IOWA CLIMATE CHANGE ADVISORY COUNCIL

Clean & Renewable Energy (CRE) Subcommittee

Summary List of Policy Recommendations

QUANTIFICATION ESTIMATES ARE THE SAME AS FROM JULY 30 MEETING

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Policy No.	Policy Option	GHG Reductions ($MMtCO_2e$) 2012	2020	Total 2009-2020	Net Present Value 2009–2020 (Million $)	Cost/ton ($\$/tCO_2e$)	Status of Option
CRE-1	Education	*Not Quantifiable*					Pending
CRE-2	Technology Initiatives, including Renewables	7.1	32.7	192.7	7462	38.7	Pending
CRE-3a	Federal Cap and Trade (including offsets to promote renewables)	*Not Quantifiable*					Pending
CRE-3b	MGA Cap and Trade (including offsets to promote renewables)	*Not Yet Quantified*					Pending
CRE-4a	Decarbonization Fund	2.2	9.5	65.7	-940	-14.3	Pending
CRE-4b	Carbon Tax (Economy-wide)	Not Yet Quantified					Pending
CRE-5	Performance Standards	3.9	11.0	72.3	2434	33.6	Pending
CRE-6	Voluntary GHG Commitments	*Not Quantifiable*					Pending
CRE-7	Policies Related to Nuclear Power	0.0	11.8	11.8	518	43.9	Pending
CRE-8	Support for Grid-based Renewable Energy & Development	0.0	0.2	0.9	29	32.0	Pending
CRE-9	Transmission System Upgrading	*Not Quantifiable*					Pending
CRE-10	R&D for Emerging Technologies and Corresponding Incentives	*Not Quantifiable*					Pending
CRE-11	Distributed Generation/Co-generation	0.0	0.1	0.5	18	36.2	Pending
CRE-12	Combined Heat and Power	4.0	12.1	85	3230	15.7	Pending
CRE-13	Pricing strategies to promote renewable energy and/or CHP	1.2	4.2	26	1038	39.6	Pending

GHG= greenhouse gas; $MMtCO_2e$ = million metric tons of carbon dioxide equivalent; $\$/tCO_2e$ = dollars per metric ton of carbon dioxide equivalent.

CRE-1. Education

Policy Description

This policy is directed at education and outreach for the purposes of nurturing public consciousness of climate change issues, as well as providing technical skills training for employment in positions that directly support GHG emission reduction activities.

Broad awareness engages citizens of all ages to take direct action to reduce GHG emissions through personal and public means. It also builds grass root support for government, industrial and civil society actions with regard to emissions reduction programs, policies, or goals.

Technical instruction and training of citizens will provide the number of skilled employees needed to fill critical jobs in the new and growing industries that will provide emissions reduction and clean energy.

Policy Design

Goals: Qualitative.

Develop, implement and execute a state wide climate change control awareness education and jobs training program that:

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- Provides a platform that along with imparting knowledge encourages a bias for action on the part of all state citizens.
- Provides a specified environmental education curriculum to primary, secondary, and post-secondary audiences within the state.
- Provides continuous public exposure through a variety of communications channels for the explicit purpose of providing environmental education and awareness to the state's masses.
- Specifically supports technical job training in support of the growing need by the state's renewable energy industries for skilled workers.
- Develops state wide environmental literacy. The outcome of a successful environmental education program is one in which the learner progresses to deeper knowledge, can apply it to address complex environmental issues, and make wiser decisions based on that knowledge.

Timing: To begin with the 2010 academic year.

Implementing Parties: Elementary and secondary school districts, municipal governments, the three regents state universities, the Iowa community colleges, community partners/associations.

Other: TBD

Implementation Mechanisms

TBD

Related Policies/Programs in Place

The Iowa Alliance for Wind Innovation and Novel Development – a newly formed organization with the purpose of creating a partnership between the educational community, government, associations, and the private sector for the purpose of meeting education/training, skills development, research, and testing needs.

Iowa Energy Center - The Energy Center awards scholarships to Iowa high school students at the State Science and Technology Fair of Iowa for exceptional energy-related projects.

Iowa Renewable Energy Association – Energy Learning Lab – "Make electricity from the sun and the wind, measure how much electricity is used by appliances, make hydrogen and use it to power a fuel cell model car, and use the sun to heat water. Your students will love using the Iowa Renewable Energy Association's energy education tools, available free of charge to teachers and schools for one week. In return, you will be asked to provide your name and contact information, a short paragraph describing how the tools were used in the classroom, and one or two digital pictures of students using the Energy Learning Lab materials".

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Maquoketa Valley Electric Cooperative's newest initiative, Renewable Energy Education in the Community (ReEC) is a new initiative to showcase the residential application of two renewable energy technologies, wind and photovoltaics (solar), recently installed at our headquarters in Anamosa. These units are designed for installation in residential neighborhoods and each will provide a portion of a home's electrical needs. ReEC will allow anyone to evaluate the real-time performance of these units and to use the data in a variety of education programs throughout Iowa. Various state and local elected officials and key leadership from state, regional and local electric cooperative's were present for a ribbon-cutting and website introduction on September 21st.

Iowa Clean Cities Coalition - Based in Des Moines, Iowa, the state capitol and the largest city in Iowa, the ICCC coordinates educational activities, promotes renewable fuels and renewable fuel infrastructure, and collaborates with partners to promote emerging technologies in the State of Iowa.

State Energy Council - The State Energy Council (SEC) brings together state agencies to communicate, collaborate, and coordinate efforts to meet the goal of advancing energy efficiency and renewable energy in the State of Iowa. SEC seeks to capitalize on the skills, responsibilities, and resources of participating agencies through agency collaboration

Alliant Energy Electrathon - The Iowa Electrathon is an educational program where high school or college-aged students research, design, build, and race Electrathon cars (small one-person electric vehicles with limited battery capacity.)

www.bioediowa.org - Informs Iowans about the public sector education & training opportunities within the biorenewable energy industry.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs (or Cost Savings)

Qualitative

Data Sources: TBD

Quantification Methods: TBD

Key Assumptions: TBD

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Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-2. Technology Initiatives, Including Renewables

Policy Description

This policy option deals with the implementation of clean and renewable energy technologies that are currently commercially available and with their potential for implementation in Iowa. States can undertake initiatives focused on developing, promoting, and/or implementing one or more specific technologies that show promise for reducing GHG emissions. Technologies could include, among others, wind, biomass (including refuse-derived fuels) landfill gas to energy, hydropower, solar, and geothermal. This policy would support providing state government and other private and public parties with resources and incentives for analysis, targeted R&D, market development, and adoption of GHG-reducing technologies that are not covered by other policies.

Policy Design

In 2008, the Iowa Legislature passed and the Governor signed a law that required the Iowa Utility Association, in consultation with the Iowa Association of Electric Cooperatives and the Iowa Association of Municipal Utilities, to conduct a technical study of the potential for renewable energy generation on a cost-effective basis by 2025. The study will be transmitted to the Office of Energy Independence by December 1, 2008, and included in the Energy Independence Plan required to be submitted by the Office to the Governor and the General Assembly by December 14, 2008. If time allows, efforts should be taken to make sure that the goals studied under this policy option are consistent with this plan, and should be considered placeholders until that study is completed.

Goals: Increase Iowa renewable electric production:

1) From landfill gas to energy (LFGTE) projects by 9,000 megawatt-hours (MWh) annually until the maximum feasible generation of approximately 90,000 MWh per year is developed;

2) From waste to energy (WTE) projects by 65,500 MWh annually until the maximum feasible generation of approximately 655,000 MWh per year is developed.

3) From wind projects by up to 2.6 million MWh annually or until the feasible amount of wind generation that can be integrated into the grid is reached.

4) From cofiring biomass agricultural residues in existing pulverized coal boilers at a rate of 10% of coal generation, or approximately 3,600 MWh annually.

5) From biomass generation from dedicated energy crops up to 760,000 MWh annually until the maximum feasible generation is developed.

6) From repowering hydroelectric facilities by up to 112,000 MWh annually annually until the maximum feasible generation is developed.

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Initial specific targets for additional technologies listed in the policy description (such as wind) are to be determined upon review of best available data to characterize the maximum cost-effective potential of each of the major technology options until the study mentioned above is completed.

Timing: Beginning in 2011; continuing through 2020.

Implementing Parties: State government. Private and public partners on a voluntary basis.

Other: TBD

Implementation Mechanisms

Biomass co-firing can be a low-cost, near-term means of converting biomass to electricity and displacing coal use by adding up to 15% biomass in high-efficiency coal boilers. Biomass energy conversion factors and crop yield estimates will be used to determine the number of farm acres needed to reach specific percentage and MWh goals.

A standard interconnection rule will ensure that distributed power products meet minimum requirements for performance, safety, and maintenance and will significantly advance the commercialization of these new technologies. Standardized interconnection rules, which are 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 identified by policy options 2.3, 2.5, and 2.6. 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) directs states to consider upgrading their standards for interconnecting small generators within one year of enactment. (http://www.epa.gov/chp/pdf/interconnection_factsheet.pdf)

Related Policies/Programs in Place

TBD

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs (or Cost Savings)

	2012	2020	Units
GHG Emission Savings	7.1	32.7	$MMtCO_2e$
Net Present Value (2008-2020)	529.1	7462.1	$ Million
Cumulative Reductions	10.7	192.7	$MMtCO_2e$
Cost-Effectiveness	49.4	38.7	$/tCO_2e

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Data Sources:

- Spreadsheet IA Biomass to Displace Coal sent by Jeff Myrom June 23, 2008 shows biomass cofiring corn stover would utilize 5.5% of Iowa harvested cropland.

