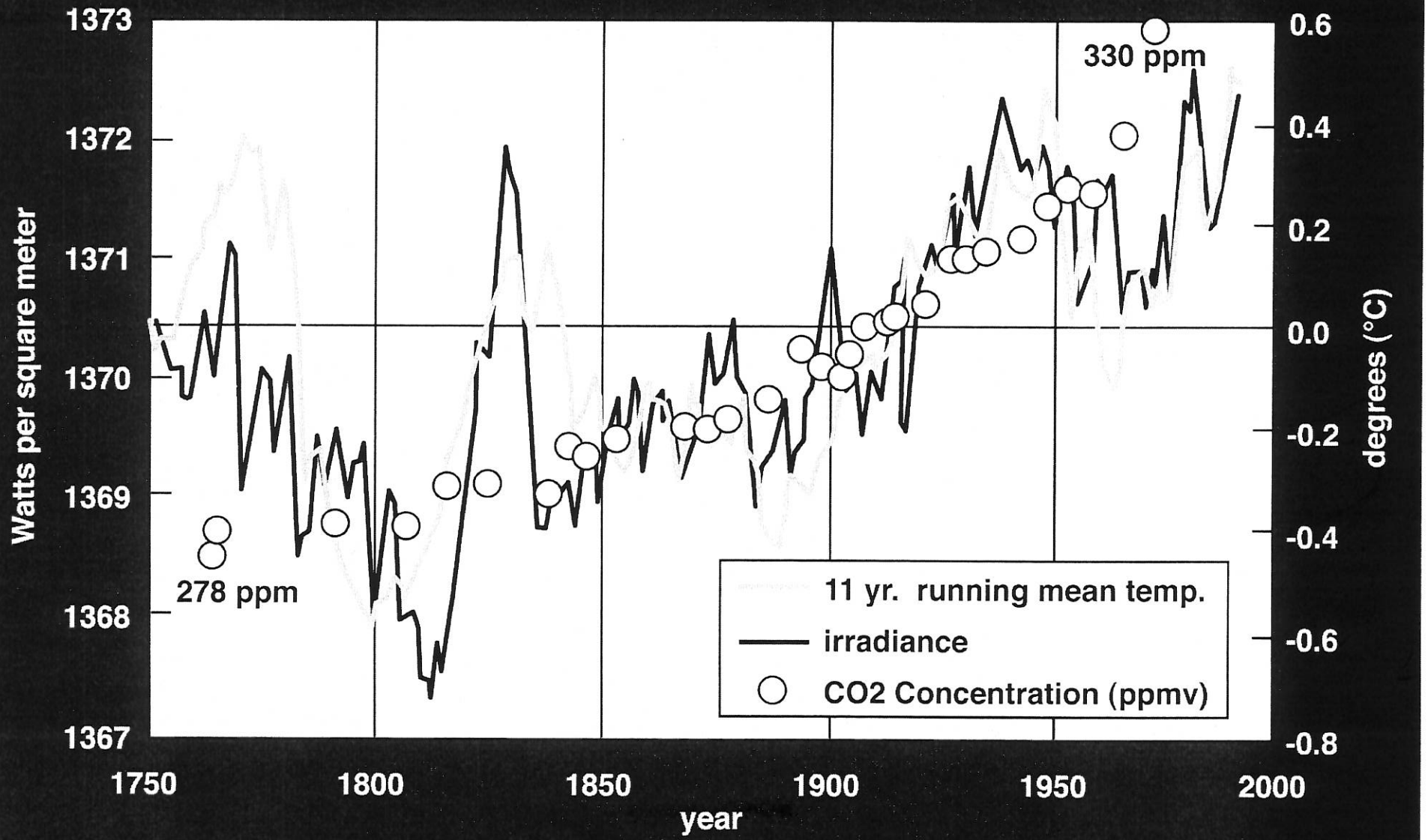
10
year
Series1

Northern Hemisphere Temperature VS. Solar Irradiance



adapted from Hoyt and Schatten, 1997

Testimony of James Ludwig
Executive Vice-President Public Affairs and Consumer Services
Westar Energy
February 6, 2008

The identical bills, HB 2711 and SB 515, were clearly written with the intent to permit construction of ***new*** baseload coal plants. In pursuit of that intention, Westar believes the proponents have inadvertently overlooked how this legislation affects ***existing*** fossil fuel power plants and that it ignores the biggest, most effective carbon mitigation source already in place in Kansas. We provide these comments to correct what we believe are unintended consequences and respectfully request that you accordingly amend this legislation.

