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## Energy Supply (ES) Technical Work Group

### Summary List of Pending Priority Policy Options for Analysis

Policy No.	Policy Option	GHG Reductions (MMtCO <sub>2</sub> e)			Net Present Value (Million \$)	Cost-Effectiveness (\$/tCO <sub>2</sub> e)	Level of Support
		2015	2025	Total (2010–2025)			
ES-1	Advanced Fossil Fuel Technology Incentives, Support, or Requirements	<i>Not Yet Quantified</i>					Pending
ES-2	Nuclear Capacity	<i>Not Yet Quantified</i>					Pending
ES-3	Transmission System Upgrading	<i>Not Yet Quantified</i>					Pending
ES-4	Renewable Portfolio Standard	<i>Not Yet Quantified</i>					Pending
ES-5	CCSR Incentives, Requirements, and/or Enabling Policies	<i>Not Yet Quantified</i>					Pending
ES-6	Technology-Focused Initiatives, Including Grant Programs	<i>Not Yet Quantified</i>					Pending
ES-7	Research and Development for CCSR	<i>Not Yet Quantified</i>					Pending
ES-8	Technology Research and Development	<i>Not Yet Quantified</i>					Pending
ES-9	Green Power Purchases and Marketing	<i>Not Yet Quantified</i>					Pending
ES-10	Energy Efficiency Resource Standard	<i>Not Yet Quantified</i>					Pending
ES-11	General Education to Public on Energy Supply Options	<i>Not Yet Quantified</i>					Pending
ES-12	Efficiency Improvements and Repowering Existing Plants	<i>Not Yet Quantified</i>					Pending

CCSR = carbon capture and storage or reuse; GHG = greenhouse gas; MMtCO<sub>2</sub>e = million metric tons of carbon dioxide equivalent; \$/tCO<sub>2</sub>e = dollars per metric ton of carbon dioxide equivalent.

Note: The numbering used to denote the above pending priority policy options is for reference purposes only; it does not reflect prioritization among these important draft policy options.

## ES-1. Advanced Fossil Fuel Technology Incentives, Support, or Requirements

### Policy Description

Advanced fossil fuel-based electric generation technologies include those that can be more efficient and thus lower-emitting generation technologies than current or older technologies. Alternatively, advanced fossil generation may include technologies different from conventional ones that could have higher or lower efficiencies but pose other advantages. Advanced fossil generation technologies combined with cost-effective and efficient carbon capture and storage or reuse (CCSR) may have the potential to materially lower carbon dioxide (CO<sub>2</sub>) emissions associated with fossil fuel-based electricity generation. Such technologies include (but are not limited to) circulating fluidized-bed combustors, integrated gasification combined-cycle (IGCC) units, and pulverized coal (advanced supercritical and ultra-supercritical units). The classes of supercritical technologies (advanced and ultra) serve to increase electric output (efficiency) through increases in pressure and temperature in the combustion and heat transfer cycles.

### Related Kansas Programs/Actions

- Kansas Statutes Annotated (K.S.A.) 2008 Supplement (Supp.) [79-233](#) exempts any CCSR equipment from all property taxes. K.S.A. 2007 Supp. [79-32,256](#) provides additional tax incentives for CCSR.
- KSA 2008 Supp. [79-32,228](#) through [32,232](#) and [79-32,238](#) through [32,241](#) provide tax credits, and KSA 2008 Supp. [74-8949a](#) authorizes Kansas Development Finance Authority financing for building and expanding IGCC plants.
- The 2008 Kansas Energy Plan recommends that the Kansas Corporation Commission (KCC) consider the value of lower-emission-coal generation and CCSR technologies when evaluating investments or purchase power agreements for IGCC with CCSR.

### Policy Design

Kansas should establish generation performance standards (GPS), or requirements that all new fossil-fueled electric generating facilities meet carbon intensity (defined as CO<sub>2</sub> emissions in metric tons per unit of gross megawatt (MW) output) goals.

A carbon intensity requirement should remain with the affected fossil-fueled generating facility until such time as CCSR technology becomes best achievable control technology for the particular generating technology and fuel type. At such time, the overall carbon intensity goal should be reviewed by the appropriate regulatory authority and adjusted downward to reflect this new development.

Kansas should also develop incentives to support reductions in greenhouse gas (GHG) intensity by rewarding new plants that exceed this target.

**Goals: [The Energy Supply (ES) Technical Work Group (TWG) has not proposed specific goals. The TWG may prefer to propose that the state legislature instruct the KCC to**

**establish or recommend a GPS by date certain. The TWG may also propose examining the potential costs and benefits of a range of standards for illustrative purposes.]**

**Timing:** To be determined (TBD).

**Parties Involved:** Governor of Kansas, state legislature, KCC, and utilities.

**Other:** None identified.

## ES-2. Nuclear Capacity

### Policy Description

Nuclear power has historically been a low-GHG source of electricity. However, no new commercial reactor has come on line in the United States since 1996 due to extremely high capital costs, the absence of any plan or technology for permanent disposal of nuclear waste, and risks to public safety exemplified by high-profile accidents at Three Mile Island and Chernobyl. The current Administration has been supportive of nuclear expansion, emphasizing its importance in maintaining a diverse energy supply and its reputation for producing electricity with negligible pollutant emissions during operation. Congress has also offered significant financial subsidies for new nuclear plants in an effort to jump-start the industry, including limitations on liability for nuclear accidents.