- Tillman. (ND). US Biomass Cofiring Experience http://www.iea.org/textbase/work/2004/zets/apec/presentations/harding.pdf

- INL. (1998). U.S. Hydropower Resource Assessment Final Report. p. 19. DOE/ID-10430.2 http://hydropower.inl.gov/resourceassessment/pdfs/doeid-10430.pdf

- Iowa Dept. of Natural Resources. (ND). Hydropower. footnote #7. http://www.iowadnr.gov/energy/pubs/rerg/hydropower.pdf

- Iowa Dept. of Natural Resources. (ND). Adoption Subsidies and Environmental Impacts of Alternative Energy Crops. http://publications.iowa.gov/5090/1/07bp50.pdf

- Iowa Dept. of Natural Resources. (ND). Switchgrass and Other Energy Crops. http://www.iowadnr.com/energy/pubs/rerg/switchgrass.pdf

- Demeter, C.P.; Knowles, D.F.; Olmstead, J.; Jerla, M.; Shah, P. (2003). Assessment Of Power Production At Rural Utilities Using Forest Thinnings And Commercially-Available Biomass Power Technologies. Antares Group, Inc: Landover, MD. http://www.antaresgroupinc.com/DOERUSreport.htm

A) Energy Consumption By Sector *(billions of Btu)*
Historical energy consumption in the state, by sector, is from the U.S. DOE Energy Information Administration (EIA) State Energy Data available at http://www.eia.doe.gov/emeu/states/_seds.html. To calculate future projected energy consumption, growth factors were applied to the historical 2005 data to calculate projections through 2030. The growth factors are based on a combination of two parameters. One accounts for growth within the RCI sectors, with growth factors for residential based on projected population growth (from http://data.iowadatacenter.org/datatables/State/stpopest19002007.xls and http://data.iowadatacenter.org/browse/projections.html); growth in the commercial sector based on non-manufacturing employment growth projections; and industrial growth based on manufacturing employment. Employment projections were taken from the Iowa Workforce Information Network, Iowa Industry Projections, 2004 - 2014 (http://iwin.iwd.state.ia.us/pubs/statewide/indprojstatewide.pdf). The other factor is growth in electricity sales, which was calculated based on historical retail sales from 1990 to 2005 obtained from the EIA state electricity profile, in GWh, available from Table 8 at: http://www.eia.doe.gov/cneaf/electricity/st_profiles/iowa.html.

B) Power Station Electricity Generation *(GWh)* **and Fuel Use** (BBtu)
Gross generation for 2005 was obtained from the EIA database (EIA-906/920) on fuel stocks at all electric power sector generating facilities, broken down by fuel type. Data

for later years was projected from the 2005 figure based on projections of growth in generation for the Mid-Continent Area Power Pool (MAPP) region. The projected regional consumption and generation data are from the EIA Annual Energy Outlook (AEO) and can be accessed by downloading the "Electric Generation & Renewable Resource" file at http://www.eia.doe.gov/oiaf/aeo/supplement/index.html. On-site usage was subtracted from all generation figures.

C) Costs Associated with Electricity Generation

The costs in the U.S. to produce electricity using different types of technologies are from the AEO 2007, and are based on an analysis of energy supply, demand, and prices in the U.S. using the EIA National Energy Modeling System. See Table 39 in the "Electricity Market Module available at: http://www.eia.doe.gov/oiaf/archive/aeo07/assumption/index.html.

D) Energy Price Projections through 2030:

Energy prices by region are from the EIA Supplemental Tables to the Annual Energy Outlook 2007, with projections through 2030. Download "Consumption & Prices by Sector & Census Division" at: http://www.eia.doe.gov/oiaf/aeo/supplement/. Energy prices by region begin with Table 11.

- **Quantification Methods:**

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A) **Heat Rates** *(Btu/kWh)*

Heat rates indicate how much fuel is used (Btu) to generate a given amount of electricity (kWh), and they vary greatly depending on the type of power stations and the fuel used. Heat rates are used to convert figures for electricity into figures for fuel use so the fuel use can be converted into GHG emissions using GHG emission factors. Heat rates for 2005 for each type of generation and fuel were calculated from 2005 fuel use (in BBtu) divided by 2005 generation (GWh). Projections for 2006 and beyond are based on annual combustion efficiency growth rates for the MAPP region. Combustion efficiency for a given year is calculated for each fuel type as the fuel use (in quadrillion Btu) divided by the electricity generated (in billion kWh), and the combustion efficiency growth rate applied to this value is based on the change in combustion efficiency from the previous year.

B) **GHG Emissions Associated with End-Use Consumption (by Sector)**

Historical CO_2 data by sector (and further broken down by fuel type) was calculated by two EPA State Greenhouse Gas Inventory Tool (SIT) software modules: the Fossil Fuel Combustion Module and—for emissions from industrial sources—the SIT module for industry. Methane (CH_4) and nitrous oxide (N_2O) emissions were calculated by the Stationary Combustion Module and—for emissions from industrial sources—the SIT module for industry.

Projected emissions through 2030 were based on the 2005 data with growth factors compounded from year to year as discussed above in (A) for energy consumption.

C) **GHG Emissions Associated with Electricity Generation From Different Technologies and Fuels**

The projected data for each GHG was calculated for each fuel and generation type (e.g., non-lignite coal in a steam plant) as a direct product of the projected generation data (in GWh) described above in (B). Metric tonnes of CO_2 are calculated from generation as:

tonnes CO_2 = GWh * (Btu/kWh) * (tonnes CO_2/MBtu) * (% of that fuel in the fuel mix)

where (Btu/kWh) is the heat rate and (tonnes CO_2/MBtu) is the CO_2 emission factor. Similarly for CH_4 and N_2O, which are then converted to CO_2 equivalents [CO_2(e)] using global warming potentials (GWPs) of 21 for CH_4 and 310 for N_2O. The emission factor used for each GHG were the same as those used in the EPA State Greenhouse Gas Inventory Tool (SIT) software modules.

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Key Assumptions:

A) Renewables include LFG, waste to energy, wind , hydro repowering, 10% biomass cofiring, biomass energy crops

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B) Capacity factor for wind is 36% which is 2015 class 3 capacity factors in EERE study. Iowa Wind Map. http://www.energy.iastate.edu/Renewable/wind/maps/annual.htm shows nearly all of the state at or above an annual class 3 wind resource.

C) Rate at which costs are discounted annually: 5%

D) Year dollars in which new present value is calculated: 2008.

E) Net present value is calculated beginning 2009.

F) Assume all electricity from coal-fired generation is coming from sources within Iowa (no imports)

G) Policy actions that result in fuel switching occur from existing coal to renewables or nuclear power.

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Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-3a. Federal Cap-and-Trade, Including Offsets to Promote Renewable Energy

Policy Description

A cap-and-trade system is a constructed market-based compliance mechanism in which greenhouse gas emissions are limited to a specified amount (i.e., the cap), and entities subject to the cap can buy and sell (i.e., trade) emissions allowances. In theory, a properly designed cap-and-trade system of sufficient market size can lower the cost of compliance of meeting the emissions cap to all entities involved. This is possible because participants with a lower cost of compliance can reduce emissions below their allocation and sell their additional allowances to a participant with a cost of compliance that is otherwise higher than the market allowance price.

Many variables can be incorporated into a cap-and-trade system, including the greenhouse gasses covered, the sectors covered, up-stream or down-stream coverage, banking, safety valve prices, tie-ins with regional or international trading systems, offsets, early action credits, technology incentives, auctioning, triggers for on and off ramps, and the glide path of the cap. Each factor can have a significant influence on the market price of allowances, and thus the cost of compliance and impacts to ratepayers.

Policy Design

Goals: The goals of this policy are**:**

Compliance with a federal cap and trade program. is assumed to take the following steps:

Realistically, the cap-and-trade program will need to follow a slow-stop-reverse glide path. An immediate or abrupt reversal of the current emissions growth path is unrealistic given current technology options and is more likely to cause undue economic hardship.

Given the time line outlined in #2 above, the cap-and-trade program would begin to slow emissions growth between 2015 and 2020. To encourage technology development, bonus allowances would be granted for base load renewable energy and carbon capture and storage projects. To minimize the chance of significant rate impacts on consumers, the majority of allowances would be distributed for free during this time window. However, some allowances would be auctioned to assist low income consumers, and to generate funds for emissions reduction and avoidance technology development.

Between 2020 and 2025, emissions growth would stop and slowly begin to reverse. To encourage technology development, bonus allowances would be granted for baseload renewable energy and carbon capture and storage projects at the same reward rate used between 2015 and 2025. The majority of allowances would be distributed for free during this time window. However, a greater number of allowances would be auctioned to assist low income consumers, and to generate funds for emissions reduction and avoidance technology development.

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Between 2025 and 2030 emissions allowances would begin to accelerate downward. To encourage technology development, bonus allowances would continue to be granted for base load renewable energy and carbon capture and storage projects, but at a lower reward rate used between 2015 and 2025. The majority of allowances would be distributed for free during this time window. However, an increasingly greater number of allowances would be auctioned to assist low income consumers, and to generate funds for emissions reduction and avoidance technology development.

