



Iowa Climate Change Advisory Council

Clean and Renewable Energy (CRE)
Subcommittee Meeting #18

October 24, 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 #17
[Decision Item]
3. Iowa Carbon Tax Results
4. Review of Next Steps
5. 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

CRE-4b. 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.

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/tCO₂e
 - A given tax rate at \$40/tCO₂e

Iowa Carbon Tax Simulation Cases

- For each scenario, two cases are simulated:
 - Base Case
 - The cost curve includes all the recommended policy options of the carbon tax covered sectors.
 - Sensitivity Case
 - Policy options that would be implemented through regulatory and legislative requirements rather than through a tax on emissions are excluded (or partially excluded) from the cost curve.
 - These regulatory options are considered as complementary options to the carbon tax.
 - Assume the regulatory options would be implemented eventually; thus, the emission reduction requirement using the carbon tax is reduced accordingly.

Development of the Marginal Cost Curve for Iowa Carbon Tax Covered Sectors (Base Case)

Sector	Climate Mitigation Actions	Estimated 2020 Annual GHG Reduction Potential (MMtCO ₂ e)	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

¹ 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).

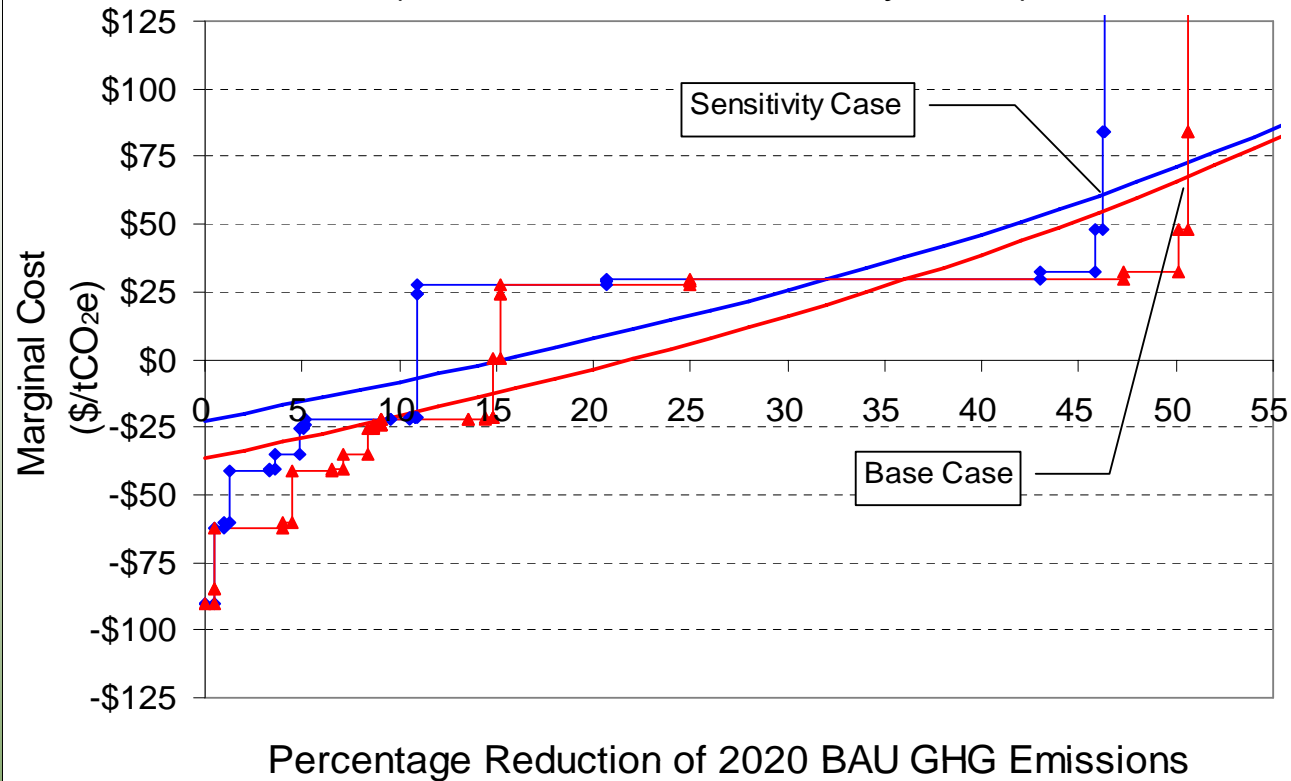
Notes:

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.

