



# Iowa Climate Change Advisory Council

Clean and Renewable Energy (CRE)  
Subcommittee Meeting #17

October 15, 2008

Iowa Department of Natural Resources  
The Center for Climate Strategies

# Welcome and Introductions

- Iowa DNR
- Iowa Subcommittee (SC) Members
- Members of the Public
- Center for Climate Strategies

# Agenda

1. Introductions and Roll Call
2. Approval of Summary of Call/Meeting #16  
[Decision Item]
3. POD Discussion
4. Iowa Carbon Tax Results
5. Review of Next Steps
6. Public Comments and Announcements

# Review and Approval of Prior Call Summary

- Review draft meeting summary for prior CRE SC call
- Consider any corrections or additions to meeting summary
- Move to approve meeting summary with agreed-upon changes

# Revised Policy Option Document

- *Refer to current version of document*

# POD Modifications

- Global: Key uncertainties text on CO<sub>2</sub> methodologies
- CRE-9 Implementation/Addt'l Costs and Benefits?
  - Language for protection of wildlife (Amy & Pam)
- CRE-9 Implementation text added:
  - Fully utilize the existing grid by balancing the congestion points in the grid by identifying and maximizing “sweet spots” that can match modest transmission capacity with good renewable resources.

# CRE-7 Uncertainties Section

- ICCAC not expecting us to revisit levelized cost assumptions
- Nuclear cost estimates in FL
- Nuclear costs from PEF and FPL.
  - The results shown assume a total levelized unit cost of nuclear power of about \$100 per MWh (all costs in 2006 dollars) generated[1], which assumes a useful life (and life for calculation of annualized capital costs) of 40 years[2], a capacity factor of 91%, an average installed capital cost of \$7,091/kW[3], \$79/kW-year fixed O&M costs, \$3.1/MWh variable O&M costs, \$15/MWh fuel costs[4], and a 8.5%/year weighted-average cost of capital[5]. Source: FL Climate Action Team Appendix A.
- Question: Does the SC want to update the existing uncertainties section in the POD with these (or other) numbers?

# CRE-4b Carbon Tax

- See accompanying documents

# Carbon Tax in Iowa

- A carbon tax is a tax on each ton of GHG emitted from an emissions source covered by the tax.
- If the emitter's cost of mitigation is lower than the tax rate, it is cheaper to mitigate and avoid the tax (and vice versa).
- Iowa Carbon Tax covered sectors: all economic sectors except AFW
- For any given tax rate, we can estimate reductions by the emission sources, as well as how much tax is paid for the emissions generated, by looking at the marginal cost curve of the tax covered sectors in Iowa.