Beyond 2030 emissions allowances would continue to accelerate downward to 50% or 90% below 2005 levels by 2050. In 2031 approximately half of all allowances would be distributed for free, but by 2050 all allowances would be auctioned. Auctioned allowances would still be utilized to assist low-income consumers, and to generate funds for emissions reduction and avoidance technology development.

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In general, the larger the scope of a cap-and-trade program, the more likely the odds of lowering the cost of compliance for all participants. Thus, a federal cap-and-trade program is recommended as the first choice. A regional cap-and-trade program, such as the Midwest Governors Association proposal, is the second best choice and is also the minimum size recommended for a cap-and-trade program. A state-level program is not likely to be a cost-effective option and therefore is not recommended.

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Timing: Assuming that cap-and-trade legislation is passed within the first year of a new presidential administration (2009), it will likely take the U.S. Environmental Protection Agency three years to complete the rulemaking (2012). However, nearly all federal rulemakings are litigated and this could take another two to three years for a final rule to emerge (2015). For these reasons, a federal cap-and-trade program is unlikely to begin prior to 2015.

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Parties Involved: All sectors of the economy must be covered to ensure actual emissions reductions. The electric generating sector is likely to cover all units emitting 10,000 tons of carbon dioxide or more pear year. This policy would require adoption of a federal, or regional cap-and-trade system by the Iowa Legislature, and implementation by appropriate federal and state government agencies.

Other: Governor Culver has announced his policy intention of incorporating Iowa into a regional cap-and-trade system proposed by the Midwest Governors Association.

Implementation Mechanisms

Many variables can be incorporated into a cap-and-trade system, including the greenhouse gasses covered, the sectors covered, up-stream or down-stream coverage, banking, safety valve prices, tie-ins with regional or international trading systems, offsets, early action credits, technology incentives, auctioning, triggers for on and off ramps, and the glide path of the cap. Each factor can have a significant influence on the market price of allowances, and thus the cost of compliance and impacts to ratepayers.

All allowances for a cap-and-trade program (2015–2050) would be given unique serial numbers and created, but not distributed, within the first year of the program. To help minimize costs to ratepayers, unlimited banking of distributed allowances and limited borrowing of allowances from future years would be allowed.

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To encourage the development of biomass based renewable energy, carbon dioxide emissions from the combustion of biomass (e.g. switch grass, corn stover) or methane from the decomposition of organic matter (e.g. landfill gas, manure biogas) would not count against the cap.

Related Policies/Programs in Place

MWG Accord

Type(s) of GHG Reductions

CO_2, CH_4, N_2O All sectors of the economy must be covered to ensure actual emissions reductions. The electric generating sector is likely to cover all units emitting 10,000 tons of carbon dioxide or more per year. Covering smaller sources would greatly increase administrative complexity for the federal agency implementing the program.

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Estimated GHG Reductions and Costs (or Cost Savings)

TBD

Data Sources: TBD

Quantification Methods: TBD

Key Assumptions: TBD

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-3b. MGA Cap-and-Trade, Including Offsets to Promote Renewable Energy

Policy Description

A cap-and-trade system is a constructed market-based compliance mechanism in which greenhouse gas emissions are limited to a specified amount (i.e., the cap), and entities subject to the cap can buy and sell (i.e., trade) emissions allowances. In theory, a properly designed cap-and-trade system of sufficient market size can lower the cost of compliance of meeting the emissions cap to all entities involved. This is possible because participants with a lower cost of compliance can reduce emissions below their allocation and sell their additional allowances to a participant with a cost of compliance that is otherwise higher than the market allowance price.

Many variables can be incorporated into a cap-and-trade system, including the greenhouse gasses covered, the sectors covered, up-stream or down-stream coverage, banking, safety valve prices, tie-ins with regional or international trading systems, offsets, early action credits, technology incentives, auctioning, triggers for on and off ramps, and the glide path of the cap. Each factor can have a significant influence on the market price of allowances, and thus the cost of compliance and impacts to ratepayers.

Policy Design

Goals: The goals of this policy are assumed to those adopted by the Midwest Governors Association cap and trade program. The preliminary short- and long-term goals for modeling and analytic purposes recommended to the Midwestern Greenhouse Gas Reduction Accord Advisory Group by the Target-Setting, Data and Reporting Subgroup are:

- 15, 20, and 25 percent below 2005 levels by 2020;
- 60-80 percent below 2005 levels by 2050

Timing: Policy would start in concert with other MGA actions..

Parties Involved: All sectors of the economy must be covered to ensure actual emissions reductions. The electric generating sector is likely to cover all units emitting 10,000 tons of carbon dioxide or more pear year. This policy would require adoption of a regional cap-and-trade system by the Iowa Legislature, and implementation by appropriate federal and state government agencies.

Other: TBD

Implementation Mechanisms

Many variables can be incorporated into a cap-and-trade system, including the greenhouse gasses covered, the sectors covered, up-stream or down-stream coverage, banking, safety valve prices,

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tie-ins with regional or international trading systems, offsets, early action credits, technology incentives, auctioning, triggers for on and off ramps, and the glide path of the cap. Each factor can have a significant influence on the market price of allowances, and thus the cost of compliance and impacts to ratepayers.

Related Policies/Programs in Place

MWG Accord

Type(s) of GHG Reductions

CO_2, CH_4, N_2O

Estimated GHG Reductions and Costs (or Cost Savings)

TBD

Data Sources:

"MGA Meeting3_Summary.ppt" from the Midwestern Greenhouse Gas Reduction Accord Advisory Group Summary of Meeting 3 Plenary Session. June 23-24, 2008 Minneapolis, MN

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Quantification Methods: TBD

Key Assumptions: TBD

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-4a. Decarbonization Fund

Policy Description

A decarbonization fee is a fee on greenhouse gas emissions whose funds are targeted to transition society to a new, non-greenhouse gas emitting state in the future. If multiple greenhouse gases are covered, the global warming potentials of the covered gasses are normalized into carbon dioxide equivalents prior to assessment of the fee. Thus, carbon fee proposals usually provide an annual fee levied on each ton of carbon dioxide or carbon dioxide equivalent.

A small portion of a decarbonization fee is to provide some market signal to consumers to reduce emissions. However, many greenhouse gas emissions result from necessities of life, such as heating and cooling and the preparation of food. Thus, given the current state of technology, there are practical and ethical limits to the assessment of a decarbonization fee for the purposes of a price signal. This fee for this option is applied only to the electric utility sector.

Deleted: Given this, a decarbonization fee can have many variables, including the greenhouse gasses covered, the sectors covered, up-stream or down-stream coverage, offsets, early action credits, technology incentives, triggers for on and off ramps, and changes to the fee over time. Each factor can have a significant influence on covered facilities and thus the impact on ratepayers.

The most important policy aspect of a decarbonization fee is that the revenue generation potential of even a small fee, feeding into a targeted decarbonization fund, can be significant. Given this, the monies derived from a decarbonization fee can provide a strong incentive toward greenhouse gas emission reductions. Thus, the most effective decarbonization fee design would include both the front-end variables (i.e. the covered greenhouse gases, amount levied per ton of emissions) and the back-end variables (i.e. where revenue is housed, how revenue is utilized).

Policy Design

Goals: The goals of this policy are:

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<#>To identify likely policy components of a decarbonization fee system that would provide significant incentives for low and no-carbon energy development in Iowa.¶
<#>To analyze the costs and benefits of decarbonization fee scenarios to reach the 50% and 90% reductions from 2005 emissions levels.¶
To accomplish these goals, an initial draft policy outline for a cap-and-trade program is as follows:¶
<#>A decarbonization fee has the potential for negative externalities, such as impacts to the economy, particularly to low income consumers, and the potential that the funds would be used for unrelated programs that do not directly assist the transition to a low-carbon future. Therefore, these issues must be addressed explicitly at the creation of the decarbonization fee policy.¶

- To help mitigate the potential impacts to the economy, the decarbonization fee should be phased in and capped at a reasonable rate, allowing for long-term planning by consumers. Therefore it is recommended, as a starting point for the analysis, that the decarbonization fee for electric generation begin at $1/ton of carbon dioxide in 2010 and increase $1/year until a cap of $10/ton of carbon dioxide is obtained in 2019. The funding in 2019 is estimated at $320 million.

Deleted: Assuming a system average in Iowa of approximately 1,800 lbs CO2/MWh, this translates into a generation cost increase of $0.0009/kilowatt-hour in 2010 rising ten-fold to $0.009/kilowatt-hour in 2019. This is estimated to result in $37.5 million in 2010.

- To help mitigate potential impacts to low income consumers, it is recommended that 10% of the funds derived from a decarbonization fee be directed toward targeted assistance (e.g. LIHEAP) and energy efficiency programs. LIHEAP funding would be approximately $32 million in 2019.
- To ensure the proper accounting and availability of decarbonization funds, the fees would be included in an adjustment clause with costs passed directly to customers on a dollar-for-dollar basis and the resulting revenue placed into a dedicated fund. The decarbonization funds could only be utilized for programs and initiatives that transition the electric generating sector to a low-carbon future (e.g. new non-emitting or low-emission generation, energy efficiency, research and development of base load renewables and carbon capture and

storage). The Iowa Utilities Board would have the authority to audit and review the use of the decarbonization funds.