Westar does not object to building new baseload generation in Kansas. We also agree that it has to be added in an environmentally responsible way. Although we have found a way to delay making a commitment to additional baseload generation for a few years, we acknowledge that it will eventually become imperative for Westar to add baseload generation to our system to assure reliable electric service to both our retail customers and our Kansas firm wholesale customers. In addition to new baseload resources in the future, Westar's plan to meet consumers' growing needs for electricity also includes new natural gas and renewable generation sources, energy efficiency, and enhancements of our existing nuclear and fossil fuel (coal and natural gas) plants.

Net *versus* Gross CO2 Emissions per MWh

On page 8, lines 2 through 7, the CO2 limits are described in pounds per net megawatt hour (MWh). Westar suggests using pounds per gross MWh. The intent of this section is to drive down the overall CO2 emissions. Using net MWh only captures those emissions for generation used for customers. Emissions attributable to auxiliary power, the typically large amount of power consumed by the power plant itself, are ignored. Auxiliary power is also called "station power" or "parasitic load." For example, we are in the midst of installing scrubbers at Jeffrey Energy Center (JEC) along with other modifications to reduce regulated air emissions. When the scrubbers are turned on, the amount of station power increases substantially without any increase in CO2 emissions. Thus the bills' use of net MWh as a way to measure carbon emissions would actually disadvantage JEC even though CO2 emissions did not increase. Stated another way, using net instead of gross MWh penalizes investment required by law to reduce other types of air emissions than CO2. The use of gross MWh would quantify actual increases/decreases in CO2 emissions, properly taking into consideration both consumer load and auxiliary power. Elsewhere in the bill, pounds per MWh are used without clarifying whether they are gross or net. We

believe use of consistent gross units will help prevent disagreements about compliance.

Conforming Definitions on Reconstruction with Current Law

We suggest changing page 7, lines 24 – 27, to read:

> "Reconstruct" or "reconstruction" means any rebuilding of an emission source within an existing affected facility which generates electricity from fossil fuel that would result in the significant emission increase of nitrous oxide and sulfur dioxide as defined under 40 CFR 52.21(b)(23) and increase carbon dioxide emissions from such facility.

We believe the current provisions in this legislation would trigger requirement of carbon mitigation for any type of modification of the affected unit that could impact fuel usage. This is much more restrictive than current federal regulation and Kansas policy. Our suggested change aligns this legislation on carbon mitigation to the similar federal regulations that set a threshold level for criteria pollutants below which no mitigation would be required. It would prevent triggering carbon restrictions at existing fossil fuel plants when only routine maintenance and capital expenditures were involved to keep the plant in good working order.

Credit for Carbon Mitigation Measures

1. The single largest, most effective mitigation of CO2 and other air emissions within the electric utility sector in Kansas today is the Wolf Creek Nuclear Generating Station. Wolf Creek has zero air emissions – no CO2, no other green house gases, no SO2, no nitrogen oxide, no particulates, no mercury. At the highest capacity factor of any plant in the state, its carbon mitigation may exceed all other types of electric utility mitigation combined. Each year, Wolf Creek's owners make substantial capital investments at the plant to keep it in good working order and retain its carbon mitigating effects. Yet this legislation does not acknowledge this fact. We believe it should recognize Wolf Creek by allowing its production to offset coal or natural gas-fired CO2 emissions. Therefore, we suggest on page 9, line 7 to strike " constructed after January 1, 2008."

2. Some of the most environmentally pristine areas in Kansas today are found at Westar's power plants. The water quality at Coffey County Lake (Wolf Creek's cooling lake) is among the best in the state because of the watershed land management practiced by Wolf Creek's owners. The trees and grasslands surrounding the lake are excellent sources of carbon capture. The property on which Jeffrey Energy Center is located is also environmentally protected and stores carbon. Those properties and many other utility properties Westar owns are not in Westar's retail service territory. They are in the service territories of rural electric cooperatives. Westar has been a leader in restoring native prairie