# Development of the Marginal Cost Curve for Iowa Carbon Tax Covered Sectors

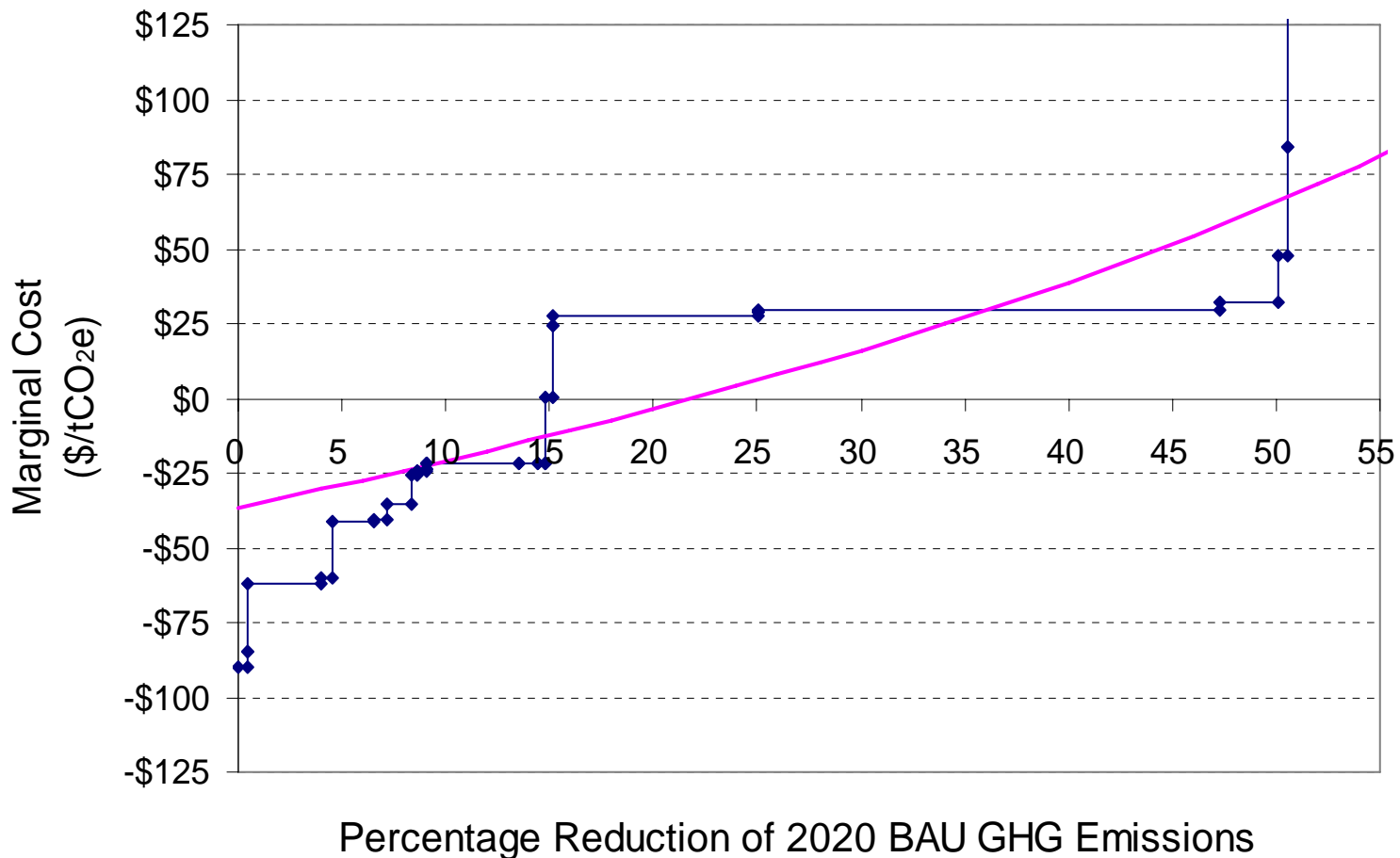
Sector	Climate Mitigation Actions	Estimated 2020 Annual GHG Reduction Potential (MMtCO2e)	Estimated Cost or Cost Savings per ton GHG Removed	GHG Reduction Potential as Percentage of 2020 Baseline Emissions	Cumulative GHG Reduction Potential	Weights (add-up to 100)
TLU-7	Fuel Efficient Operations for Light Duty Vehicles	0.44	-\$90.00	0.45%	0.45%	0.88
TLU-4	Support Passenger Rail Service in Iowa	0.00	-\$85.00	0.00%	0.45%	0.00
TLU-10	Fuel Strategies (20% Low Carbon Fuel Standard)	3.47	-\$62.00	3.51%	3.95%	6.93
TLU-8	New Vehicle Standards (Tailpipe GHG and Fuel Economy)	0.54	-\$60.00	0.55%	4.50%	1.08
CRE-12	Combined Heat and Power	2.06	-\$41.42	2.08%	6.58%	4.11
EEC-14	More stringent appliance efficiency standards	0.55	-\$40.85	0.56%	7.14%	1.10
EEC-2	Demand-Side Management (DSM) Energy Efficiency Programs for Natural Gas	1.24	-\$35.29	1.25%	8.39%	2.48
EEC-8	Focus on Specific Residential Market Segments	0.24	-\$25.37	0.25%	8.64%	0.49
EEC-6	Promotion and Incentives for Improved Design and Construction in the Private Sector	0.01	-\$24.57	0.01%	8.65%	0.02
EEC-4	Improved Building Codes for Energy Efficiency	0.40	-\$24.44	0.40%	9.05%	0.80
EEC-10	Energy Management Training/Training of Building Operators	0.05	-\$23.89	0.05%	9.11%	0.11
EEC-9	Midwestern Governors Association Energy Security and Climate Stewardship Platform	0.00	-\$21.92	0.00%	9.11%	0.00
EEC-12	Demand-Side Management (DSM)/Energy Efficiency Programs for Electricity	4.38	-\$21.88	4.42%	13.53%	8.74
EEC-3	Financial Mechanisms for Energy Efficiency	0.92	-\$21.87	0.93%	14.46%	1.83
EEC-5	Incentive Mechanisms for Achieving Energy Efficiency	0.33	-\$21.48	0.33%	14.79%	0.66
EEC-11	Rate Structures and Technologies To Promote Reductions	0.04	-\$21.45	0.04%	14.83%	0.08
EEC-13	Government Lead-by-Example: Improved Design and Construction in New and Existing State and Local Government Buildings	0.36	\$0.53	0.37%	15.20%	0.73
CRE-8	Support for Grid-based Renewable Energy & Development	0.00	\$24.39	0.00%	15.20%	0.00
CRE-7	Policies Related to Nuclear Power	9.71	\$27.57	9.81%	25.01%	19.38
CRE-11	Distributed Generation/Co-generation	0.00	\$29.11	0.00%	25.01%	0.00
CRE-2	Technology Initiatives, including Renewables	22.05	\$29.36	22.27%	47.28%	44.02
CRE-13	Pricing strategies to promote renewable energy and/or CHP	2.82	\$32.05	2.85%	50.14%	5.64
TLU-9	Freight Strategies (Truck and Rail)	0.43	\$48.00	0.43%	50.57%	0.85
TLU-5a	Adopt Best Workplaces for Commuters in Iowa	0.01	\$84.00	0.01%	50.58%	0.03
TLU-1a	Expand and Improve Transit Infrastructure	0.02	\$487.00	0.02%	50.60%	0.04

<sup>1</sup> Iowa 2020 projected consumption-based gross GHG emission level of the carbon tax covered sectors is 98.99 Million Metric Tons of CO2e (assuming RPS is implemented in the baseline).