- The decarbonization fee would be phased out, or reduced to a level that allows continued future system emissions performance, once a 50% or 90% reduction in emissions from 2005 is achieved.

Timing: Program begins in 2010 at $1/ton CO_2 and fee reaches $10/ton in 2019.

Parties Involved: Potentially any entity, public or private, with a significant quantity of greenhouse gas emissions or emissions offsets.

Other: TBD

Implementation Mechanisms

This policy would require adoption of a decarbonization fee by the Iowa Legislature and implementation by appropriate state government agencies.

Should be applied state-wide, requiring a rate mechanism approved through IUB for rate-regulated utilities, with legislative support, particularly for non-rate regulated utilities.

Related Policies/Programs in Place

Nothing similar is in place in IA.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs (or Cost Savings)

The decarbonization fee could result in about 4,400 GWh of new renewables by 2020, which when combined with existing renewable resources results in renewable energy equivalent of 19% of generation. The cost effectiveness per ton of CO_2 is lower than the fee in 2020 for two reasons: 1) cost effectiveness is measured as an average over the period. 2) The benefits from energy efficiency reduce the impacts of renewable generation that cost more than existing thermal generation.

	2012	2020	Units
GHG Emission Savings	1.8	9.4	$MMtCO_2e$
Net Present Value (2008-2020)	131.1	297.8	$ Million
Cumulative Reductions	3.0	61.2	$MMtCO_2e$
Cost-Effectiveness	43.3	4.9	$/t$CO_2$e

- **Data Sources:** See CRE-2
- **Quantification Methods:** See CRE-2

Deleted: This policy would require adoption of a decarbonization fee by the Iowa Legislature and implementation by appropriate state government agencies.¶

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- **Key Assumptions:**

A) The decarbonization fee for electric generation begins at $1/tonne of carbon dioxide in 2010 and increase $1 per year until a cap of $10/tonne is obtained in 2019, and kept constant at $10/tonne through 2030.

B) Assume that the new renewable generation that results from the decarbonization fee comes 95.8% from wind, 2% each from biomass and solar PV, and 0.2 from LPG.

C) Assume that efficiency is capped as a percent of generation at 20%.

D) Assume the funding goes 30% to efficiency, 40% to renewables, 10% to LIHEAP and 20% to other.

E) The levelized costs of energy efficiency measures is $37.13/MWh in 2009. Source for capital costs is from: Quantec/Cadmus. (2008). This figure includes all utility and participant costs. Utility fixed costs are assumed to be 24% of the capital cost, based on MEC EE plan filing Docket # EEP-08-02. Vol II. pA1-8

F) Avoided cost of electricity in 2009 is $72/MWh. Figure is from 2009–2013 Energy Efficiency Plan Interstate Power and Light Company Docket No. EEP-08-1 23-Apr-08, p. 33 Values base case without externality factor.

G) The real rate at which costs are discounted annually: 5%

H) Year dollars in which new present value is calculated: 2008.

I) Net present value is calculated beginning 2009.

J) Assume all electricity from coal-fired generation is coming from sources within Iowa (no imports)

K) Policy actions that result in fuel switching occurs from existing coal to renewables or nuclear power.

Deleted: <#>Assume that one-third of the tariff comes from sources other than electric generation.¶

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Key Uncertainties

TBD

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Additional Benefits and Costs

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- The quantification assumes does not include the 10% of funds that go to low income assistance and 20% that goes to “other”. Thus the emissions reductions estimates are likely to be higher than estimated in the quantification process.
- A decarbonization fee has the potential for negative externalities, such as impacts to the economy, particularly to low income consumers, and the potential that the funds would be used for unrelated programs that do not directly assist the transition to a low-carbon future. Therefore, these issues must be addressed explicitly at the creation of the decarbonization fee policy.

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Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-4b. Carbon Tax

Policy Description

A carbon tax is a tax on each ton of carbon dioxide emitted from an emissions source covered by the tax. The tax would be imposed at the point of combustion and emission. If any of those sources sequester carbon dioxide, then that carbon dioxide that was sequestered would not be taxed. If greenhouse gases besides carbon dioxide are being taxed, those emissions are converted to a carbon dioxide equivalent.

Alternatively the tax could be imposed based on the tons of coal, gallons of oil, volume of natural gas, and even gallons of petroleum purchased. Again, if any of those sources sequester carbon dioxide, then that equivalent to the carbon dioxide that was sequestered would not be taxed.

In general, a Btu from coal produces 30% more carbon dioxide that a Btu from oil and 80% more carbon dioxide than a Btu from natural gas. Per Btu, the carbon tax would be greatest on sources burning coal, less on than those that burn oil, and least on those sources burning natural gas.

By implementing measures to reduce greenhouse gases, an entity can reduce the amount of tax paid.

The tax is constant and predictable. It can be implemented quickly and simply, being collected by the Iowa Department of Revenue. It does not require a new energy trading market. The tax would be paid upstream, at the point the carbon is emitted.

The tax could be passed along to the consumers, it could be taken off the bottom line of the utility, or a combination.

The taxes collected could be used to offset the increased cost of the power to low-income consumers and could be used to fund other programs in the state that would reduce emissions of greenhouse gases.

If a cap and trade system takes a number of years to implement, the carbon tax might be a good interim policy.

If the tax must be paid primarily by the emission sources and not simply passed in total to the consumer, the carbon tax will encourage the emitter to pursue renewable energy sources, or carbon sequestration.

If some of the carbon tax is passed to the consumer, the carbon tax would encourage immediate reductions of greenhouse gases by consumers who pursue conservation and energy efficiency measures. If the carbon tax were great enough, it would shift consumers into purchasing green power from the utilities, which today is priced higher than non-green power. That shift would provide money for the utilities to increase investment in renewable energy.

Policy Design

Goals: The goals of this policy are:

- To achieve reductions in GHGs through implementation of an $80/ton carbon tax in Iowa, particularly working in concert with energy efficiency programs, conservation programs, and programs to encourage customers to purchase green power.
- To identify the specific legislative and regulatory actions that would be needed to support the carbon tax in Iowa, including dealing with entities that sequester carbon and assisting low-income consumers affected by the carbon tax.
- To determine what programs and initiatives the collected tax revenue should be allocated to support, including low-income consumer assistance, education, and others.

Timing: This policy would become effective with action by the Iowa Legislature and implementation by the Iowa Department of Revenue, beginning in 2010

Parties Involved: State legislators, Iowa Department of Revenue. It would affect every consumer of electrical power in the state. It might require the Iowa Utilities Board to determine how much of the tax can be passed to the consumer.

Other: TBD

Implementation Mechanisms

IUB would have to determine how much of the tax would go to consumers.

Related Policies/Programs in Place

None in IA.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs (or Cost Savings)

TBD

Data Sources: TBD

Quantification Methods: TBD

Key Assumptions: TBD

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-5. Performance Standards

Policy Description

A generation performance standard is an emissions rate hurdle that must be met for compliance by sources supplying electricity to consumers in Iowa. Typically, a generation performance standard is expressed in pounds of carbon dioxide per megawatt hour (lb CO2/MWh). A renewable portfolio standard (RPS) is a type of performance standard, identifying a target percentage of a generator's supply mix that must be from sources that meet the RPS's definition of renewable. Generation performance standards can be applied to new generation or include the system wide emissions rate of an entity's generating fleet.

In either scenario, the theory of a generation performance standard is to lower the emissions rate over time to obtain a desired end-point. Given this, a generation performance standard can have many variables, including coverage of generating units or load serving entities, offsets, the inclusion of energy efficiency programs, technology incentives, trading of renewable energy credits, penalty rates for non-compliance, emissions from purchased power, triggers for on and off ramps, and the rate of change to the emissions standard. Each factor can have a significant influence on the cost of compliance and thus the impact on ratepayers.

Policy Design

Goals: The goals of this policy are:

- To identify the likely reasonable cost regulatory structures for a generation performance standard to comply with the scenarios modeled.
- To analyze the costs and benefits of generation performance standard scenarios to reach the
  - 5a) 50% reductions from 2005 emissions levels, and
  - 5b) 90% reductions from 2005 emissions levels

To accomplish these goals, an initial draft policy outline for a generation performance standard is as follows:

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- The simplest approach to model the 50% and 90% reduction scenarios, from a 2005 emissions baseline, is a system-wide emissions rate from an entity's generating fleet.
- In 2005, the average emissions rate for electrical generating fleets in Iowa was approximately 1,800 lb CO2/MWh. Furthermore, by 2050, it is expected that demand for electricity may approximately double. Therefore, the draft generation performance standard path begins at 1,800 lb CO2/MWh in the year 2010. The end-points for the performance standards in the year 2050 are 450 lb CO2/MWh for the 50% reduction scenario, and 90 lb CO2/MWh for the 90% reduction scenario. Nonetheless, it is important to note that these end points are theoretical and will need to be amended according to real-world growth in the demand for electricity.