Since 1990, nuclear power has accounted for 18%–24% of all electricity generated in Kansas and 15%–20% of total electricity exports. Currently, the 1,200-MW Wolf Creek generating station near Burlington is the only operating nuclear power plant in Kansas.

Steps to encourage nuclear power options in Kansas could include the provision of streamlined siting review at existing nuclear facilities, including a streamlined appeals process. Kansas could develop finance authority to assume the developer role (and potentially an equity ownership role) for new nuclear resources. Under such a scenario, the state would not necessarily need to be an operator of nuclear facilities. Instead, it could serve as a facilitator in developing a new nuclear facility, recognizing the cost and financing burdens such a facility could impose on existing Kansas companies, including those as large as Westar Energy, Inc., and Kansas City Power & Light (KCP&L). Small-scale nuclear power options could also be considered.

Nuclear plant relicensing allows a nuclear power plant to extend the life of the facility for 20 years past its original 40-year license term. This is considered a low-cost and low-emission source of energy because there are limited additional capital costs or additional embodied emissions associated with extending the life of fully depreciated and operating nuclear plants. The U.S. Nuclear Regulatory Commission (NRC), the nation's regulatory authority for nuclear power, considers the relicensing program one of its major cornerstones of current regulatory activity. A nuclear power plant uprating is a process whereby a licensee receives approval from the NRC to operate a plant at a higher power level than the level authorized in the original license.

Nuclear power efficiency improvements increase generation efficiency at power stations through incremental improvements at existing plants (e.g., more efficient boilers and turbines, improved control systems, or combined-cycle technology). Policies to encourage efficiency improvements could include incentives or regulations as described in other ES policy options, with adjustments for financing opportunities and emission rates of existing plants.

### Related Kansas Programs/Actions

- K.S.A. 2008 Supp. [79-230](#) has a property tax exemption for new nuclear facilities built near other nuclear facilities.

- K.S.A. 2008 Supp. [66-128q](#) provides electric utilities the ability to recover certain costs related to planning for new nuclear generation capacity.
- K.S.A. 2008 Supp. [66-128q](#) also allows for Construction Work in Progress, which can significantly reduce the financing costs for a new nuclear facility.
- KCC has recently held workshops to explore construction cost, licensing, and financing impediments to building new nuclear facilities.
- The Wolf Creek Nuclear Operating Corporation recently obtained relicensing approval for the current Wolf Creek nuclear facilities.

## Policy Design

**Goals:** This policy is intended to ensure that the state of Kansas undertakes analyses of utility operating systems to identify and pursue cost-effective opportunities to reduce emissions through the use of nuclear power by:

- Purchasing imported nuclear power, and/or
- Constructing another nuclear unit at the existing Wolf Creek Station; and
- Considering the costs, benefits, and technological obstacles of pursuing smaller-scale nuclear facilities in Kansas.

To accomplish these goals, a stakeholder group comprised of the Governor's office, KCC, Kansas utilities, the Citizens Utility Ratepayer Board (CURB), NRC, the Kansas Department of Health and Environment (KDHE), and the Kansas legislature should examine existing barriers to the development or increased use of nuclear power. The stakeholder group should examine:

- Whether legislative or regulatory barriers to the increased use of more nuclear power exist;
- Whether the need for additional baseload electricity resources to serve Kansas communities and citizens justifies investment in new nuclear capability, particularly in light of potential new federal carbon regulation regimes;
- Whether financing to construct a nuclear power unit can be obtained, or, in the alternative, whether the full faith and credit of the state of Kansas should be committed to build more nuclear power in the state;
- Whether federal initiatives (e.g., U.S. Department of Energy [DOE] incentives, such as loan guarantees) to encourage development of nuclear energy exist;
- Whether it will be possible to reprocess spent nuclear fuel; and
- Whether public concerns with the safety of nuclear power outweigh increased use of nuclear power to reduce GHG emissions statewide.

**Timing:** This policy should be implemented as soon as possible.

**Parties Involved:** The Governor of Kansas, KCC, CURB, Kansas utilities, NRC, KDHE, and Kansas legislature.

**Other:** None identified.

## ES-3. Transmission System Upgrading

### Policy Description

Successfully reducing GHG emissions through renewable portfolio standards (ES-4) is highly dependent upon energy deliverability via the electric transmission system. New transmission lines and upgrades to existing lines will facilitate Kansas' renewable energy resources' (primarily wind) access to load centers in the state and, to a greater extent, interstate energy markets.

Of potential benefit, transmission system enhancements intended to extract renewable Kansas wind energy may result in additional suitable locations for dispatchable generation capacity additions—base load, intermediate load, and peak load—including nuclear (ES-2) and advanced fossil fuel (ES-6) resources.

Deliverability of physically remote nuclear, advanced fossil fuel, and renewable generation may afford earlier retirement of existing high-GHG-emitting resources near concentrated load centers. Such early retirements would be unlikely, absent alternative capacity resource availability through an improved transmission system.

It may be useful to designate areas with higher wind energy potential as Renewable Energy Zones to establish preferred destinations for transmission system expansion or upgrades. With approximately 82,264 square miles in Kansas and transmission construction costs of \$1.0–\$2.5 million per mile, universally available transmission service is not economically viable. Specifically targeted Renewable Energy Zones would help define possible transmission routes and reduce the volume of projects that must be studied by the Regional Transmission Organization. (See “Other” for wind maps.)