at the National Tallgrass Preserve near Strong City. Some scientific studies show that native grassland restoration is as effective, if not more effective, than forest restoration in capturing and storing atmospheric carbon. But our efforts at the Preserve, and similar efforts in many of the nearly two hundred other projects for prairie restorations and tree plantings are outside our service territory. To grant more carbon mitigation credit to properties inside a utility's service territory than outside ignores two facts: (1) most of Westar's service territory is located within cities and towns where such opportunities for carbon mitigation are limited; and (2) CO2 emissions are atmospheric, and therefore mitigation efforts, whether inside or outside Westar's service territory, have the same beneficial effect. Discriminating in favor of one over the other has no scientific basis. Current bill language allows for a 3X multiplier credit for projects located in Kansas plus an additional 2X multiplier credit if the project is located in the utility's service territory. We suggest on page 9, amending line 28 through 31 to read, "equal to five times the actual carbon dioxide tonnage sequestered as a result of such projects in Kansas."

3. The section on the retirement of generating units should also be changed to allow for offsets from any retirements of fossil fuel plants, regardless if the same fuel is used in the replacement plant. In support of this suggestion, we return to the purpose of this section of the legislation – to mitigate emissions of carbon dioxide. Whether burning coal or natural gas generates the carbon dioxide should not matter. The goal is carbon mitigation. On page 10, lines 23 and 24 we suggest changing the date to July 1, 1995 and deleting "on or after July 1, 2008, and which combusted the same fuel as the affected facility." We also suggest deleting lines 27 through 30, beginning with "Such offset credit…" We have retired some of our natural gas units and believe that reduction in carbon dioxide emissions should have an offset value under this bill. We are replacing these old retired units with higher efficiency natural gas peaking units.

In future sessions, if this legislation becomes law, it will have many repercussions that will need to be addressed. It establishes the Kansas electric generation, transmission and efficiency study commission that will likely have to deal with other unforeseen consequences and developments. We respectfully request that the legislature address the unintended consequences we have identified this session.

Kansas City Power & Light®
ENERGIZING LIFE

Testimony of KCP&L
Before the House Energy and Utilities Committee
Regarding House Bill 2711
February 7, 2008

Kansas City Power and Light understands the challenges involved in building a coal plant. KCP&L is currently constructing an 850 megawatt supercritical coal-fired electrical generating plant near Weston, Missouri. The plant, known as Iatan 2, is expected to come online in 2010, joining the existing Iatan 1, which came online in 1980.

Undertaking a major investment such as construction of a coal plant requires compromise by all parties. HB 2711 seeks to address those compromises upfront.

KCP&L does not offer policy analysis of the bill, but would like to bring attention to various sections that may have unintended consequences and request technical changes.

Issue 1 – to ensure the bill deals only with new generation plants, the following change is requested:

> Page 6 - New Section 10(b)(1)
> ''Affected facility'' means a fossil-fuel-fired steam electricity generating ~~unit~~ *emission source* of more than 250 million British thermal units per hour heat input other than:
> (A) A facility owned or operated by the federal government;
> (B) a facility located on tribal lands; ~~or~~
> (C) any other facility exempt under section 111 of the federal clean air act; *or*
> *(D) any existing emission source which commences operation prior to July 1, 2009.*

Issue 2 – the current heat rate used to describe coal plant specifications is not believed to be consistently achievable with Powder River Basin (PRB) coal. Ultra-supercritical coal technology, while more efficient than traditional pulverized coal unit designs, has not developed a long term operating record using PRB coal, which is the most widely used coal in Kansas. It is important that when considering incentives for coal unit efficiency that considerations for the

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DATE: 2/7/2008
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long-term reliability and maintenance cost of the unit also be valued as important considerations for customers.

> Page 7 – New Section 10
> (8) ''Supercritical pulverized coal technology'' means a steam generating facility operating at or above 3,600 pounds per square inch and less than ~~1,200~~ *1100* degrees fahrenheit.
> (9) ''High efficiency pulverized coal technology'' means a steam generating facility operating at or above 4,500 pounds per square inch and at or above ~~1,200~~ *1100* degrees fahrenheit.

Issue 3 – Carbon offset values that differentiate between investments in Kansas and other states create regulatory challenges for utilities like KCP&L that operate in more than one state. Because emissions, or emission offsets, don't stay where they are created, it is suggested the bill treat offsets the same.

> Page 8 to 12 – New Section 12
> Remove references to "in Kansas."

KCP&L appreciates the opportunity to offer suggestions on this bill and urges the committee adopt the recommendations presented.

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