Notes:

1. The numbers presented here are subject to change if there are any revisions in the quantifications from the Subcommittees.
2. Only options that are quantitatively analyzed for reduction potential and for costs or cost savings are included in the cost curve development.

## Stepwise and Fitted Marginal Cost Curves of Iowa Carbon Tax Covered Sectors, 2020



1. The marginal cost curves in the figure are developed based on the quantification analysis results for individual mitigation options provided by the EEC, CRE, and TLU Subcommittees. Those options that are not quantified for emission reduction potentials or cost-effectiveness are not included in the cost curve development.

2. Since the Renewable Portfolio Standard is assumed to be implemented separately from the Carbon Tax program, CRE-5 “Performance Standards”, which pertains to the RPS in Iowa, is excluded from the list of options used in the cost curve development.

# Iowa Carbon Tax Simulation Scenarios

- Five carbon tax scenarios for Iowa in 2020 are analyzed:
  - Tax rate for Iowa to achieve the MGA 15% goal applied to the tax covered sectors
  - Tax rate for Iowa to achieve the MGA 20% goal applied to the tax covered sectors
  - Tax rate for Iowa to achieve the MGA 25% goal applied to the tax covered sectors
  - A given tax rate at \$30/tCO<sub>2</sub>e
  - A given tax rate at \$40/tCO<sub>2</sub>e

# Iowa Carbon Tax Simulation Results

**Table 4. Simulation results of an economy-wide carbon tax**

Scenario	Tax Rate (\$/tCO <sub>2</sub> e)	Emission Reduction*		Mitigation Cost (\$MM)	Emissions That Require Payment of a Carbon Tax (MMtCO <sub>2</sub> e)	Carbon Tax Payments (\$MM)	Net Cost (\$MM)‡
		(Percentage from 2020 BAU)†	(MMtCO <sub>2</sub> e)				
1	\$2.86	23.40	23.17	-\$408.53	75.82	\$216.62	-\$191.91
2	\$11.78	27.91	27.63	-\$376.09	71.36	\$840.63	\$464.53
3	\$21.28	32.41	32.09	-\$302.60	66.90	\$1,423.58	\$1,120.98
4	\$30.00	36.30	35.94	-\$204.08	63.05	\$1,891.58	\$1,687.50
5	\$40.00	40.49	40.08	-\$59.35	58.91	\$2,356.44	2,297.09

\* In equilibrium, the emitter will choose to mitigate to the level where its marginal abatement cost equals the tax rate.

† The Iowa 2020 BAU emissions level of the tax covered sectors is 98.99 MMtCO<sub>2</sub>e with RPS implemented in the baseline.

‡ Sum of Mitigation Cost and Tax Payment.

\$/tCO<sub>2</sub>e = dollars per metric ton of carbon dioxide equivalent; MMtCO<sub>2</sub>e = million dollars per metric ton of carbon dioxide equivalent; BAU = business as usual; \$MM = millions of dollars.

# Findings From the Iowa Carbon Tax Simulations

- In Scenarios 1–3, when we apply the three MGA goals to the tax covered sectors, the goals are translated into 23.40%, 27.91%, and 32.41% below the 2020 baseline emissions of these sectors. To achieve the three emission reduction goals, the corresponding tax rate would be \$2.86/tCO<sub>2</sub>e, \$11.78/tCO<sub>2</sub>e, and \$21.28/tCO<sub>2</sub>e, respectively.
- In Scenarios 4 and 5, when the respective tax rates are given at the level of \$30/tCO<sub>2</sub>e and \$40/tCO<sub>2</sub>e, the emission reductions that can be achieved in Iowa are 36.30% and 40.49%, respectively, below the 2020 baseline level of these sectors, or 35.94 MMtCO<sub>2</sub>e and 40.08 MMtCO<sub>2</sub>e, respectively.
- Please note the tax revenue collected can be redistributed to low-income consumers or directed to other greenhouse gas mitigation programs in the state, including R&D in new or improved fuels and technologies. However, in this study, we did not analyze the economic impacts associated with the revenue recycling.

# Timing

<b>Date</b>	<b>Action</b>
October 18, 2007	1 <sup>st</sup> ICCAC meeting
December 17, 2007	2 <sup>nd</sup> ICCAC meeting
February 8, 2008	3 <sup>rd</sup> ICCAC meeting
April 11, 2008	4 <sup>th</sup> ICCAC meeting
June 12, 2008	5 <sup>th</sup> ICCAC meeting
September 3, 2008	6 <sup>th</sup> ICCAC meeting
November 10, 2008	7 <sup>th</sup> ICCAC meeting
December 15, 2008	ICCAC Final Report completed
Between ICCAC meetings	SC conference calls and meetings

# Next Steps

- Final ICCAC meeting on 11/10

# Public Input, Announcements