Competent intellectual resources dedicated to transmission reliability, operation, planning, and power marketing exist in Kansas in the form of incumbent transmission owners (TOs) and a federally sanctioned Regional Transmission Organization (RTO)—Southwest Power Pool, Inc. (SPP). Under the regulatory oversight of KCC, the Federal Energy Regulatory Commission, and the Kansas Electric Transmission Authority (KETA)—combined with the expertise of incumbent TOs and SPP—protecting the interests of ratepayers and reducing GHG emissions may be possible with new and upgraded transmission facilities.

Time is of the essence if the transmission system is to be expanded or upgraded to support renewable portfolio standards (RPS) and other efforts to reduce GHGs.

### Related Kansas Programs/Actions

- KETA was created to manage transmission issues and upgrades (K.S.A. 74-99d01).
- Westar Energy completed 35 miles of the new 345-kilovolt (kV) transmission line from near the Gordon Evans Energy Center in Colwich, just northwest of Wichita, to a new Reno County Substation near Hutchinson. Most of this line included reconductoring and new, double-circuit construction with existing 138-kV and 115-kV lines (12/20/08).

- KCP&L recently completed the reconductoring of the Stillwell to LaCygne 345-kV transmission line, relieving a critical congestion problem.

## Policy Design

### Goals:

- 2010<sup>1</sup>—Westar Energy to construct 51 miles of 345 kV from Reno County to Summit (near Salina) in central Kansas.
- 2011—Westar Energy to construct 53 miles of 345 kV from Rose Hill (near Wichita) to the Kansas-Oklahoma border. (Oklahoma Gas and Electric to construct 53 miles of 345 kV to Sooner Central in Oklahoma).
- 2012—Construct 90 miles of 765 kV operated at 345 kV from Spearville to Knoll (Hays) with a 345/230-kV transformer at Knoll.
- 2012—Construct 95 miles of 345 kV from Knoll (Hays) to Axtell, Nebraska.
- 2012—Construct 60 miles of 345 kV from Spearville to Comanche County Switching Station operated 345 kV.
- 2012—Construct 120 miles of 765 kV from Comanche County Switching Station to Wichita, operated at 345 kV.
- TBD—Proposed to construct 765 kV from Comanche County Switching Station and/or Medicine Lodge Substation to 765 kV line in Oklahoma (extra high voltage to Woodward, Oklahoma).

**Timing:** Planning studies for projects impact implementation schedules.

**Parties Involved:** SPP

**Other:** Wind Power Density Maps are available at <http://kcc.ks.gov/energy/wind.htm>.

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<sup>1</sup> Projects listed and in-service years are from the *2008 SPP Transmission Expansion Plan: A Report of the SPP Regional Transmission Organization*. Available at: [http://www.spp.org/publications/2008\\_Approved\\_STEP\\_Report\\_Redacted.pdf](http://www.spp.org/publications/2008_Approved_STEP_Report_Redacted.pdf)

## ES-4. Renewable Portfolio Standard

### Policy Description

A renewable portfolio standard (RPS) is a requirement that retail electricity providers must supply a certain percentage of electrical energy from renewable energy sources. Renewable energy sources are defined as wind, hydro, biomass, solar, and methane-capture generating facilities, or as further defined in specific state policy, including carbon offsets from certified sources. An RPS of 5% would mean that for every 100 megawatt-hours (MWh) that a retail electric provider supplies to its retail customers, 5 MWh must be generated from renewable resources. Retail electric providers can meet this requirement by purchasing or generating renewable-based electrical energy or by purchasing renewable energy certificates (RECs) from eligible renewable energy resources.

RECs are tradable certificates, created for every MWh of renewable electricity generated from eligible renewable energy resources. Under applicable federal and state laws, certain entities other than the retail electric provider may construct or own an eligible renewable facility and earn RECs for the electrical energy that it generates. Retail electric providers can either generate their own RECs and/or purchase RECs to meet their RPS requirement. In this way, retail electric providers may not in all circumstances need to build and operate renewable generating facilities. By providing this flexibility, a market in these credits would be created, leading to lowest-cost renewable energy for Kansas' electric customers.

Kansas, the nation's third windiest state, recognizes its vast potential for the development of wind energy resources. The state has determined that it is in the public's interest to utilize this resource for the purpose of stimulating economic development in the state through the additional jobs and investments in renewable energy; providing for a source of clean, zero-emission electric energy that can offset the harmful emissions from traditional fossil resources; and providing the nation with alternative domestic energy resources to reduce dependence on foreign supplies. Kansas also recognizes that additional costs may be imposed on electric customers should the deployment of renewable resources per the standard prove more expensive than absent this state policy.

The Kansas renewable energy policy should be designed with the flexibility to adapt to federal policy when it is established without economically penalizing in-state participants.

### Related Kansas Programs/Actions

- A voluntary RPS to meet 10% of Kansas' energy demand with wind power by 2010 and 20% by 2020. See K.S.A. 2008 Supp. [66-1,184\(g\)](#).
- Since January 2006:
  - KCP&L commissioned its 100.5 MW Spearville Wind Generating Facility in Ford County Kansas, the first wind-generating facility in the state to be owned and operated by an electric utility.

