Brief Description of Catalog of State Actions
Energy Supply (ES)
Technical Work Group (TWG)

Note that this listing is incomplete and will be fleshed out during the ES TWG process. TWG members are encouraged to provide input on policies and programs in place in Kansas to assist in defining baselines.

Items in Green are additions to the options.

ES-1 EMISSIONS POLICIES AND OVERARCHING ITEMS

1.0 Overarching items

Overarching items include Kansas' current commitments and goals associated with GHG emissions. Examples include the State of Kansas' establishment of the KEEP to develop GHG emissions reductions goals and targets and an associated action plan for achieving these reductions. Overarching items also include current and potential future regional initiatives, such as those developed in 2007 under the auspices of the Midwestern Governors' Association.

1.1 GHG cap and trade

A cap and trade system is a market mechanism by which GHG emissions are limited or capped at a specified level, and those participating in the system are required to hold permits for each unit of emissions. Through trading, participants with lower costs of compliance can choose to over-comply and sell their additional reductions to participants for whom compliance costs are higher. In this fashion, overall costs of compliance are lower than they would otherwise be.

The initial allocation of the allowances is a crucial policy decision. They can be auctioned (with the proceeds used to benefit consumers who will pay higher costs) or allocated to existing sources, or some combination of the two. Participants can range from a small group within a single sector to the entire economy. As with carbon taxes, the compliance obligation can be imposed "upstream" (at the fuel extraction or import level) or "downstream" at points of fuel consumption.

Among the important considerations with respect to a cap and trade program are: The sources and sectors to which it would apply; the level and timing of the cap; how allowances would be distributed (e.g., whether load-based or generation-based, how new market entrants are accommodated, how leakage is addressed, etc.); and what if any offsets would be allowed. Other issues to consider include which GHGs are covered; whether there is linkage to other trading programs; banking and borrowing; early reduction credit; what if any incentive opportunities may be included; use of any revenue accrued from permit auctions; and provisions for encouraging energy efficiency.

The principal example of a GHG cap-and-trade system in the US today is the Northeast States' Regional Greenhouse Gas Initiative: http://www.rggi.org/

1.2 Carbon (GHG) tax

A GHG tax would be a tax on each ton of CO_2 equivalent emitted from certain sources. The tax could be imposed upstream, based for example on the carbon content of fuels (e.g., fossil fuel suppliers) or at the point of combustion and emission. Although taxed entities would pass some or all of the cost on to consumers, there would be competitive pressure to find cost-effective ways to lower (or offset) emissions. Consumers who see the implicit cost of GHG emissions in products and services could adjust their behavior to lower emissions and reduce cost. The program can be designed to be "revenue neutral" (not a net tax increase) for example by offsetting with an income tax reduction, can fund policies and programs to assist with reducing GHG emissions, or can be directed to helping the competitiveness of industries or assisting communities affected by the tax.

1.3 Generation performance standards and/or mitigation requirements for electricity

A generation performance standard (GPS) is a mandate that requires load-serving entities (LSEs) to acquire electricity, or power plant developers to build and operate new generation, with a per-unit emission rate below a specified mandatory standard. In some cases, GHG offsets or credits can be used to mitigate emissions and achieve compliance. A market-based variation of a GPS would allow generators with emission rates lower than the GPS to sell their extra "credits" to generators with emission rates higher than the standard.

1.4 Integrated resource planning (IRP)

Integrated Resource Planning, or IRP, is planning process that strives to meet needs for electricity services in a manner that meets multiple objectives, such as least cost, meeting emissions standards, fuel diversity, RPS requirements, etc. An IRP process should include evaluation of all options, from both the supply and demand sides, in a fair and consistent manner, building in flexibility to account for future uncertainties. While originally targeted primarily towards cost minimization, IRP processes have increasingly considered the environmental risks and the potential costs associated with future regulation of GHGs.

1.5 Voluntary GHG commitments

Numerous US companies and organizations, including many utilities, have taken on voluntary GHG reduction commitments. Some of these are organized through the US EPA's Climate Leaders program. These commitments can be based on total GHG emissions in a given year or can be defined on an intensity basis (tCO_2e per MWh generated or delivered). Some entities with voluntary commitments also transact through the Chicago Climate Exchange (CCX), a self-regulating pilot program for reducing and trading GHG emissions in North America.