- The success of an emissions performance standard depends upon the reasonable cost technologies available. Consistent with CRE-10, base load renewable energy and carbon capture and storage technologies are not expected to be commercialized until the 2020-2025 time frame. Therefore, the performance standard must provide incentives for developing these technologies in Iowa.
- The emissions performance standard for both goals begins in 2010 at 1,800 lb CO2/MWh for an entity's generating fleet. For the 50% scenario, the standard will be reduced by approximately 33.75 lb CO2/MWh per year through 2050. For the 90% scenario, the standard will be reduced by approximately 42.75 lb CO2/MWhper year through 2050.
- Electric generating entities employing base load renewable energy and carbon capture and storage technology prior to 2025 would receive a bonus multiplication factor for such megawatt-hours to stimulate technology development. Between 2025 and 2030, the bonus multiplication factor would continue to be granted for base load renewable energy and carbon capture and storage projects, but at a lower reward rate than used between 2015 and 2025.
- To encourage the development of biomass based renewable energy, carbon dioxide emissions from the combustion of biomass (e.g. switch grass, corn stover) or methane from the decomposition of organic matter (e.g. landfill gas, manure biogas) would not count against the emissions performance standard.
- Electric generating entities failing to meet the standard would be required to implement a dedicated decarbonization investment account. As a starting point for the analysis, the decarbonization fee for electric generation would begin at $1/ton of carbon dioxide emitted by the electric generating fleet, increasing $1 per year of non-compliance to a maximum of $10/ton of carbon dioxide. Assuming a system average in Iowa of approximately 1,800 lbs of carbon dioxide per megawatt-hour, this translates into an initial generation cost increase of between $0.0009/kilowatt-hour, and a maximum cost increase of $0.009/kilowatt-hour.
- To help mitigate potential impacts to low income consumers, it is recommended that 10% of the funds derived from a decarbonization fee be directed toward targeted assistance (e.g. LIHEAP) and energy efficiency programs.
- The remainder of the decarbonization funds could only be utilized for programs and initiatives that transition the electric generating sector to a low-carbon future (e.g. new non-emitting or low-emission generation, energy efficiency, research and development of base load renewables and carbon capture and storage).
- To ensure the proper accounting and availability of decarbonization funds, the fees would be included in an adjustment clause with costs passed directly to customers on a dollar-for-dollar basis and the resulting revenue placed into a dedicated fund. The Iowa Utilities Board would have the authority to audit and review the use of the decarbonization funds.
- The decarbonization fee would be phased out, or reduced to a level that allows continued future system emissions compliance, once the generation performance standard is achieved.

Timing: This policy would require adoption of a generation performance standard by the Iowa Legislature and implementation by the Iowa Utilities Board.

Parties Involved: The Iowa Legislature, the Iowa Utilities Board, and entities covered by the performance standard.

Other: Various forms of generation performance standards have been utilized by many states and countries to encourage zero and low emitting generation while providing regulatory flexibility in the compliance pathway.

Implementation Mechanisms

TBD

Related Policies/Programs in Place

TBD

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs (or Cost Savings)

	2012	2020	Units
GHG Emission Savings	3.9	11.0	MMtCO2e
Net Present Value (2008-2020)	446.6	2434.5	$ Million
Cumulative Reductions	10.4	72.3	MMtCO2e
Cost-Effectiveness	42.8	33.6	$/tCO2e

- **Data Sources:** See CRE-2
- **Quantification Methods:** See CRE-2
- **Key Assumptions:**

A) The program begins in 2009 and runs through 2020.

B) Assume that the fossil fuel displaced is coal and that it is replaced by 90% from wind, 10% from biomass .

C) The real interest rate used to discount cash flows is: 5%

D) Year dollars in which new present value is calculated: 2008.

E) Net present value is calculated beginning 2009.

F) Assume all electricity from coal-fired generation is from sources within Iowa (no imports).

G) Policy actions that result in fuel switching occurs from existing coal to renewables or nuclear power.

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Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-6. Voluntary GHG Commitments

Policy Description

Numerous U.S. companies and organizations, including many utilities, have taken on voluntary GHG reduction commitments. Some of these are organized through the U.S. EPA's Climate Leaders program. Others include participation in Power Partners and the EIA 1605(b) Voluntary GHG Emission Reduction Program. Forty two companies, including some of the world's largest; GE, Dupont, IBM and Duke Energy; have joined together as the Business Environmental Leadership Council (BELC) of the Pew Center on Global Climate Change. These companies are voluntarily addressing global climate change through proactive and innovative measures including: setting targets for GHG emissions reductions; implementing innovative energy supply and demand solutions; improving waste management practices; participating in emissions trading; and investing in carbon sequestration opportunities and research. Thirty-seven of these BELC companies have established greenhouse gas (GHG) reduction targets. Some of these companies have achieved their targets and are currently evaluating new goals, while other companies are considering first-time targets.

These commitments can be based on total GHG emissions in a given year, specific voluntary projects 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 pilot program for reducing and trading GHG emissions in North America. Currently there are more than 350 participants including the University of Iowa and Iowa Farm Bureau.

Policy Design

Goals: The goals for an Iowa Voluntary GHG program include:

- Encouraging Iowa business and citizens to voluntarily begin reducing GHG emissions immediately, without waiting for mandatory Iowa or national GHG reduction program measures. A goal of this program is to obtain voluntary commitments from each of Iowa's investor-owned utilities to reduce GHG emissions by at least 6% below baseline year of 2005 emissions by 2010 and to obtain similar commitments from 25% of Iowa's GHG-emitting private businesses.
- Provide a means for Iowa voluntary GHG emission reductions to be quantified and recognized by applying Iowa approved GHG quantification methods.
- Allow rate-regulated utilities assurance of cost recovery for voluntary GHG reduction measures that are previewed and approved by the IUB. The rates charged by some utilities in Iowa are regulated and must be approved by the IUB. The rate-regulated utilities in Iowa are MidAmerican Energy Company, Interstate Power and Light Company, Aquila, Inc., Atmos Energy Corporation, and Linn County REC. The rates of the rural electric cooperatives and the municipal utilities are not regulated or approved by the IUB, except that Linn County REC has voluntarily asked that its rates be regulated. Rate-regulated utilities would have to propose actions they would take to reduce their GHG emissions for approval by the IUB. If

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the IUB approved those measures, cost recovery means that the IUB would allow the rate-regulated utility to recover the cost of the approved GHG reduction measures in rates the utility charges its customers.

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- Provide documentation that supports voluntary measures receiving full credit under a future Iowa or national mandatory or voluntary GHG reduction program (e.g. credit for early action).
- Enable Iowa voluntary GHG emission reduction measures to receive credit as certifiable CO_2 offsets for use within and outside of the United States.

Timing: Upon promulgation

Parties Involved: All sectors and sources that wish to provide for voluntary GHG reductions or offsets, including: government, utilities, industry, business, commercial building owners and homeowners.

Other: TBD

Implementation Mechanisms

Legislation will provide for voluntary GHG emission reductions to be registered and for costs recovery mechanisms. The IDNR shall be authorized to provide voluntary measure recordkeeping. The IDNR shall be authorized to provide for review for public interest. The IUB shall be authorized to review and approve any cost for rate-regulated utilities.

Related Policies/Programs in Place

None

Type(s) of GHG Reductions

Reductions in emissions of carbon dioxide, as well as other greenhouse gases, depending on participation in the program.

Estimated GHG Reductions and Costs (or Cost Savings)

Not quantifiable.

Data Sources: TBD

Quantification Methods: TBD

Key Assumptions: TBD

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-7. Policies Related to Nuclear Power

Policy Description

Nuclear power has potential as an alternative source of electricity for meeting greenhouse gas reduction goals. During operation, nuclear plants generate no greenhouse gases (GHGs), although, as with any new structure, there are GHG emissions associated with the construction of the facility. Nuclear power generation is classified as base load generation and designed to operate at high capacity factors. It is also the largest single source of non-carbon emitting electric generation. As a result, it is a potential energy supply alternative, in large scale, to meet Iowa's growing electric needs and for possible long-term replacement of base load coal-fired generation.

As of the end of the last year, there were 104 commercial nuclear generating units licensed by the U.S. Nuclear Regulatory Commission (NRC) with an electric capability of 97,400 MW. The most recent reactor came on line in 2007. The current administration has been supportive of nuclear expansion, emphasizing its importance in maintaining a diverse energy supply and its potential for producing electricity with negligible greenhouse gas emissions operation.

Other means of incorporating nuclear generation include license renewal and uprating for existing plants. Nuclear license renewal allows a nuclear power plant to extend the life of the facility for 20 years past its original 40-year license term. The NRC considers the license renewal program one of its major cornerstones of current regulatory activity. A nuclear power plant uprating is a technical review process whereby a licensee may receive approval from the NRC to operate a plant at a higher power level than the level authorized in the original license. License renewal and power uprates typically require some capital investment for upgrades and rebuilding of plant subsystems.

Iowa's only nuclear plant is the Duane Arnold Energy Center, which is owned by the FPL Group, through its subsidiary FPL Energy (70 percent ownership), Central Iowa Power Cooperative (20 percent ownership) and Corn Belt Power Cooperative (10 percent ownership). Duane Arnold received approval for a power uprate in 2001, and currently has a license from the NRC to operate until 2014. In acquiring its ownership share in 2005, FPL committed to seek license renewal for an additional 20 years, until 2034. MidAmerican Energy Company is a 25% owner of the Quad Cities Nuclear Power Station near Cordova, Illinois, which also completed a power uprate, and has received license renewal from the NRC to operate until 2032.

It is currently estimated that it would take approximately 10 to 12 years to design, permit, and construct a new nuclear power plant. Therefore, steps should be taken today if Iowa chooses to employ nuclear power as part of a balanced and diversified energy portfolio[1] that achieves Iowa's long-term carbon emission reduction goals.