- 1,000 MW of potential new wind power was announced by a number of the state's leading utilities. The new Smoky Hill Wind Project, along I-70 in Lincoln and Ellsworth counties, was developed by TradeWind Energy, LLC, a Kansas developer, and will be owned by Enel North America, Inc. It features 100 MW of wind generation to be divided among Sunflower Electric, Kansas City Board of Public Utilities, and Midwest Energy.
- The state's largest utility, Topeka-based Westar Energy, announced on February 26, 2007, a request for proposals for 500 MW of renewable energy. This was followed by a joint announcement on March 20 by KCP&L and the Sierra Club of a commitment of another 400 MW of wind generation. Westar plans to have about 300 MW of the development installed by the end of 2008. KCP&L already owns the Spearville Wind Energy Facility in Ford County that was put into operation in the fall of 2006.
- These announcements will ensure Kansas utilities will meet a voluntary goal of 1,050 MW of wind by 2010, as announced by Governor Sebelius during the State of the State address in January 2007 (<http://www.governor.ks.gov/news/speeches.htm>). This equals about 10% of nameplate electric generation capacity for the state's utilities. The utilities agreed to a commitment of a 20% voluntary goal by 2020.

## Policy Design

The ES TWG recommends that Kansas codify its existing voluntary RPS of no less than 20% of renewable energy by 2020. These requirements would apply to electric utilities supplying customers in Kansas as follows:

**Goals:** For all retail electric providers serving customer loads of 100,000 MWh per year or greater:

- No less than 8% by 2013.
- No less than 10% by 2015,
- No less than 15% by 2017, and
- No less than 20% by 2020 and thereafter.

**Timing:** As noted above.

**Parties Involved:** All electric utilities (EUs) and load-serving entities (LSEs) serving customers or load in Kansas.

**Other:** Considerations toward implementation:

- Retail electric providers can meet the requirements of the standard by generating renewable energy from an eligible renewable resource and/or by purchasing RECs.
- Renewable energy generated in Kansas will be eligible for 1.25 RECs toward compliance with the standard.
- RECs will remain valid for 36 months from the date the energy was generated, for the purpose of compliance with this standard.

- RECs must be audited and verified, and tracked to avoid double counting. Decisions must be made about sourcing of RECs, whether from inside and/or outside of Kansas.
- Cost recovery and return on investment should be allowed for regulated utilities, regardless of whether the investment in renewable energy was the least-cost resource.
- Transmission and market constraints must be taken into account by KCC.
- “Net metering” RECs should count toward the utility’s compliance obligation.

## ES-5. CCSR Incentives, Requirements and/or Enabling Policies

### Policy Description

Carbon capture and storage or reuse (CCSR) is a process that includes separation of CO<sub>2</sub> from industrial and energy-related sources, transport to a storage location, commercial use, or permanent or long-term storage in isolation from the atmosphere. Ideally, the CO<sub>2</sub> from large point sources of emissions, such as fossil-fueled power plants, can be compressed and transported for commercial use in food products or enhanced oil recovery (EOR). EOR has been tested in Kansas and neighboring states on a limited basis.

If those option aren't available, storage in geological formations—most likely the abundant saline aquifer space in Kansas—is the next best option. While CO<sub>2</sub> capture from fermentation in ethanol production is relatively simple with the gas being highly concentrated, capture from coal gasification or combustion is complex, expensive, and energy intensive. While IGCC includes a mechanism to capture concentrated CO<sub>2</sub>, the cost for this technology is very high. Combusting coal and capturing and concentrating its diffuse CO<sub>2</sub> is being tested at a small scale in numerous trials currently, but this technology is expensive and requires much additional electricity, and is likely a decade away from commercial-scale applications. A third technique, coal combustion with concentrated oxygen, produces much more concentrated CO<sub>2</sub>, but with similarly high energy and equipment costs.

Both technological and financial barriers obstruct the implementation of CCSR. While separation, capture, and transport of CO<sub>2</sub> are themselves understood technologies, financially independent, commercially viable examples don't exist in the United States. In Kansas however, CO<sub>2</sub> EOR and sequestration opportunities may be abundant in the state's saline aquifers. Further research and development (R&D) funding to improve CCSR technologies and evaluation studies to identify and map geologically sound reservoirs will be needed for this technology to play a significant role in reducing GHG emissions.

### Related Kansas Programs/Actions

- Various carbon sequestration research efforts exist in Kansas, including Kansas University's (KU's) Energy Research Center (ERC) and Kansas State University's Soil Carbon Center.
- Carbon reuse opportunities are proposed by Sunflower Electric for the Holcomb facility. Utilization of flue gas for the enhanced production of algae for integration with the production of high-value products has potential application in many industrial facilities that use conventional fossil fuel.
- K.S.A. 2008 Supp. [79-233](#) and K.S.A. 2008 Supp. [79-32,245](#) provide property tax incentives for the sequestration of CO<sub>2</sub>, beginning with fiscal year 2008.
- The U.S. Environmental Protection Agency has published a proposed rule on the [Underground Injection Control Program](#) for Carbon Dioxide Geologic Sequestration Wells.
- The Kansas Geological Survey (KGS) is a partner in the [Southwest Regional Partnership on Carbon Sequestration](#) (SWP). SWP was developed as a part of DOE's effort to respond to

global climate change. The SWP has been challenged to evaluate available technologies that capture and store CO<sub>2</sub> in the Southwest region. The SWP includes portions of Arizona, Colorado, Kansas, Nevada, New Mexico, Oklahoma, Texas, Utah, and Wyoming. Participants include the coal, oil, and gas industries; electric utilities; the Navajo Nation; nongovernmental organizations; universities; and U.S. federal agencies.