1.6 Technology research & development

R&D funding can be targeted toward a particular technology or group of technologies as part of a state initiative to build an industry around that technology in the state, and/or to set the stage for adoption of the technology for use in the state. For example, an agency can be established with a mission to help develop and deploy energy storage technologies. R&D funding can also be made available to any renewable or other advanced technology through an open bidding procedure (i.e., driven by bids received rather than by a focused strategy to develop a particular technology). Funding can also be given for demonstration projects to help commercialize technologies that have already been developed, but which are not yet in widespread use. Finally, funding could be targeted to increase collaboration among existing institutions in the state for R&D.

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

ES-2 RENEWABLE ENERGY AND ENERGY EFFICIENCY

2.1 Renewable and/or Environmental Portfolio Standard (RPS/EPS)

A renewable portfolio standard (RPS) is a requirement that utilities must supply a certain, generally fixed percentage of electricity from an eligible renewable energy source(s). An environmental portfolio standard (EPS) expands that notion to include energy efficiency or other GHG emissions-reducing technologies as an eligible resource. About 20 states currently have an RPS in place, while a handful have implemented an EPS. In some cases, utilities can also meet their portfolio requirements by purchasing Renewable Energy Certificates (RECs) from eligible renewable energy projects. With Renewable Energy Certificate "trading", it may be beneficial to consider a variety of renewable resources.

2.2 Grid-based renewable energy incentives and/or barrier removal

This policy option reflects financial incentives to encourage investment in renewable energy resources. Examples include: (1) direct subsidies for purchasing/selling renewable technologies; (2) tax credits or exemptions for purchasing renewable technologies; (3) feed-in tariffs, which provide direct payments to renewable generators for each kWh of electricity generated from a qualifying renewable facility; (4) tax credits for each kWh generated from a qualifying renewable facility; (5) regulatory policies that provide incentives and/or assurance of cost recovery for utilities that invest in central station renewable energy systems. In addition, this policy option would make it a priority for the Legislature, the public service commission, and other relevant state agencies to identify and rectify barriers which are impeding the development of renewable resources in the state.

Considerations for this option could include net metering, interconnection standards, and production/performance-based incentives (e.g., statewide program or rebate—such as in the form of dollars per kWh—designed to encourage the use of renewable energy by offering production payments for grid-tied electricity generated by wind, solar, and biomass resources).

2.3 Distributed renewable energy incentives and/or barrier removal

This option is analogous to option 2.2 but focuses on providing incentives for and removing barriers to distributed renewable resources throughout the state.

Considerations for this option could include corporate tax incentives, sustainable building tax credits, wind and solar energy tax deductions, green building incentives, green building standards for state facilities, energy efficiency and renewable energy bond programs, personal tax incentives, sales tax incentives, lease purchase programs, grant programs, and loan programs.

2.4 Green power purchases and marketing

Green power refers to electricity produced by environmentally benign sources such as wind, solar, biomass, and hydroelectric generating resources. These programs allow consumers to purchase “green tags” along with their electricity ensuring that a quantity of electricity equal to their purchase contributed to the development and support of renewable resources. Generally voluntary, these programs can be implemented on a statewide or regional basis. A consideration for this option could be a Utility Green Power Option.

2.5 Combined Heat and Power (CHP) standards, incentives and/or barrier removal

Combined heat and power can reduce GHG emissions by increasing the overall efficiency of fuel use. However, there are numerous barriers to combined heat and power (CHP), including inadequate information, institutional barriers, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk, "split incentives" between building owners and tenants, and utility-related policies like interconnection requirement, high standby rates, exit fees, etc. The lack of standard offer or long-term contracts, payment at avoided cost levels, and lack of recognition for emissions reduction value provided also creates obstacles. Policies to remove these barriers can include: improved interconnection policies, improved rates and fees policies, streamlined permitting, recognition of the emission reduction value provided by CHP and clean distributed generation (DG), financing packages and bonding programs, power procurement policies, education and outreach, etc.

Financial incentives for combined heat & power (CHP) could include: (1) direct subsidies for purchasing/selling CHP systems given to the buyer/seller; (2) tax credits or exemptions for purchasing/selling CHP systems given to the buyer/seller; (3) tax credits or exemptions for operating CHP systems; (4) feed-in tariff, which is a direct payment to CHP owners for each kWh of electricity or BTU of heat generated from a qualifying CHP system; and (5) tax credits for each kWh or BTU generated from a qualifying CHP system.