[1] Including, among others, renewable energy, conservation and energy efficiency measures

The focus of this particular policy is to determine the economic feasibility of nuclear power in a carbon-constrained environment and to define specific state legislative and regulatory actions to facilitate licensing, financing, and construction of new nuclear power plants in Iowa.

Policy Design

Goals: The goals of this policy are:

- To quantify the costs and identify the benefits (including avoidance of greenhouse gas emissions) associated with building one new 1200 MW nuclear power plant in Iowa.
- *[Question: Why was this changed from the previous 1200 MW to 1500 MW? Was this a decision by the subcommittee or by CCS?]*

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Timing: To have the plant operational by January 1, 2025.

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Parties Involved: This policy would become effective with action by the Iowa Legislature and implementation by the Iowa Utilities Board, Iowa Department of Natural Resources and other state agencies. Investor-owned utilities, generation and transmission electric cooperatives, municipalities, Iowa Department of Public Health, environmental advocacy groups, state legislators, county government and economic development leaders, business advocacy groups, Office of Energy Independence and the Office of Consumer Advocate.

Other: TBD

Implementation Mechanisms

TBD

Related Policies/Programs in Place

As a starting point, the analysis should assume that the NRC approves the license renewal application for the Duane Arnold Energy Center.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs (or Cost Savings)

	2012	2020	Units
GHG Emission Savings	0.0	11.8	MMtCO2e
Net Present Value (2008-2020)	NA	518.1	$ Million
Cumulative Reductions	NA	11.8	MMtCO2e
Cost-Effectiveness	NA	43.9	$/tCO2e

- **Data Sources:** See CRE-2.
- **Quantification Methods:** See CRE-2.

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- **Key Assumptions:**
  - That one new nuclear plant with a capacity of 1200 MW is operating in Iowa by 2025.
  - The existing Duane Arnold Energy Center is operating with a new license until 2034.
  - 90% capacity factor for new nuclear units.
  - The real interest rate used to discount cash flows is: 5%
  - Year dollars in which new present value is calculated: 2008.
  - Net present value is calculated beginning 2009.
  - Assume all electricity from coal-fired generation is coming from sources within Iowa (no imports).
  - Policy actions that result in fuel switching occurs from existing coal to renewables or nuclear power.

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Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-8. Support for grid-based renewable energy and development

Policy Description

This policy option reflects financial incentives to encourage investment in renewable energy resources by businesses and individuals that sell power commercially. Grid-based renewable energy facilities are assumed to be those that interconnect directly with the transmission system.

Policies can be developed to help overcome financial barriers and increase incentives for renewable energy development. Barriers such as low market prices, the inability of the market to assign values to the public benefits of renewables and the social costs of fossil fuel technologies, high transaction costs relative to smaller project sizes, high financing costs because of lender unfamiliarity and perceived risk, and other institutional barriers, can be overcome through a suite of financial and regulatory incentives for renewable energy development.

These policies and incentives can include:

- Direct subsidies for buying or selling renewable generation equipment.
- Tax credits or exemptions for buying or selling renewable generation equipment.
- Government-sponsored or facilitated loan programs for buying renewable generation equipment.
- Tax credits or direct subsidies for each kWh generated or sold from renewable generation facilities, such as:
  - The wind and renewable energy tax credits available under Iowa Code chapters 476B and 476C.
- Government-sponsored or facilitated loan programs supporting the manufacture of renewable generation equipment.
- Direct subsidies supporting the manufacture of renewable generation equipment.
- Tax credits or exemptions supporting the manufacture of renewable generation equipment.
- Regulatory policies that provide incentives and/or assurance of cost recovery for utilities that invest in renewable energy systems, such as:
  - The advance ratemaking principles available for utility-owned renewable generation under Iowa Code § 476.53, which are determined in advance of plant construction and before the utility's next rate case.
- Regulatory policies that streamline certification requirements for renewable generation plant, such as:
  - The Iowa Utilities Board (IUB) chapter 24 rules for "Location and Construction of Electric Power Generating Facilities" (199 IAC 24), and the "25 MW per gathering line" exemption for wind generating facilities described in IUB Docket No. DRU-03-2.

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<#>The property tax exemption for methane gas conversion available under Iowa Code § 427.1(29);¶
<#>The property tax exemption for renewable energy facilities available under Iowa Code § 441.21;¶
<#>The local option special assessment for wind generation facilities available under Iowa Code § 427B.26;¶
<#>The replacement generation tax exemption for renewable energy facilities available under Iowa Code § 437A.6; and¶
The sales tax exemption for wind and solar generation equipment available under Iowa Code §§ 423.3(54) and 423.3(90)

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<#>The alternate energy revolving loan program under Iowa Code § 476.46, and¶
The Iowa Energy Bank loan program under Iowa Code § 473.19

- Iowa regulatory support for federal transmission cost allocation policies that are equitable and promote the cost-efficient siting of renewable generation resources.

Policy Design

Goals:

A. Increase grid-based renewable electric production in Iowa by 400,000 MWh of generation and growing by 1% of retail MWh sales each year.

B. Midwest Governors' renewable energy goal: A renewable portfolio standard (RPS) for the Midwest region equivalent to 10% of retail MWh sales by 2015 and 20% by 2020.

Timing:

A. Beginning in 2012; continuing through 2020.

B. As specified in the Midwest Governors' renewable energy goal.

Parties Involved: Grid-based renewable generation developers.

Implementation Mechanisms

- Identify barriers to grid-based renewable generation development.
- Quantify barriers in dollar terms.
- Determine specific incentive levels and durations needed to overcome barriers.
- Set incentive levels and program limits to achieve grid-based renewable generation development goals.
- Federal production tax credit

Related Policies/Programs in Place

Current policies and programs include:

- Tax exemptions for buying or selling renewable generation equipment:
  - The property tax exemption for methane gas conversion available under Iowa Code § 427.1(29);
  - The property tax exemption for renewable energy facilities available under Iowa Code § 441.21;
  - The local option special assessment for wind generation facilities available under Iowa Code § 427B.26;
  - The replacement generation tax exemption for renewable energy facilities available under Iowa Code § 437A.6; and
  - The sales tax exemption for wind and solar generation equipment available under Iowa Code §§ 423.3(54) and 423.3(90).

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- Government-sponsored or facilitated loan programs for buying renewable generation equipment:
  - The alternate energy revolving loan program under Iowa Code § 476.46; and
  - The Iowa Energy Bank loan program under Iowa Code § 473.19.
- Tax credits for each kWh generated or sold from renewable generation facilities:
  - The wind and renewable energy tax credits available for kWh sold under Iowa Code chapters 476B and 476C; and
  - The wind energy tax credits available for kWh generated and consumed on-site under Iowa Code chapter 476B.
- Regulatory policies that provide incentives and/or assurance of cost recovery for utilities that invest in renewable energy systems:
  - Advance ratemaking principles available for utility-owned renewable generation facilities under Iowa Code § 476.53, which are determined in advance of plant construction and before the utility's next rate case.
- Regulatory policies that streamline certification requirements for renewable generation plant:
  - The Iowa Utilities Board (IUB) chapter 24 rules for "Location and Construction of Electric Power Generating Facilities" (199 IAC 24), and the "25 MW per gathering line" exemption for wind generating facilities described in IUB Docket No. DRU-03-2.

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DOE's "20% Scenario" Report should be discussed here. The DOE report "20% Wind Energy by 2030" describes an expansion of U.S. wind generation capacity from 11.6 GW in 2006 to 305 GW by 2030, with more than 10 GW located in Iowa by 2030. The 10 GW of wind capacity in Iowa would be equivalent to an Iowa RPS of 60% to 80%, based on 2006 Iowa retail sales of 43,000 GWh (i.e., 60% RPS if the wind capacity generates at a 30% capacity factor; 80% RPS if it generates at a 40% capacity factor).

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Type(s) of GHG Reductions

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DOE's "20% Scenario" Report should be discussed here¶

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Estimated GHG Reductions and Costs (or Cost Savings)

	2012	2020	Units
GHG Emission Savings	0.0	0.2	MMtCO2e
Net Present Value (2008-2020)	0.8	28.9	$ Million
Cumulative Reductions	0.0	0.9	MMtCO2e
Cost-Effectiveness	39.3	32.0	$/tCO2e

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- **Data Sources:** See CRE-2.
- **Quantification Methods:** See CRE-2.
- **Key Assumptions:**

- The program runs from 2012 through 2020.
- Assume that the fossil fuel displaced is coal and that it is replaced by grid-based renewable electric production: wind (95%), solar PV (2%) and biomass (3%).
- The real interest rate used to discount cash flows is: 5%

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- Year dollars in which new present value is calculated: 2008.

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- Net present value is calculated beginning 2009.
- Assume all electricity from coal-fired generation is coming from sources within Iowa (no imports)
- Policy actions that result in fuel switching occurs from existing coal to renewables or nuclear power.

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Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-9. Transmission System Upgrading

Policy Description

Developing policies to address the long-term demand for electricity requires not only consideration for enhancing the generating portfolio mix and demand-side and energy efficiency programs, but also measures to improve both the regional transmission system and local distribution system in order to diminish bottlenecks, enhance throughput and reduce line losses.