- The use of sequestered CO<sub>2</sub> to enhance oil recovery is of great interest due to the rise in the price of crude oil. Wellfields that were once marginal may be brought back to production. Some of these efforts include:
  - An ongoing project at the KU ERC (<http://www.kgs.ku.edu/ERC/CO2Pilot/index.html>), which includes research by the KU Tertiary Oil Recovery Project, KGS, and ERC for EOR in Kansas using miscible-CO<sub>2</sub> flooding.
  - A partnership between Coffeyville Resources Nitrogen Fertilizers and Blue Source to develop options for the utilization of CO<sub>2</sub> captured from petroleum coke gasification-based ammonia and urea ammonium nitrate production. Particular focus is proposed to develop an EOR project.
- K.S.A. 2008 Supp. [55-1636 through 55-1640](#), the Carbon Dioxide Reduction Act, directs KCC to adopt rules and regulations establishing requirements, procedures, and standards for the safe and secure injection of CO<sub>2</sub> and maintenance of its underground storage. Specifically, the rules must address site selection criteria, design and development, operation criteria, casing, monitoring, measurement, safety, closure and abandonment requirements, financial assurance, and long-term monitoring.
- As part of the rulemaking process for Kansas House Bill 2419, KCC has recently held a workshop to obtain public input to the rulemaking process.

## Policy Design

Since CO<sub>2</sub> capture from coal is currently either cost-prohibitive (IGCC) or not available at commercial scale, federally backed incentives for both this and geologic injection of CO<sub>2</sub> should be directed at R&D. Kansas should investigate and pursue federal funding opportunities, including special funding pursuant to the 2009 Recovery and Reinvestment Act. In addition, Kansas should look for ways to leverage federal funds with private investment to promote research, technology development, and demonstration projects in CCSR. Kansas should continue to explore and resolve the legal and policy issues associated with geostorage, concurrent with the scientific and technological work.

### Goals:

- Encourage the mapping and testing of Kansas' saline aquifers for EOR, CO<sub>2</sub> sequestration, or both, particularly in proximity to large, stationary CO<sub>2</sub> sources.
- Initially encourage EOR and the accompanying carbon storage from this activity, and sequestration in depleted oil and gas fields, within the 2- to 5-year time frame. By 2015, encourage and support additional pilot/demonstration activity for deep carbon geostorage in several locations in the state.

**Timing:** Mapping completed by 2015.

**Parties Involved:** KGS, oil and gas developers and producers, and fossil-fueled energy providers.

**Other:** None identified.

## ES-6. Technology-Focused Initiatives, Including Grant Programs

### Policy Description

The development of new technologies to efficiently serve the energy needs of this country is essential. Consistent with that objective, the need to address the goal of carbon reduction from existing and new production sources will require meaningful incentives, since carbon reduction and/or capture processes will most likely add to the cost of that produced energy. A significant investment by the public and private sectors in technology-based R&D will be required to further these general policy objectives.

Advanced fossil fuel technologies (ES-1), CCSR (ES-5), and market-ready renewable and efficiency technologies (ES-4 and ES-8) are covered under their respective policies. This policy is intended to support the development and use of technologies not included in these other policies. Many of these are new, emerging technologies that are not market ready, and others are market-ready or nearly market-ready.

Combined heat and power (CHP) is market-ready, and while the industrial opportunities in Kansas may be limited, there may be untapped potential among large institutional users of heat and steam. Hospitals, universities, government complexes, and similar facilities may be able to take advantage of the benefits of CHP. CHP technologies, also referred to as “co-generation,” include steam turbines with steam extraction or back pressure, gas turbines with waste heat recovery boilers, combined-cycle units, reciprocating engines with manifold exhaust and cooling heat recovery, as well as less proven technologies, such as fuel cells and Stirling engines. If, and only if, there is a match between the real-time requirements for thermal energy and the electrical load that is generated, then the energy/fuel requirements to produce a given amount of electricity can be less than half of what is possible with even the largest and most efficient power generation technologies in existence today.

As a “co-benefit” of this inherent efficiency, CHP installations significantly reduce GHG emissions by increasing the overall efficiency of fuel use relative to making the same energy products (i.e., power and heat) separately in stand-alone installations. However, generating both electricity and heat is a cost-intensive undertaking that carries considerable risk to any Kansas business or institution that might consider implementing such projects.

Biomass co-firing of coal power plants is generally not viewed as market-proven, but may offer some potential for reduced emissions at certain plants. Key concerns are the sustainable availability of sufficient supply of affordable biomass within a cost-effective transportation radius, the suitability of mixing the biomass with the coal for each boiler and fuel-feed technology, the storage and handling of the biomass at the power plant, Clean Air Act Title V air permit issues, and others.

### Related Kansas Programs/Actions

- The 2008 Kansas Renewable Energy & Energy Efficiency Conference, held September 25–26, had over 500 attendees. Multiple concurrent sessions on various energy topics were

facilitated by over 40 energy experts from Kansas and throughout the country. Topics included efficiency and conservation, new technologies, wind and solar energy, biofuels, public education and loan programs, and federal policy updates. Another Renewable Energy Conference will be held in September 2009.

- KSA 2008 Supp. [79-32,233](#) through [32,237](#) provides tax incentives for biomass-to-energy plants.
- Some Kansas university research centers are focusing on these issues.

## Policy Design

**Goals:** Promote the development of new technologies and improve existing processes, with specific initiatives by the public sector and incentives for private entities. Ultimately, Kansas should be viewed as an innovator in energy production that addresses carbon reduction and capture.

Set a goal of CHP utilization in Kansas equal to 15% of in-state CHP technical potential at institutional and industrial facilities by 2020, with a phase-in beginning in 2010. Seek federal and other financial incentives to subsidize a pilot private proposal to demonstrate the feasibility of up to 10% biomass co-firing at a 25-MW coal plant, to be operational by 2015.

**Timing:** Tax incentives and grant programs should become available in 2010 and continue indefinitely. CHP and biomass co-firing timing as stated above under the goals.

**Parties Involved:** Kansas state government agencies, colleges and universities conducting applicable research programs and private partners, industrial and institutional candidates for CHP, and utilities.

**Other:** None identified.

## **ES-7. Research and Development for CCSR**

- **[Merged with ES-5]**

## ES-8. Technology Research and Development

### Policy Description

Technology R&D is necessary for the preservation of a reliable electricity supply under the carbon constraints that are being contemplated as a matter of public policy. A single technology will not accomplish the broad objectives. Rather, technologies of various types that now exist at various points along the technology development curve will require consideration.

Promote technological R&D to capture or reduce GHG emissions in Kansas, through use of tax credits and a grant program.

Tax credits will be given to energy supply industry entities that undertake or continue technological R&D projects approved by a KCC committee for the capture and or reduction of GHG.

A grant program will be developed to promote technological R&D for the capture or reduction of GHG for individuals, small entities, and nonprofit organizations who submit projects for review and approval by the KCC committee. When the project is approved by the KCC committee, the applicant will be awarded a grant to assist with project.

### Related Kansas Programs/Actions

None identified.

### Policy Design

**Goals:** Have at least 10 viable projects approved conducting R&D of technology to capture or reduce GHG by the end of 2020.

**Timing:** Have the KCC approval committee in place by mid-2010; approve at least one project a year over the 10-year policy period.

**Parties Involved:** KCC approval committee and applicants from industry, individuals, small entities, non-profit organizations.

**Other:** Have at least one capture or reduction project put into practical application reducing GHGs.

## ES-9. Green Power Purchases and Marketing

### Policy Description

Green power refers to electricity produced by wind, solar, biomass, and hydroelectric generating resources. Green power purchasing programs are state or utility programs that allow consumers to purchase a percentage of their electric power requirements sourced through renewable resources. Providers of green power programs will obtain green resources either through the generation of green power from eligible renewable resources or through the purchase of green tags or RECs (the renewable attributes of power generation). One REC is generated for each MWh of renewable energy generated. Green programs are designed to ensure that a quantity of electricity or RECs equal to their purchase will contribute to the development and support of renewable resources or other programs that provide opportunities for consumers to purchase or support green power, regardless of whether those renewable resources are the least-cost alternative. Generally voluntary, these programs can be implemented on a local, statewide, or regional basis. These programs are distinct from carbon offset markets.

### Related Kansas Programs/Actions

- Green power purchases were offered by Westar Energy in 1999, but discontinued due to low participation. A new green power purchasing program is in development at Westar.
- Electric cooperatives have implemented the Cooperatives Advancing Renewable Energy (CARE) program. This voluntary program affords electric cooperative members (CARE Supporters) an opportunity to support customer-owned generation by adding a financial contribution to their monthly electric bill to support other cooperative members who own and operate renewable generation (CARE Producers). The funds contributed by CARE Supporters are paid out *pro rata* to CARE Producers annually.

### Policy Design

This policy will increase the opportunity for utility consumers in Kansas to purchase or financially support green power initiatives, regardless of whether these renewable resources are the least-cost alternative. It will also allow utilities and other electric providers to credit energy provided under green power program participation toward achieving state or federal RPS.

**Goals:** Allow green power programs to contribute up to 50% of the utility's green power requirements specified in the RPS. The percentage contribution of the green purchase and marketing programs would be specific to each utility or retail electric provider.

**Timing:** Utilities will voluntarily conduct market surveys to determine their customers' interest in purchasing a percentage of their energy through green power programs. Within 120 days of the completion of the survey, utilities will provide to KCC a report of survey results and an analysis of the potential for customer participation in green power programs, along with an assessment of customer cost impact.

**Parties Involved:** For entities under its jurisdiction, KCC would need to approve green power and marketing programs and allow recovery of the costs necessary to implement such programs; the utilities would need to design and market programs that provide opportunity for consumers to purchase and/or support green energy; and consumers would need to provide the financial support necessary to incentivize the installation of green power and meet the programs' *pro rata* share of the RPS goal.

**Other:** None identified.

## ES-10. Energy Efficiency Resource Standard

### Policy Description

An energy efficiency resource standard (EERS) requires electric and sometimes natural gas utilities to reduce demand by a set percentage or to reduce retail electric sales in kilowatt-hours by a set percentage. Utilities can meet this requirement through end use energy efficiency improvements (residential, commercial, industrial, agricultural, and institutional), transmission and distribution upgrades that save energy, and CHP systems. Rate payers benefit from avoided or forestalled construction of new power plants and lower utility bills for those who directly participate in available energy efficiency programs. In the Midwest, states that have adopted this policy mechanism include Minnesota (1.5% annual energy savings), Illinois (1% annual energy savings by 2011, 2% annual energy savings by 2015), and Ohio (1% annual energy savings by 2014, 2% annual energy savings by 2019).