Development of the Marginal Cost Curve for Iowa Carbon Tax Covered Sectors (Sensitivity Case)

- The following regulatory policy options are entirely removed from the cost curve of the carbon tax in the sensitivity case:
 - TLU-4 “Support Passenger Rail Service in Iowa”
 - EEC-4 “Improved Building Codes for Energy Efficiency”
 - EEC-9 “Midwestern Governors Association Energy Security and Climate Stewardship Platform”
 - EEC-13 “Government Lead by Example: Improved Design and Construction in New and Existing State and Local Government Buildings”
- For the following three policy options, the potential of CO_{2e} emission reductions that can be realized through the carbon tax are scaled down:
 - TLU-10 “Fuel Strategies: Low Carbon Fuel Standard (20% Reduction)”: 85% scaled down.
 - TLU-8 “New Vehicle Standards for Increased Fuel Economy and Reduced Greenhouse Gas Emissions”: 50% scaled down.
 - EEC-14 “More Stringent Appliance Efficiency Standards”: 50% scaled down.

Stepwise and Fitted Marginal Cost Curves of Iowa Carbon Tax Covered Sectors, 2020 (Base Case and Sensitivity Case)



1. The red pair is for the base case scenario and the blue pair is for the sensitivity case scenario.
2. 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.
3. 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 Results

Base Case:

Scenario	Tax Rate (\$/tCO ₂ e)	Emission Reduction*		Mitigation Cost (\$MM)	Emissions That Require Payment of a Carbon Tax (MMtCO ₂ e)	Carbon Tax Payments (\$MM)	Net Cost (\$MM) [‡]
		(Percentage from 2020 BAU) [†]	(MMtCO ₂ e)				
	1	2	3	4	5	6 = 1 x 5	7 = 4 + 6
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

Sensitivity Case:

Scenario	Tax Rate (\$/tCO ₂ e)	Emission Reduction through Regulatory options		Emission Reduction through Carbon Tax*		Compliance Cost of Regulatory Options (\$MM)	Mitigation Cost Under Carbon Tax (\$MM)	Emissions That Require Payment of a Carbon Tax (MMtCO ₂ e)	Carbon Tax Payments (\$MM)	Net Cost (\$MM) [‡]
		(% from 2020 BAU) [†]	(MMtCO ₂ e)	(% from 2020 BAU) [†]	(MMtCO ₂ e)					
	1	2	3	4	5	6	7	8	9 = 1 x 8	10=6+7+9
1	\$6.05	4.31	4.26	19.10	18.90	-\$220.07	\$71.54	75.82	\$458.79	\$310.26
2	\$13.77	4.31	4.26	23.60	23.37	-\$220.07	\$171.36	71.36	\$982.52	\$933.81
3	\$21.95	4.31	4.26	28.11	27.83	-\$220.07	\$306.63	66.90	\$1,468.81	\$1,555.37
4	\$30.00	4.31	4.26	32.28	31.95	-\$220.07	\$465.28	62.77	\$1,883.25	\$2,128.46
5	\$40.00	4.31	4.26	37.12	36.75	-\$220.07	\$692.90	57.98	\$2,319.10	\$2,791.94

Findings from the Iowa Carbon Tax Simulations

Base Case:

- 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/tCO₂e, \$11.78/tCO₂e, and \$21.28/tCO₂e, respectively.
- In Scenarios 4 and 5, when the respective tax rates are given at the level of \$30/tCO₂e and \$40/tCO₂e, 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 MMtCO₂e and 40.08 MMtCO₂e, respectively.
- Please note the tax revenue collected can be re-distributed 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.

Findings from the Iowa Carbon Tax Simulations

Sensitivity Case:

- In Scenarios 1–3, the three MGA goals are translated into 23.40%, 27.91%, and 32.41% below the 2020 baseline emissions. The regulatory policy options alone can achieve 4.26 MMtCO₂e (or 4.31%) emission reductions in 2020. Therefore, the emission reduction requirements for the carbon tax policy are 19.10%, 23.60%, and 28.11%, respectively. To meet these three goals, the corresponding tax rate would be \$6.05/tCO₂e, \$13.77/tCO₂e, and \$21.95/tCO₂e, respectively.
- In Scenarios 4 and 5, when the respective tax rates are given at the level of \$30/tCO₂e and \$40/tCO₂e, the emission reductions that can be achieved through carbon tax in Iowa are 32.28% and 37.12%, respectively, below the 2020 baseline level of these sectors, or 31.95 MMtCO₂e and 36.75 MMtCO₂e, respectively.
- Again, the economic impacts associated with tax revenue recycling are not analyzed.

Findings from the Iowa Carbon Tax Simulations

Comparison of the two analysis cases:

- The cost of the sensitivity case (combined carbon tax and regulation) is higher for each emission reduction level than for the base case (pure carbon tax).
- The main reason is that some relatively higher priced options that would not be forthcoming with a carbon tax signal are required to be implemented under the regulatory approach.

Timing

Date	Action
October 18, 2007	1st ICCAC meeting
December 17, 2007	2nd ICCAC meeting
February 8, 2008	3rd ICCAC meeting
April 11, 2008	4th ICCAC meeting
June 12, 2008	5th ICCAC meeting
September 3, 2008	6th ICCAC meeting
November 10, 2008	7th 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