2.6 Pricing strategies to promote renewable energy and/or CHP (e.g. net metering)

Pricing and metering strategies can provide price signals and revenue streams to support investment in and optimal operations of CHP and renewable energy systems. Net metering is a policy that allows owners of grid-connected distributed generation (generating units on the customer side of the meter, often limited to some maximum kW level) that generate excess electricity to sell it back to the grid, effectively "turning the meter backward."

Net metering provides several incentives for renewable DG by reducing transaction costs (e.g., no need to negotiate contracts for the sale of electricity back to the utility) and increasing revenue by setting compensation at retail electricity rates rather than at utility avoided costs. The State of Kansas could adopt rules for net metering and interconnection for renewable energy systems (e.g., up to 2 megawatts in capacity). Qualified renewable generators could be categorized into tiers.

In addition to net metering, pricing strategies of relevance to CHP and distributed renewable energy systems can include "time-of-use" rates. These are fixed rates for different times of the day and/or for different seasons which reflect the time-varying value of electricity;

2.7 Renewable energy development issues (zoning, siting, etc.)

Policies can be developed to help overcome barriers for renewable energy development. Institutional and market barriers include price distortions, failure of the market to value the public benefits of renewables and the social cost of fossil fuel technologies, inadequate information, institutional barriers to grid interconnection, high transaction costs because of small projects, high financing costs because of lender unfamiliarity and perceived risk. These can be overcome through a suite of financial and regulatory redresses as well as through information and public education campaigns.

Financial obstacles can be addressed through property tax exemptions, exclusions, and credits; personal income tax credits or deductions to cover the expense of purchasing and installing renewable energy equipment; loan programs to aid in financing the purchase of renewable energy equipment; and grant programs designed for research and development or to help a project achieve commercialization.

Regulatory policies can include solar or wind easements of access rights; development guidelines at the local level to enhance renewable energy generation (e.g., requiring proper street orientation); requirements that utilities provide information and utility leasing programs for renewable energy production to customers in remote regions.

2.8 Technology-focused initiatives (biomass co-firing, energy storage, fuel cells, etc.)

States can undertake initiatives focused on developing, promoting, and/or implementing one or more specific technologies that have the potential to reduce GHG emissions. Technologies could include, among others, hydrogen production and fuel cells for electricity storage, compressed air energy storage systems (to enable greater penetration of intermittent renewable technologies such as wind), or biomass co-firing. Biomass co-firing can be a low-cost, near-term means of converting biomass to electricity and displacing a fraction of coal use by adding up to 15% biomass in high-efficiency coal boilers. Other technology-focused initiatives could also be considered.

The State of Kansas could create a "New Energy Technology Program", such as a grant program aimed at developing innovative energy-efficient technologies and renewable energy technologies that save energy, improve air quality, and generate economic and employment opportunities for small firms in Kansas.

2.9 Public benefits charge

A public benefits charge (sometimes call systems benefits charge) is a fee on utility customers based on their usage of energy which is to be spent on public goods such as energy efficiency. In many deregulated states the utility commissions have lost the ability to require efficiency programs of the electric utilities, so the public benefits charge has been introduced as a non-by-passable charge on electric bills. The funds collected are then provided to a third party to provide energy efficiency programming. The funds could be used to fund rebates for buyers of new, low-GHG emitting technologies through very small surcharge on electricity consumption.

2.10 Research and development for renewable technologies

Similar to 2.8 above, but this option focuses on specific research and development efforts related to renewable energy technologies.

2.11 Co-location or integration of energy producing facilities

Encourage Combined Heat and Power (CHP) operations that enable the more efficient utilization of heat and energy through co-location of these facilities.

ES-3 FOSSIL FUEL AND NUCLEAR ELECTRICITY

3.1 Advanced fossil fuel technology (e.g., IGCC, CCSR, advanced pulverized coal, CFB) incentives, support, or requirements

Advanced fossil technologies include more efficient and thus lower emitting generation technologies. Advanced fossil technologies combined with carbon capture and sequestration or reuse (CCSR) may have the potential to significantly lower CO_2 emissions associated with fossil-fuel based electricity generation. Advanced fossil technologies that could be considered include integrated gasification combined cycle (IGCC), advanced pulverized coal, and advanced circulating fluidized-bed (CFB) technology.

Policies to encourage the development of these technologies may include mandates or incentives to use advanced coal technologies for new coal plants, such as a mandate that requires new fossil fuel-fired power plants to achieve a specific low net CO_2 emission rate. Alternatively, a mandate might require that all or a portion of new coal plants be of a certain type, such as integrated gasification combined cycle (IGCC). Incentives may take the form of direct subsidies or assistance in securing financing, and/or off-take agreements. A combination of mandates and incentives is also possible.