The Kansas Energy Council commissioned a 2008 study by Summit Blue Consulting, which collected and analyzed demand-side management (DSM) program results from 24 utilities and energy agencies in the Midwest and across North America. Quoting directly from that report (E-1, E2)<sup>2</sup>:

"The achievement of significant DSM savings is influenced by several factors including: the regulatory environment under which utilities and agencies operate, how DSM projects are funded, how the issue of lost revenues is addressed, the provision of financial incentives for DSM performance, and other factors.

"British Columbia, Connecticut, California, Iowa, Massachusetts, Minnesota, and Vermont all achieved about 1% or more reductions in annual energy sales due to DSM programs in 2006 (or 2005). The electricity market structure is not a determining variable in DSM performance; most of the high achievers operated under a traditional market structure, but California is partially restructured. Nor does year that programs began appear [sic] to be a strong influence on savings achieved. All states achieving high DSM savings set significant mandated goals for utilities' DSM programs. Other success factors include financial incentives for cost-effective DSM (Minnesota, Vermont), adjustments for lost revenues caused by DSM programs (California), and the use of the Total Resource Cost (TRC) test or societal test for cost-effectiveness rather than the Ratepayer Impact Measure (RIM) test (British Columbia, California, Iowa, Minnesota, Vermont)."

Summit Blue found that the median residential and commercial and industrial electric energy efficiency program savings is about 0.6%–0.7% of baseline sales annually, while high-efficiency Midwest electric utility programs save 0.9%–1.0% of baseline sales annually.

### Related Kansas Programs/Actions

None identified.

<sup>2</sup> *Energy Efficiency Potential Study for the State of Kansas: Final Report*, (2008) Prepared by Summit Blue Consulting, LLC, [http://kec.kansas.gov/reports/KEC\\_DSM\\_Final\\_081108.pdf](http://kec.kansas.gov/reports/KEC_DSM_Final_081108.pdf)

## Policy Design

Based in part on the *Energy Efficiency Potential Study for the State of Kansas: Final Report*, the ES TWG recommends that Kansas electric utilities ramp up to an annual reduction of 1% of weather-normalized projected retail sales by 2015 and thereafter.

### Goals:

- 0.4% of baseline sales by 2011,
- 0.6% of baseline sales by 2012,
- 0.8% of baseline sales by 2013, and
- No less than 1% of baseline sales by 2015 and thereafter.

**Timing:** As noted above.

**Parties Involved:** All EUs and LSEs serving customers or load in Kansas.

### Other:

- Note the critical overlap with ES-11, General Education to Public on Energy Supply Options.
- The ES TWG or Kansas Energy and Environmental Policy (KEEP) Advisory Group may consider adding a natural gas requirement.

Notes toward consideration of implementation:

- The TWG's inclination is toward utility-administered rather than third-party-administered programs. Utilities have long-standing relationships with and are uniquely positioned with an effective avenue for regularly and consistently reaching all customer classes. Utilities also have an intimate daily awareness of the specific need for and access to the various means available to acquire needed supply resources.
- An EERS must be cost-effective. Five different cost-effectiveness tests will be assessed and applied; of these, the societal perspective is preferred determinant of cost-effectiveness.
- Policy must direct KCC to develop rules that provide incentives to utilities to make investments in energy efficiency that are more favorable than investments in traditional energy supply. These rules should provide a methodology for utilities to recover costs incurred in designing, implementing, and managing energy efficiency programs; to recover lost margins due to reduced customer energy use; and to earn an incentive return that is financially better than investments in traditional supply.
- This policy must allow for programs for all types of customers.
- Plans must include analysis of the potential for energy efficiency, performance standards in terms of energy and capacity savings, and measurement and verification of actual program results.
- While 1% appears to be an appropriate overall state goal, individual utilities may find it difficult to meet. Therefore, the Kansas EERS might provide for bilateral contracts to permit

utilities to procure some efficiency savings from other utilities or third-party efficiency providers.

## ES-11. General Education to Public on Energy Supply Options

### Policy Description

There will be direct and indirect effects on GHG emissions if the public or specific groups are well informed about aspects of the technical, economic, and/or environmental dimensions of energy supply and use options. Public education and outreach efforts should build upon existing work being done by federal, state, and local agencies; utility companies; and nonprofit organizations. Approaches can include public announcements, forums, educational programs, materials, Web sites, educational curricula, tours of energy facilities, etc. Education should focus on quality-assured scientific data and energy economics that provide the public, the business community, and industry with the information needed to make intelligent and timely decisions regarding energy use, selection, and/or optional efficiency improvements. With this educational program, no one option that is adopted for the energy supply sector would be focused on more than any other options.

Public education and outreach relevant to the energy supply sector is essential in cultivating support for policies designed to reduce GHG emissions. Providing the electricity consumer quantitative (technical) and qualitative (subjective) information regarding the social, environmental, and economic dimensions of energy supply fosters a broad awareness of climate change. Such direct and indirect awareness is essential in engaging consumers in actions that modify human behavior, and lays the foundation for the long-term success of the mitigation activities proposed by the KEEP Advisory Group.

### Related Kansas Programs/Actions

Some energy generation facilities in Kansas provide educational public tours, such as the Bowersock hydropower facility.