Opportunity exists to significantly increasing transmission line carrying through the implementation of new construction methods and retrofit activities on the transmission grid including incorporating advanced composite conductor technologies, reactive compensation technologies, and grid management software. Siting new transmission lines can be a difficult process given their cost and perceived impact on health, the environment, and the use, enjoyment, and value of property. Future development of renewable energy facilities will require the addition of new or the upgrade of currently existing transmission lines which must be integrated into the regional transmission grid. Policy measures in support of this option could provide incentives to utilities and transmission owners to upgrade transmission systems and reduce barriers to siting of new transmission lines. This option could also include reductions in the use and leakage of SF6 from electrical equipment, plus use of efficient transformers and other advanced materials and equipment. Given the long lead time (between 4 and 7 years) for large transmission line planning, permitting and construction, current distribution line capacity should be evaluated immediately as a “quick start” measure to get carbon free distributed generation on the grid.

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 reduce losses. Increasing the efficiency of these components can further reduce losses. Vermont, for example, offers a rebate to encourage users to install energy efficient transformers. Regulations, incentives, and/or support programs can be applied to achieve greater efficiency of transmission and distribution system components.

Policy Design

The goals of this policy are:

- To research how implementing modern grid technologies would enable a more efficient and intelligent transmission system.
- To identify specific legislative and regulatory actions that would be needed to support long-term, cost effective alternatives that increase transmission system capabilities.
- To commission a study that would identify areas in Iowa’s transmission system where upgrading and/or expanding transmission would enable our state’s wind resources to be developed for use for Iowa users and for potential exports to other states. The study would focus on both identifying areas where large expansions are necessary to catapult Iowa’s wind production as well as areas where smaller upgrades would enable wind installations for local

area purposes. The study would seek to quantify the incremental costs and identify the benefits and implementation timeframes for alternatives that yield additional increases to transmission and distribution system capabilities, beyond normal planned expansion. The analysis should take into account reductions in GHG emissions that would result from energy saved due to lower line losses.

Timing: This policy would become effective with action by the Iowa Legislature and implementation by the Iowa Utilities Board and other state agencies.

Parties Involved: Iowa Utilities Board, Investor-owned utilities, generation and transmission electric cooperatives, municipalities, representatives of environmental and economic development organizations and the Office of Consumer Advocate, the FERC, Midwest ISO and transmission owners (such as ITC).

Related Policies/Programs in Place

TBD

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs (or Cost Savings)

Not Quantifiable

Data Sources: TBD

Quantification Methods: TBD

Key Assumptions: TBD

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-10. R&D for Emerging Technologies and Corresponding Incentives

Policy Description

Research and development (R&D) of emerging technologies to develop demonstration projects and eventual commercialization of reasonable cost generation technologies with low or zero greenhouse gas emissions is critical to solving the global climate change challenge. Technology areas often cited as requiring such reasonable cost developments are carbon capture and storage (e.g., in deep saline aquifers or coal seams) for fossil fuel facilities, and large-scale base-load renewable energy or technologies that can transform intermittent renewables into base load generation (e.g., batteries, compressed air storage).

Given the magnitude of the task, an Apollo-like research program to create and field-test such technologies that are commercially viable is needed. Presently, such funding is not a significant portion of a rate-regulated utilities budget or the budgets of federal and state government agencies. Nonetheless, even a small fee per kilowatt-hour of electricity could generate significant funding. However, funding is only one-half of the equation, and strategies to use such funds to implement a focused program to commercialize generation technologies with low or zero greenhouse gas emissions must also be developed.

Policy Design

Goals: The goals of this policy, though unquantifiable in terms of emissions, are the following:

- By 2009, identify the likely funding mechanisms and policy tools that would provide further stimulus for the development of new, reasonable cost, low and zero greenhouse gas emitting electricity generation in Iowa.
- By 2009, analyze the costs and benefits of a research and development program scenarios to help reach the 50% and 90% reductions from 2005 emissions levels.
- By 2010, begin to implement the R&D funding mechanisms.
- By 2015, have identified and begun characterizing areas within and near Iowa that are likely candidates for carbon capture and storage, and begin larger scale field studies of base-load renewable energy and technologies that can transform intermittent renewables into base load generation.
- By 2020, have completed larger scale field studies and demonstrations of base-load renewable energy and technologies that can transform intermittent renewables into base load generation. Small scale carbon capture and storage test projects within suitable formations have been verified, and larger scale projects shall have been initiated prior to this date.
- By 2025, base-load renewable energy and technologies that can transform intermittent renewables into base load generation will be fully commercialized. Carbon capture and storage will be fully integrated into new coal-fueled power plants.

- By 2030, reasonable cost carbon capture and storage technology will have been commercialized for coal-fueled power plants that were not originally designed for sequestration. Base-load renewable energy and technologies that can transform intermittent renewables into base load generation will be cost competitive without subsidies or incentives.

Timing: This policy may require the adoption of incentives by the Iowa Legislature, Iowa Utilities Board, and potentially other appropriate state government entities.

Parties Involved: Iowa Legislature, Iowa Utilities Board, electric utilities, and potentially other appropriate state government entities such as the Office of Energy Independence, Iowa Power Fund, Iowa Department of Economic Development and State Regents Institutions.

Other: The Iowa Power Fund is an example of a new state government board designed to help stimulate the research, development, and commercialization of new clean energy sources in Iowa.

Implementation Mechanisms

TBD

Related Policies/Programs in Place

TBD

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs (or Cost Savings)

Not quantifiable

Data Sources: TBD

Quantification Methods: TBD

Key Assumptions: TBD

Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE-11. Distributed Generation/Co-generation

Policy Description

This option focuses on encouraging investment in small-scale distributed generation through incentives or subsidies and the prevention of barriers for both utility and consumer investment.

Policy Design

Goal: 7500 MWh per year of new distributed renewable generation

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Timing: New distributed renewable generation beginning at in 2010 and continuing each year thereafter.

Parties Involved: All utilities serving customers in Iowa; state agencies with jurisdiction; other interested stakeholders.

Other: A funding source to cover any financial incentives would need to be determined. The level of credit or funding should be consistent for all utilities (IOUs, municipals and cooperatives). The cost of the incentive should be shared among all end users so that no one is overly burdened.

Implementation Mechanisms

Distributed generation can be encouraged by ensuring access to the grid under uniform technical and contractual terms and charges for interconnection, including mandatory insurance coverage and amounts, that are based on economic costs so that owners know in advance the requirements for parallel interconnection and manufacturers can design standard packages to meet technical requirements. Changes that generally facilitate the integration of customer-owned distributed generation with the grid could encourage the adoption of specific renewable energy and high-efficiency technologies, including small wind farms, solar photo-voltaic systems, fuel cells, and microturbines. In addition, prices should be established that owners of distributed generators both pay and receive for electricity at levels consistent with utilities' costs. Uniform requirements for emissions, land use, and building codes should be established that are based on the technology of electricity generation so that manufacturers can design suitable units and owners of distributed generators are not restricted in their siting and operating decisions relative to other new sources of generation.

Incentives for distributed renewables should include: (1) direct subsidies for purchasing/selling renewable technologies; (2) tax credits or exemptions for purchasing/selling renewable technologies; (3) tax credits for each kWh generated from a qualifying renewable facility; (4) rebates to the customer from utilities for the installation of residential renewable energy system, similar to rebates for energy efficient appliances.; (5) State assistance for Iowa's utilities to implement a Smart Grid, which would more easily enable utility customers to be both a user and a producer; (6) Hiring a DG point-person that would work within the Office of Energy Independence to assist utilities and customers to implement this policy, its incentives and regulatory requirements in order to fully utilize the benefits from DG and reach the ICCAC's goal of 90% reduction of carbon emissions by 2050.

Distributed generation can be encouraged by ensuring access to the grid under uniform technical and contractual terms for interconnection, that are based on best practices so that owners know in advance the requirements for parallel interconnection and manufacturers can design standard packages to meet technical requirements. Changes that generally facilitate the integration of customer-owned distributed generation with the grid could encourage the adoption of specific renewable energy and high-efficiency technologies, including solar photovoltaic systems, fuel cells, and microturbines. Uniform requirements for emissions, land use, and building codes should be established that are based on the technology of electricity generation so that manufacturers can design suitable units and owners of distributed generators are not restricted in their siting and operating decisions relative to other new sources of generation.

Funding mechanisms and incentives. Regulatory policies that support utility investments in small-scale distributed renewable energy.

Related Policies/Programs in Place

Wind production tax credits. Tax exemptions on residential wind, solar (PV) panels, and solar hot water systems.

Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs (or Cost Savings)

	2012	2020	Units
GHG Emission Savings	0.0	0.1	$MMtCO_2e$
Net Present Value (2008-2020)	1.9	18.0	$ Million
Cumulative Reductions	0.0	0.5	$MMtCO_2e$
Cost-Effectiveness	42.5	36.2	$\$/tCO_2e$

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Data Sources:

- Energy Consumption by Sector (billions of Btu) – See CRE-1
- Power Station Electricity Generation (GWh) and Fuel Use (BBtu) – See CRE-1

Quantification Methods:

- Heat Rates (Btu/kWh) – See CRE-1
- GHG Emissions Associated With End-Use Consumption (By Sector) – See CRE-1
- GHE Emissions Associated With Electricity Generation From Different Technologies and Fuels – See CRE-1

Key Assumptions:

- The program begins in 2010 and continues annually.
- It is assumed that the new renewable distributed generation will come from wind (95%), , and solar PV (5%).
- The real interest rate used to discount cash flows is: 5%
- Year dollars in which new present value is calculated: 2008.
- Net present value is calculated beginning 2009.