Policies to encourage CCSR could include a state agency or department within an existing agency tasked with promoting CCSR, evaluation studies to identify geologically sound reservoirs, R&D funding to improve CCSR technologies, and/or financial incentives or mandates to capture and store carbon or to capture and reuse it.

3.2 New nuclear power

Nuclear power has historically presented a low-GHG source of electricity. However, no new commercial reactor has come on line in the US 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.

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. The State of 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 of Kansas would not necessarily need to be an operator of nuclear facilities. Instead, the State could serve as a facilitator in development of a new nuclear facility, recognizing the cost and financing burdens such a facility could represent on existing Kansas companies, including those as large as Westar and KCPL. Small-scale nuclear power options could also be considered.

3.3 Relicensing/uprating existing nuclear power

Nuclear plant relicensing allows a nuclear power plant to extend the life of the facility for twenty years past its original 40-year license term. This is considered a low-cost and low-emissions source of energy because there is limited additional capital cost or additional embodied emissions associated with extending the life of fully depreciated and operating nuclear plants. The 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.

3.4 Efficiency improvements and repowering existing plants

Efficiency improvements refer to increasing 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). Repowering existing power plants refers to switching to lower or zero emitting fuels at existing plants, or for new capacity additions. This includes use of biomass or natural gas in place of coal or oil. Policies to encourage efficiency improvements and repowering of existing plants could include incentives or regulations as described in other options, with adjustments for financing opportunities and emission rates of existing plants.

3.5 Technology-focused initiatives

States can undertake initiatives focused on developing, promoting, and/or implementing one or more specific fossil fuel or nuclear technologies that show promise for reducing GHG emissions. Technologies could include, among others, carbon capture and storage (to sequester carbon dioxide emissions from power plants, oil and gas operations, and/or refineries); biomass blending in coal power plants; implementation of equipment in oil and gas operations that increases efficiency and reduces losses (e.g., remote sensors of leaks); small-scale nuclear; advanced pulverized coal; and advanced circulating fluidized-bed (CFB) technology.

ES-4 FUEL PRODUCTION, PROCESSING AND DELIVERY

4.1 Oil and gas production: GHG emission reduction incentives, support, or requirements

Emissions of both methane (CH_4) and CO_2 can be reduced in the oil and gas production. Natural gas consists primarily of methane, a potent greenhouse gas; any reduction in leaks during production, processing, and transportation/distribution avoids GHG emissions. Stopping these leaks may also be economically beneficial because it can prevent the waste of valuable product. The EPA Natural Gas STAR program offers numerous methods of preventing leaks, including preventive maintenance (improving the overall efficiency of the gas production and distribution system), reducing flashing losses (releases when pressure drops at storage tanks, wells, compressor stations, or gas plants), and changing and replacing parts and devices to reduce leaks and improve efficiency. The State of Kansas could take steps to encourage all oil and gas production companies operating in Kansas to participate in the EPA Gas STAR program.

Policy Question posed by TWG member: Are there additional regulatory restrictions or requirements on these activities which "do no harm" to the overall fuel production and supply? (Question related to all of the options under ES-4)

4.2 Natural gas transmission and distribution

As with leaks of methane in oil and gas operations, any reduction of leaks during production, processing, and transportation/distribution avoids GHG emissions to the atmosphere and prevents the waste of valuable product.

4.3 Oil refining: GHG emission reduction incentives, support, or requirements

Options for reducing CH_4 and CO_2 emissions during the production of liquid fuels at oil refineries include various efficiency measures including enhanced combined heat and power along with carbon capture and storage. Regulations, incentives, and/or support programs can be applied to achieve these reductions.

4.4 Coal production: GHG emission reduction incentives, support, or requirements

There are a number of ways in which CH_4 and CO_2 emissions can be reduced and CH_4 can be recovered in the production of coal. These options include various efficiency measures, use of combined heat and power for operations, carbon capture and storage, and capture and use (or at least flaring) of methane that would otherwise be vented to the atmosphere. Regulations, incentives, and/or support programs can be applied to achieve these goals.

4.5 Coal-to-liquids and gas-to-liquids production: GHG emission reduction incentives, support, or requirements

Coal can also be converted into liquid fuels like gasoline or diesel by several different processes. Coal-to-liquids (CTL) plants are typically energy-intensive, producing about 10 times more CO_2 emissions than conventional oil refineries in order to produce liquid fuels. However, with carbon capture and storage (and co-production of electricity and liquid fuels) such emissions can be substantially reduced.[1] Regulations, incentives, and/or support programs can be applied to achieve these goals.

Gas-to-liquids (GTL) technology could also be assessed for its GHG reduction potential when coupled with carbon capture and storage options. GTL is a refinery process to convert natural gas or other gaseous hydrocarbons into longer-chain hydrocarbons in liquid form.

4.6 Low-GHG hydrogen production incentives and support

Hydrogen is not an energy source, but rather an energy carrier. It must be produced from other energy resources, such as fossil fuels (coal, oil, gas), renewable electricity (wind, solar), renewable fuels (biofuels, LFG), or nuclear power. However, it may facilitate the avoidance of GHG emissions by storing energy produced when and where available to be used when needed. The net greenhouse gas implications of producing hydrogen depend on the energy resource from which it is produced. In order to produce hydrogen from fossil fuels with low greenhouse gas emissions, it would be necessary to do it in conjunction with carbon capture and storage. Policies in support of this option would provide incentives to projects that help develop or deploy low-GHG hydrogen production technologies as well as advance the technology of efficiently storing electric energy as hydrogen and converting it back to electricity.

ES-5 CARBON CAPTURE AND STORAGE OR REUSE

5.1 CCSR incentives, requirements and/or enabling policies (administration, regulation, liability, incentives)

Carbon dioxide capture and storage or reuse (CCSR) is a process which includes separation of CO_2 from industrial and energy-related sources, transport to a storage location, and permanent or long-term storage in isolation from the atmosphere. Ideally, the CO_2 from large point sources such as power plants can be compressed and transported for storage in geological formations, in the ocean, in mineral carbonates, or for use in industrial processes. Captured carbon can also be used for enhanced recovery of oil and gas. The net reduction of emissions to the atmosphere through CCSR depends on the fraction of CO_2 captured, the relative increase in CO_2 production resulting from loss in overall efficiency of power plants which capture carbon, energy used for

[1] International Energy Agency, 2006. *Energy Technology Perspectives.* Well-to-wheel GHG emissions from coal liquids are approximately twice those of conventional oil products. Cogeneration and carbon capture and storage can reduce those emissions to levels similar to, or slightly below, those of conventional oil products.

transport and storage, any leakage from transport, and the fraction of CO_2 retained in storage over the long term.

Policies to encourage development of CCSR technology could include a state agency or department within an existing agency tasked with promoting CCSR, financial incentives to capture and store carbon or to capture and reuse it, and/or mandates – coupled with technical feasibility and cost and investment recovery mechanisms, if appropriate – to capture and store or reuse carbon dioxide from power plants.

5.2 R&D for CCSR

Technological as well as financial barriers exist to implementation of CCSR. While separation, capture and transport of CO_2 are themselves mature technologies, only three industrial-scale storage projects are currently in operation: the Sleipner project in an offshore saline formation in Norway, the Weyburn EOR project in Canada, and the In Salah project in a gas field in Algeria. Further R&D funding to improve CCSR technologies and evaluation studies to identify geologically sound reservoirs will be needed for this technology to play a significant role in reducing GHG emissions.

ES-6 OTHER ENERGY SUPPLY OPTIONS

6.1 Transmission system upgrading

Measures to improve transmission systems to reduce bottlenecks and enhance throughput may be required to satisfy long-term electricity demands and improve the efficiency of operations system wide. Opportunities may exist to substantially increase transmission line carrying capacity through the implementation of new construction and retrofit activities on the transmission grid, including incorporating advanced composite conductor technologies, capacitance technologies, and grid management software. Siting new transmission lines can be a difficult process given their cost and their local impact on the environment, and on the use, enjoyment, and value of property. Policy measures in support of this option could provide incentives to utilities to upgrade transmission systems and reduce barriers to siting of new transmission lines.

6.2 Reduction of transmission and distribution line losses

There are several energy efficiency measures that can be implemented to reduce the transmission and distribution line losses of electricity.

Utilities use a variety of components throughout the transmission and distribution system to manage losses. Increasing the efficiency of these components can further reduce losses and associated GHG emissions. For example, the State of Vermont offers a rebate to encourage the installation of energy efficient transformers. Regulations, incentives, and/or support programs can be applied to achieve greater efficiency of transmission and distribution system components.

6.3 General distributed generation support (interconnection rules, net metering, etc.)

Well-designed interconnection rules will ensure that distributed power products meet minimum requirements for performance, safety, and maintenance, at the same time significantly advancing the commercialization of these technologies. Such rules, generally developed and administered by a state's public utility commission, establish clear and uniform processes and technical requirements for connecting DG systems to the electric utility grid. Interconnection standards will reduce barriers to connection of DG systems to the grid. Connecting to the grid enables the facility to: a) purchase power from the grid to supply supplemental power as needed, for example, during periods of planned system maintenance, b) sell excess power to the utility, c) maintain grid frequency and voltage stability, as well as utility worker safety. This topic is of particular interest as the Energy Policy Act of 2005 (EPAct 2005) directed states to consider upgrading their standards for interconnecting small generators within one year of enactment. (See http://www.epa.gov/chp/index.html for more information on the effects of federal legislation on DG systems and CHP.)

6.4 Environmental (GHG emissions) disclosure

Emission disclosure consists of establishing requirements that GHG emitters publish their estimated GHG emissions on a regular (e.g., annual) basis. In addition to emissions, disclosure can also include an accounting of business risks due to climate change, such as assets in danger of weather-related damage, threats to market share, and risks of future regulation. Environmental disclosure allows investors and consumers to obtain information regarding a firm's GHG emissions and climate risks so as to better make purchasing and investment decisions, and provide an incentive for firms to reduce risk in these areas by, among other actions, reducing their CO_2 footprints. In the case of energy supply, environmental disclosure would take the form of providing consumers and stockholders with information on carbon emissions per kWh in a form that it would help them make decisions about electricity purchases and consumption, as well as evaluate investment risks. It is effective particularly in areas where consumers have an opportunity select their electricity provider.

6.5 Landfill Gas Recovery (see also Waste)

Capture of methane gas from landfills to reduce direct emissions and to produce electricity. This option could be structured as either a mandate or an incentive program.

6.6 Waste to Energy (see also Waste)

Certain components of municipal and agricultural waste can be used as a non-fossil combustion resource for generating electricity. For example, anaerobic digesters can recycle agricultural and ethanol byproducts as fuels and as feedstock for other bio-energy facilities. Such development may have potential application in industrial facilities that use conventional fossil fuel.

6.7 N_2O reduction co-benefit

Nitrous Oxide (N_2O), a minor component of total NOx emissions from fossil fuel combustion, is one the most powerful GHG's. Each ton of N_2O represents > 250 tons CO_2e. Emissions policies further reducing NOx emissions from power plants would have the additional benefit of reducing release of N_2O into the atmosphere.

6.8 Smart Grid

Smart Grid systems promote efficiency through improvements in system stability and better control technology and systems integration.

6.9 Consider expanded hydroelectric power opportunities

Most hydroelectric power comes from the potential energy of dammed water driving a water turbine and generator. Hydroelectric power generation can occur at different scales, from small to large. Small hydro plants are those producing up to 10 megawatts, although projects up to 30 megawatts in North America are considered small hydro and typically have the same regulations. Since hydroelectric dams do not burn fossil fuels, they do not directly produce CO2 or other greenhouse gases. While some CO2 is produced during manufacture and construction of the project, this is typically a tiny fraction of the operating emissions of equivalent fossil-fuel electricity generation. Citing of hydro plants, even small-scale plants, however, can be difficult and controversial due to factors such as technical feasibility, other environmental and habitat concerns, property value impacts, safety considerations, among others.

Incentives, government investment, and other approaches can be used to encourage efforts to identify and develop hydro power opportunities.

ES-7 EDUCATION AND OUTREACH

7.1 General education to public on energy supply options

There may be 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 options. Approaches can include public forums, educational programs, materials and websites, educational curriculum, tours of energy facilities, and other means.

7.2 Workforce development education to support energy supply options and economic development

Changes in the energy supply sector, coupled with other potential initiatives stemming from efforts to reduce GHG emissions, will likely trigger workforce development needs. For example, significant expansions in wind energy may increase the demand for trained technicians who can service wind energy equipment. Efforts to address workforce development needs can provide important support to successful execution of energy supply and GHG emissions reduction initiatives while enhancing employment and economic opportunities in the state. Approaches can include the development of educational programs, materials and curriculum at state universities and/or community and technical colleges.