### Policy Design

The policy recommendations for public education and outreach within the energy supply sector will involve a diverse group of stakeholders, represent the various entities within the energy supply industry, and embody a variety of educational approaches, with the primary purpose of building upon and coordinating with existing outreach efforts to establish an energy information network. However, this policy option must be flexible and open to the introduction of new ideas throughout the planning, implementation, and evaluation processes. The Kansas Energy Office under the KCC should be the lead agency coordinating these efforts with other Kansas agencies and departments, schools and universities, the media, and the general public. [The energy supply sector should work in collaboration with other KEEP TWGs that are designing public education and outreach policies to coordinate overall efforts and quality/cost assurance, and to establish a comprehensive policy option.]

**Goals:** TBD

**Timing:** Begin the educational programming and outreach process upon the KEEP Advisory Group's endorsement of this policy option.

**Parties Involved:**

- KEEP Advisory Group, KEEP TWGs, and volunteers from TWG members working on the Recreational, Commercial, and Industrial TWG RCI-3 policy option, and the Cross-Cutting Issues TWG CCI-4 policy option.
- General public (electricity consumers, businesses, and low-income assistance).
- Energy supply organizations (utility companies, cooperatives, energy facilities, and renewable energy and energy efficiency facilities).
- Federal, state, and local government agencies.
- Policymakers (legislators, regulators and executive branches).
- Community-based organizations (community leaders, municipalities, service clubs, social affinity groups, for-profit/not-for-profit organizations).
- Future generations (primary, secondary, post-secondary educational institutions, community colleges, technical colleges, other colleges and universities).
- Communication channels (print, broadcast, outdoor, electronic media).

**Other:** None identified.

## ES-12. Efficiency Improvements and Repowering Existing Plants

### Policy Description

The average startup date for coal-fired generation units in Kansas is 1967. The average age for all fossil fuel-fired units in Kansas with greater than 20-MW generation capacity is 36 years. The state's utilities will likely be faced with the decision of retiring or repowering a number of old, less efficient units within the time frame of this planning process.

Replacing aging units with more efficient in-state generation could significantly reduce GHG emissions from this sector. Furthermore, the existing coal-based generation may benefit from additional technologies and upgrades to make their fuel burning more efficient, resulting in more electric output for the amount of fuel burned. However, certain existing regulatory policies, such as New Source Review (NSR), deter some efficiency improvements. NSR is the general term applied to the permitting requirements of new stationary sources or modifications of existing stationary sources under the Clean Air Act. NSR encompasses the Prevention of Significant Deterioration permitting requirements for areas that are and are not in attainment and the National Ambient Air Quality Standards.<sup>3</sup>

Generation efficiency improvements refer to increasing generation efficiency at power stations through incremental improvements at existing plants (e.g., more efficient boilers and turbines, and improved air and feed-water heaters, condensers, or power plant control systems). An efficiency upgrade results in lower GHG emissions at the same or a higher level of electrical output.

Repowering existing power plants refers to the engineering and installation of technologies that enable switching to lower-emitting fuels, such as natural gas in place of coal or oil, or biomass-based carbon-neutral fuels, such as switchgrass.

Power replacement refers to the replacement of an existing plant with another plant of similar or different technologies. Replacement plants using new, modern design are inherently more efficient than the older generation technologies in terms of GHG emissions per unit of fuel consumed.

Policies to encourage generation efficiency improvements, repowering of existing plants, or power plant replacement(s) could include both incentives and regulations. This policy evaluation would be part of an overall plan identifying cost-effective options for reducing system CO<sub>2</sub> and other GHG emissions to applicable regulatory levels or limits on both short-term and long-term bases, requiring utilities to pursue cost-effective options for reducing their emissions profile through measures identified above, and creating financial incentives that reward such emission reductions.

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<sup>3</sup> It should be noted that utilities can use emissions netting under the NSR program, which may allow for modifications without triggering NSR.

## Related Kansas Programs/Actions

None identified.

## Policy Design

**Goals:** A 5% improvement in the overall fossil fuel generation GHG intensity in Kansas by 2025, as a result of efficiency improvements and repowering existing fossil fuel units. This 5% improvement applies to existing fossil-based generation, and should be evaluated based on the GHG generation intensity measured as pounds of CO<sub>2</sub>/MWh.

To reach this goal, utilities should evaluate efficiency upgrades, repowering, and/or plant replacements against other generation options. This evaluation should include all renewable generation replacement options and consider potential GHG compliance costs, such as a market-based procurement of emissions allocations or other “costs of carbon.”

In addition, a stakeholder group should be formed to evaluate potential policy deterrents, such as NSR, to determine if modifications should be advocated to help achieve desired climate benefits.

Kansas should continue efforts to modify federal NSR rules to encourage efficiency upgrades, and should work with and through the Midwest Governor’s Association and regional member states toward this end.

**Timing:** Efficiency can be improved incrementally over shorter periods of time (i.e., 1–5 years) while repowering, and replacements can take many years to plan and implement.

**Parties Involved:** This recommendation applies to all Kansas utilities. For regulated utilities, efficiency upgrades, repowering, and power plant replacement would most likely be evaluated through a KCC review. For unregulated generators, these projects would be economically driven based on market forces. For municipalities, their local boards or commissions would evaluate these projects. Major upgrades that trigger NSR permitting would involve KDHE. Stakeholder meetings for evaluating policy deterrents should include utility representatives, KCC, and KDHE staff.

**Other:** None identified.