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Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE 12. Combined Heat & Power

Policy Description

Combined heat and power is a term used to describe scenarios in which waste heat from energy production is recovered for productive use. Combined heat and power scenarios most commonly occur at base load generating stations so that a reliable source of thermal energy can be provided to the users of the reclaimed thermal energy. The reclaimed thermal energy, while sometimes not of significant energy value for the base load generating station, can potentially be used by other nearby entities (e.g. within an industrial park or district steam loop) for productive purposes.

The theory of combined heat and power is to maximize the energy use from fuel consumed and to avoid additional greenhouse gas emissions from entities near a base load generating station via additional fossil fuel combustion. Generating stations in more rural areas will likely require the co-location of new industry, thereby avoiding new emissions from development. However, generating stations in urban areas may have existing opportunities or may require the co-location of new industry. Thus, this goal may be more effective at slowing and stopping emissions increases by targeting industrial development near base load generating stations, than reversing current emissions from existing industry.

The key to implementing combined heat and power systems is to provide adequate incentives for the development of infrastructure to capture and utilize the waste heat. Such incentives could come in many forms, such as recruiting suitable end users to the area, tax credits, grants, zoning, and offset credits for avoided emissions.

Policy Design

Goals: The following are goals of this policy:

- Biomass; ethanol; wind sectors will grow and develop facilities that might use CHP
- To identify the likely policy tools that would provide significant stimulus for combined heat and power developments in Iowa by 2009.
- To implement significant incentives for combined heat and power development by 2010.
- To quantify the maximum cost-effective contribution of combined heat and power scenarios to help reach the 50% and 90% reductions from 2005 emissions levels.
- To provide sufficient stimulus to implement 50% of cost-effective combined heat and power opportunities by 2025.
- To provide sufficient stimulus to implement 90% of cost-effective combined heat and power opportunities by 2035.

Timing: This policy may require the adoption of incentives by the Iowa Legislature and appropriate state and local government agencies.

Parties Involved: Iowa Legislature, Iowa Department of Economic Development, electric generating stations, city and county governments, and other agencies as appropriate.

Other:

Implementation Mechanisms

This policy may assist the transportation group and any renewable fuels goal that would require an expansion of biofuels plants in Iowa. Such new plants could be given incentives to locate where combined heat and power opportunities exist.

Related Policies/Programs in Place

Renewable Fuels Standards (U.S. and Iowa)
Iowa's state renewable fuel standard is the most progressive standard in the country. The standard will be implemented beginning in the calendar year 2009 with incentives eligible in 2010. The Iowa standard, in cooperation with the Federal RFS, guides production and sets goals for renewable fuel use over a span of 14 years.

Goal levels:
-25% biofuel sales in Iowa by 2019.
-36 billion gallons produced in the U.S. by 2022
-50% reduction in GHG emissions from biomass-based diesel and advanced biofuels
-20% reduction in GHG emissions from renewable fuels
-60% reduction in GHG emissions from cellulosic biofuels
(Goals defined in Iowa RFS and the 2007 Energy Independence and Security Act)

Timing: Achieve by 2022 under the Federal RFS and 2019 under Iowa RFS

Parties Involved: Federal Government, State Government, Producers, Marketers, Blenders, Consumers, and Refiners.

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Type(s) of GHG Reductions

TBD

Estimated GHG Reductions and Costs (or Cost Savings)

	2012	2020	Units
GHG Emission Savings	2.37	7.22	**MMtCO2e**
Net Present Value (2009-2020)	-215	-3,555	**$ Million**
Cumulative Reductions (2008-2020)	4.78	50.52	**MMtCO2e**
Cost-Effectiveness	(45.03)	(28.94)	**$/tCO2e**

Data Sources:

NREL/FEMP (2004). Biomass Cofiring in Coal-Fired Boilers. Federal Energy Management Program (FEMP) Federal Technology Alert. June. DOE/EE-0288.

Onsite. (2000). The Market and Technical Potential for Combined Heat and Power in the Commercial/Institutional Sector. January. http://www.chpcentermw.org/pdfs/eiacom.pdf

US EIA. (ND). *Net Energy Balance for Bioethanol Production and Use*. http://klprocess.com/Facts_Legends/USDOE_Energy_Bal.pdf

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US EIA. (ND). *Net Energy Balance for Bioethanol Production and Use*. http://klprocess.com/Facts_Legends/USDOE_Energy_Bal.pdf

Estimates for IA biofuels consumption is derived from IA_transportation_CO2.xls file

Quantification Methods:

Includes avoided T&D charges and thermal costs for commercial, industrial and biomass CHP

Key Assumptions:

- The program begins in 2010 and runs through 2019.
- The real interest rate used to discount cash flows is: 5%
- Year dollars in which new present value is calculated: 2008.
- Net present value is calculated beginning 2009.
- Assume all electricity from coal-fired generation is coming from sources within Iowa (no imports)
- Transmission and distribution losses are 7%
- Avoided electricity emissions are IA average emissions over the period at 7%.
- The fuel for new commercial CHP is 100% gas, for new industrial and biomass refineries is 50% coal and 50% gas.
- The program deploys only 30% of estimated achievable CHP potential in the state over the life of the program.
- Avoided cost of electricity in 2009-2018 from: 2009–2013 Energy Efficiency Plan Interstate Power and Light Company Docket No. EEP-08-1, 23-Apr-08, p. 33 Values base case without externality factor. 2009 avoided cost is $.72/MWh
- Avoided capacity charges for commercial CHP are: Ancillary Service Charge of $0.28/kW/ month, Facility Capacity--Distribution $1.65/kW/ month, On Peak Demand Charge $1.90/kW/ month, System Usage Charge $0.35/ cents/kWh. Avoided capacity charges for industrial and biomass are ½ those of commercial. Fixed and variable O&M for displaced thermal are assumed to be $0.07 MBTU each
- Displace boiler efficiency is assumed to be 80%

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Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

CRE 13. Pricing strategies to promote renewable energy and/or CHP

Policy Description

This option focuses on creating pricing and metering strategies that can encourage consumers to implement CHP, renewable energy, and overall reductions in greenhouse gas emissions. Pricing strategies, such as feed-in tariffs provide minimum utility purchase rates for distributed generation. Net metering is a policy that allows owners of distributed generation (generating units on the customer side of the meter, often limited to some maximum kW level) to generate excess electricity and effectively sell it back to the utility by "turning the meter backward." Implementation of pricing strategies, such as feed-in tariffs, must be considered in light of existing rules, such as the Federal Energy Regulatory Commission's (FERC['s) avoided cost standard.

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Policy Design

Goals: Achieve 10% shift to renewable energy sources through implementation of various pricing strategies.

Timing: 1% shift achieved in 2010, with linear growth through 2019.

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Parties Involved: All industrial, commercial, and residential electricity customers in Iowa, utilities, representatives of environmental & economic development organizations, Iowa Utilities Board, Office of Consumer Advocate, Office of Energy Independence.

Other: TBD

Implementation Mechanisms

Encourage net metering of renewable energy systems by:

- Creating a centralized net metering program that is a one-stop shop for net metering. Staff would work with customers and utilities to assist the process of net metering.
- Provide incentives to utilities to net meter with their customers
- Provide incentives to customers to net meter with their utilities
- Establish uniform standards and requirements for utilities and customers
- Require all Iowa's utilities to net meter with interested customers who meet the minimum requirements
- Award utilities that show leadership in net metering measured by the number of customers who are net metering and the amount of energy net metered.

Related Policies/Programs in Place

- Iowa Utilities Board net metering rule for rate-regulated utilities (199 IAC 15.11(5)).

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- Rate-regulated utility net metering tariffs.
- Iowa's state law: According to current FERC rules, states can't require utilities to pay more than the utility's avoided cost of electricity. This potentially limits state application of feed-in tariffs. Passage of a federal feed-in tariff law would supersede the FERC avoided cost standard.

Type(s) of GHG Reductions

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Iowa's state law: can't require utilities to pay more than the avoided cost of electricity.¶

TBD

Estimated GHG Reductions and Costs (or Cost Savings)

	2012	2020	Units
GHG Emission Savings	1.2	4.2	MMtCO2e
Net Present Value (2008-2020)	108.3	1037.6	$ Million
Cumulative Reductions	2.3	26.2	MMtCO2e
Cost-Effectiveness	47.4	39.6	$/tCO2e

Data Sources:

- Energy Consumption by Sector (billions of Btu) – See CRE-1
- Power Station Electricity Generation (GWh) and Fuel Use (BBtu) – See CRE-1

Quantification Methods:

- Heat Rates (Btu/kWh) – See CRE-1
- GHG Emissions Associated With End-Use Consumption (By Sector) – See CRE-1
- GHG Emissions Associated With Electricity Generation From Different Technologies and Fuels – See CRE-1

Key Assumptions:

- The program begins in 2010 and runs through 2019.
- It is assumed that the reduced GHG emissions come from reduced use in coal, replaced by 80% wind, and 15% biomass energy crops, solar PV (3%), fuel cells (2%).
- Rate at which costs are discounted annually: 5%
- Year dollars in which new present value is calculated: 2008.
- Net present value is calculated beginning 2009.
- Assume all electricity from coal-fired generation is coming from sources within Iowa (no imports)

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- Policy actions that result in fuel switching occurs from existing coal to renewables or nuclear power

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Key Uncertainties

TBD

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD