

**Final Report**

**Implementation of EGU1 and EGU2 Policies Using the Integrated Planning Model (IPM®)  
in the Midwest RPO Region**

Prepared for

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## A. Overview

LADCO has awarded a contract to ICF Resources, L.L.C. (ICF), seeking ICF's services to evaluate the impact of LADCO's EGU1 and EGU2 policies on the electric generating sector of the contiguous United States using ICF's Integrated Planning Model (IPM<sup>®</sup>).

IPM is a dynamic linear optimization model that can be used to examine air pollution control policies for various pollutants throughout the contiguous U.S. for the entire electric power system. The dynamic nature of IPM enables the projection of the behavior of the power system over a specified future period. The optimization logic determines the least-cost means of meeting electric generation and capacity requirements while complying with specified constraints including air pollution regulations, transmission bottlenecks, and plant-specific operational constraints. The versatility of IPM allows users to specify which constraints to exercise and populate IPM with their own datasets.

This report summarizes the analysis that ICF has performed in evaluating the impact of EGU1 and EGU2 policies on the electricity generating sector using IPM (hereafter, the analysis is referred to as the LADCO analysis). The model assumptions and data used in this analysis are presented in Section B of the report. The results are presented in Section C and the analysis limitations are presented in Section D.

Since the LADCO analysis is based on the recent IPM-based analysis performed for the US EPA and VISTAS, we have summarized only the incremental changes that were proposed by LADCO as part of this analysis.

## B. Modeling Assumptions

As per the direction of LADCO the following assumptions for modeling EGU1 and EGU2 policies were implemented:

- i) The LADCO analysis is based on the VISTASII\_PC\_1f run that was developed for VISTAS in 2005. This run incorporates the EPA 219b fuel prices, RPO directed NEEDS, regional and state environmental regulations, and run year updates. The CAIR and CAMR rules are also modeled.
- ii) LADCO had directed ICF to implement the EGU1 and EGU2 policies in IPM as an overlay on top of the existing CAIR and CAMR policies in the VISTASII\_PC\_1f run. The specifications of the two policies are summarized in Table 1.

**Table 1: EGU1 and EGU2 Policy Specifications (lbs/MMBtu)**

Year	EGU1		EGU2	
	NO <sub>x</sub> Rate Limit	SO <sub>2</sub> Rate Limit	NO <sub>x</sub> Rate Limit	SO <sub>2</sub> Rate Limit
2009-2011	0.15	0.36	0.12	0.24
2012-2030	0.10	0.15	0.07	0.10

- iii) The EGU1 and EGU2 policies were implemented in Illinois, Indiana, Michigan, Ohio and Wisconsin, the five states comprising the LADCO region. Only fossil units larger than 25 MW

are considered to be affected. The NO<sub>x</sub> and SO<sub>2</sub> budgets for run years 2009, 2012, 2015 and 2018 were calculated using the emission rates in Table 1 and the corresponding heat inputs from the VISTASII\_PC\_1f run for the affected units.

It should be noted that by treating EGU1 and EGU2 as an overlay on CAIR/CAMR effectively means that SO<sub>2</sub> and NO<sub>x</sub> emissions go down in the LADCO region, but go up outside the LADCO region (within the CAIR/CAMR region), such that total CAIR/CAMR region emissions remain relatively constant. Another approach would have been to lower the CAIR SO<sub>2</sub> and NO<sub>x</sub> budgets to reflect the tighter EGU1 and EGU2 policies in LADCO. This other approach would likely show higher compliance costs, but greater air quality benefits.

iv) Table 2 summarizes the SO<sub>2</sub> and NO<sub>x</sub> budgets. The budgets for 2012 are significantly higher than those for 2015 because the 2012 run year comprises the 2010-2013 calendar years. The 2012 run year emission cap is the average of the 2010-2013 year emission caps. As the 2010 and 2011 run years are affected by the Phase I EGU1 and EGU2 requirements, and 2012 and 2013 are affected by the Phase II EGU1 and EGU2 requirements, the 2012 run year cap is higher than the estimated 2012 calendar year budget.

ICF ran IPM under two future scenarios – LADCO\_PC\_1d and LADCO\_PC\_2a. LADCO1\_PC\_1d represents the EGU2 policy while LADCO\_PC\_2a reflects the EGU1 policy.

**Table 2: EGU1 and EGU2 Budgets for SO<sub>2</sub> and NO<sub>x</sub> Emissions in LADCO Region (Thousand Tons)**

Year	Years Mapped to Run Year	EGU1 – LADCO_PC_2a		EGU2 – LADCO_PC_1d	
		NO <sub>x</sub> Budget	SO <sub>2</sub> Budget	NO <sub>x</sub> Budget	SO <sub>2</sub> Budget
2009	2009-2009	433	995	346	664
2012	2010-2013	369	710	281	473
2015	2014-2017	307	430	215	287
2018	2018-2018	324	451	227	301

v) The analysis allows the SO<sub>2</sub> and NO<sub>x</sub> emission allowances to be banked in any year starting 2009 and then withdrawn from the bank in a future year under the EGU1 and EGU2 policies. However, since the EGU1 and EGU2 SO<sub>2</sub> and NO<sub>x</sub> policies are implemented separately from the CAIR SO<sub>2</sub> and NO<sub>x</sub> policies, a power plant participating in the EGU1 and EGU2 SO<sub>2</sub> programs cannot take advantage of the CAIR SO<sub>2</sub> bank for complying with the EGU2 SO<sub>2</sub> program requirements.

## C. Analysis Results

VISTASII\_PC\_1f is the point of reference for this analysis. The run results from LADCO\_PC\_2a (EGU1) and LADCO\_PC\_1d (EGU2) were parsed for the 2009 and 2012 run years. Additionally, the run results from VISTASII\_PC\_1f (CAIR/CAMR) were parsed for 2009, 2012, 2015 and 2018 run years. The Appendix summarizes the SO<sub>2</sub> and NO<sub>x</sub> emission results on a state level. The following paragraphs discuss the results from the two runs.

### 1. Projected Costs

For the proposed EGU1 and EGU2 policies, the analysis projects the annualized incremental cost for the US with respect to VISTASII\_PC\_1f to be \$0.7 billion (+0.7%) and \$1.3 billion (+1.4%) in 2009, and \$0.8 billion (+0.7%) and \$1.1 billion (+0.7%) in 2018 respectively. The

production cost as projected by IPM includes the capital costs of new investment decisions, fuel costs and the operation and maintenance costs of power plants.

The marginal costs of emission reductions (allowance prices) in the EGU1 and EGU2 cases are shown in Table 3. Note that as the emission policies get tighter (moving from EGU1 to EGU2), the allowance prices for both SO<sub>2</sub> and NO<sub>x</sub> in the LADCO region go up. However, since the EGU1 and EGU2 policies control a subset of the CAIR states, the LADCO region injects additional allowances into the CAIR SO<sub>2</sub> and NO<sub>x</sub> markets resulting in a lowering of their allowance prices.

**Table 3: Marginal Costs of Emission Reductions under EGU1 and EGU2 (1999 \$/Ton)**

Region		LADCO_PC_2a			LADCO_PC_1d		
		2009	2012	2018	2009	2012	2018
CAIR	SO <sub>2</sub>	565	643	903	536	610	856
	NO <sub>x</sub>	978	1112	1562	825	938	1318
LADCO (EGU1/EGU2)	SO <sub>2</sub>	1,044	1,186	1,667	1,847	2,101	2,951
	NO <sub>x</sub>	76	86	0	639	726	1,020

## **2. Projected Control Technology Retrofits**

The modeling results indicate that the power sector opts for a technology strategy for complying with the CAIR and EGU1/EGU2 policy requirements. At the national level, the proposed EGU1 and EGU2 policies require the installation of similar amount of SO<sub>2</sub> scrubbers and SCR's (selective catalytic reduction) on existing national coal capacity by 2018 (see Table 4). However, the installations of controls in the LADCO region are higher in EGU2 as compared to EGU1 run due to the relatively tighter requirements in the LADCO states. This implies that the emission controls installed in the non-LADCO states vary significantly between the EGU1 and EGU2 runs.

In the LADCO analysis, no feasibility constraints for retrofits in 2009 are applied.

**Table 4: Pollution Control Installations by Technology (GW)**

Region	Technology	LADCO_PC_2a		LADCO_PC_1d	
		2009	2018	2009	2018
National	Scrubber	50.0	99.1	53.9	100.9
National	SCR	36.6	65.8	38.4	66.0
LADCO	Scrubber	35.0	46.2	42.2	51.4
LADCO	SCR	10.9	21.6	19.9	27.9

### 3. Projected Emissions

Tables 5a and 5b compare the emissions from all units (fossil and non-fossil) in VISTASII\_PC\_1f, LADCO\_PC\_1d and LADCO\_PC\_2a runs.

**Table 5a: SO<sub>2</sub> and NO<sub>x</sub> Emissions from the Electric Power Sector (Million Tons)**

Region		VISTASII_PC_1f			LADCO_PC_2a			LADCO_PC_1d		
		2009	2012	2018	2009	2012	2018	2009	2012	2018
CAIR	SO <sub>2</sub>	5.74	4.79	3.84	5.68	4.77	3.65	5.71	4.71	3.63
	NO <sub>x</sub>	1.61	1.58	1.34	1.61	1.57	1.36	1.6	1.56	1.36
LADCO	SO <sub>2</sub>	1.80	1.57	1.39	0.85	0.74	0.59	0.59	0.52	0.41
	NO <sub>x</sub>	0.45	0.45	0.40	0.40	0.37	0.33	0.29	0.28	0.25
Non-CAIR	SO <sub>2</sub>	0.95	0.98	0.94	1.07	1.07	1.02	1.08	1.07	1.03
	NO <sub>x</sub>	0.91	0.90	0.91	0.90	0.90	0.91	0.91	0.90	0.91

**Table 5b: Mercury Emissions from Fossil Units for Parsed Run Years (Tons)**

Region		VISTASII_PC_1f			LADCO_PC_2a		LADCO_PC_1d	
		2009	2012	2018	2009	2012	2009	2012
CAIR	Hg	27.93	22.81	19.78	29.17	23.18	29.84	22.85
LADCO	Hg	8.50	7.10	6.45	6.97	6.00	6.14	5.09
Non-CAIR	Hg	8.72	8.25	6.73	9.01	7.97	9.05	7.97

In the LADCO region, compared with the VISTASII\_PC\_1f, SO<sub>2</sub> emissions in LADCO\_PC\_2a and LADCO\_PC\_1d would be reduced by 0.95 million tons and 1.21 million tons in 2009, and by 0.80 million tons and 0.98 million tons in 2018 respectively. Similarly, compared with the VISTASII\_PC\_1f, NO<sub>x</sub> emissions in LADCO\_PC\_1d and LADCO\_PC\_2a would be reduced by 0.05 million tons and 0.16 million tons in 2009, and by 0.07 million tons and 0.15 million tons in 2018 respectively.

Note that the total SO<sub>2</sub> and NO<sub>x</sub> emissions across the three runs are comparable to each other while the emissions in the LADCO region are lower in LADCO\_PC\_2a as compared to VISTASII\_PC\_1f run, and higher than the LADCO\_PC\_1d run. This implies that the implementation of EGU1 and EGU2 policies that are tighter than CAIR in LADCO states result in an increase in emissions in the non-LADCO CAIR states. As noted above, another approach would have been to update the CAIR SO<sub>2</sub> and NO<sub>x</sub> budgets to reflect the tighter EGU1 and EGU2 policies. This other approach would likely show higher compliance costs, but greater air quality benefits.

Table 6 summarizes the EGU1 and EGU2 SO<sub>2</sub> and NO<sub>x</sub> allowance markets as implemented in the LADCO region. In the 2009 and 2012 run years, emission allowances are banked resulting in the actual emissions that are lower than the emission cap while the emissions in the later years are higher than the emission cap because of withdrawal of emission allowances from the allowance bank.

The emissions as presented in Table 6 are lower than in Table 5 because Table 6 presents the emissions at the affected units (fossil units larger than 25 MW) while Table 5 presents emissions from all units.

**Table 6: Summary of EGU1 and EGU2 SO<sub>2</sub> and NO<sub>x</sub> Allowance Markets in MRPO Region (Thousand Tons)**

Run Year	2009	2012	2015	2018	2020
Years Mapped to Run Year	2009-2009	2010-2013	2014-2017	2018-2018	2019-2022
<b>EGU2 - SO<sub>2</sub></b>					
Emission Budget	664	473	287	301	301
Emissions at Affected Units	502	432	363	323	301
Allowances Banked	162	42	0	0	0
Allowances Withdrawn from Bank	0	0	-76	-22	0
<b>EGU2 - NO<sub>x</sub></b>					
Emission Budget	346	281	215	227	227
Emissions at Affected Units	274	259	244	236	231
Allowances Banked	72	22	0	0	0
Allowances Withdrawn from Bank	0	0	-29	-9	-4
<b>EGU1 - SO<sub>2</sub></b>					
Emission Budget	996	710	430	451	451
Emissions at Affected Units	761	650	535	502	451
Allowances Banked	234	60	0	0	0
Allowances Withdrawn from Bank	0	0	-105	-51	0
<b>EGU1 - NO<sub>x</sub></b>					
Emission Budget	433	369	307	324	324
Emissions at Affected Units	380	356	333	313	303
Allowances Banked	53	13	0	0	0
Allowances Withdrawn from Bank	0	0	-26	0	0

Total projected state-level emissions for SO<sub>2</sub> and NO<sub>x</sub> for LADCO\_PC\_1d and the LADCO\_PC\_2a runs are presented in Tables A1-A4 in the Appendix.

#### **4. Projected Generation Mix**

Tables 7 and 8 present the generation mix and coal production under the proposed EGU1 and EGU2 policies. Coal-fired generation and natural gas-fired generation are projected to remain relatively unchanged due to the technology oriented as opposed to fuel switching oriented compliance strategy opted by the power sector. The amount of coal produced under the two policies is also similar.

**Table 7: National Generation Mix (BkWh's)**

Generating Fuel Use	LADCO_PC_2a			LADCO_PC_1d		
	2009	2012	2018	2009	2012	2018
<b>Coal</b>	2.19	2.21	2.33	2.18	2.20	2.32
<b>Oil/Natural Gas</b>	0.90	1.09	1.40	0.91	1.09	1.41
<b>Other</b>	1.20	1.22	1.24	1.20	1.22	1.24

**Table 8: Coal Production in the Electric Power Sector (Million Tons)**

Supply Area	LADCO_PC_2a			LADCO_PC_1d		
	2009	2012	2018	2009	2012	2018
Appalachia	313	320	333	322	323	330
Interior	179	185	202	173	180	205
West	604	578	590	596	576	586
National	1,096	1,083	1,124	1,090	1,078	1,121

**5. Projected Retail Electricity Prices**

National average retail electricity prices in the LADCO\_PC\_1d are projected to increase 0.15 percent in 2009 and 2018 as compared to LADCO\_PC\_2a. Table 9 and Table 10 summarize the national and regional level retail electricity prices. These estimates were developed using the Retail Electricity Price Model.

**Table 9: National Average Retail Electricity Prices (1999 Mills/kWh)**

	VISTASII_PC_1f	LADCO_PC_2a	LADCO_PC_1d	LADCO_PC_2a - VISTASII_PC_1f (%)	LADCO_PC_1d - VISTASII_PC_1f (%)
2009	64.7	64.7	64.8	0.08%	0.22%
2012	65.3	65.5	65.7	0.25%	0.53%
2018	64.8	64.8	64.9	0.04%	0.15%

Source: Retail Electricity Price Model as documented in [http://www.epa.gov/clearskies/tech\\_sectiong.pdf](http://www.epa.gov/clearskies/tech_sectiong.pdf)

**Table 10: Retail Electricity Prices by NERC Region (1999 Mills/kWh)**

Power Region	Primary States Included	LADCO_PC_2a			LADCO_PC_1d		
		2009	2012	2018	2009	2012	2018
ECAR	OH, MI, IN, KY, WV, PA	56.6	58.9	59.4	57.0	59.5	59.8
ERCOT	TX	65.1	65.4	62.8	65.0	65.5	62.8
MAAC	PA, NJ, MD, DC, DE	65.3	69.6	72.6	65.5	70.0	72.7
MAIN	IL, WI	57.4	60.6	63.3	57.8	61.4	63.9
MAPP	MN, IA, SD, ND, NE	54.0	52.5	49.4	54.1	52.6	49.5
NY	NY	94.2	94.5	88.3	94.0	94.4	88.2
NE	VT, NH, ME, MA, CT, RI	89.4	89.2	82.6	89.0	89.0	82.6
FRCC	FL	73.5	73.1	71.9	73.5	73.1	71.9
STV	VA, NC, SC, GA, AL, MS, TN, AR, LA	58.0	57.2	56.6	58.0	57.2	56.4
SPP	KS, OK, MR	56.9	57.7	57.4	56.9	57.8	57.3
PNW	WA, OR, ID	51.6	51.5	50.7	51.6	51.6	50.7
RM	MT, WY, CO, UT, NM, AZ, NV, ID	69.4	69.3	65.7	69.4	69.4	65.7
CALI	CA	100.4	100.5	100.2	100.5	100.6	100.2

Source: Retail Electricity Price Model as documented in [http://www.epa.gov/clearskies/tech\\_sectiong.pdf](http://www.epa.gov/clearskies/tech_sectiong.pdf)

## 6. Projected Fuel Price Impacts

The impacts of the CAIR on mine-mouth coal prices and the Henry Hub natural gas prices are summarized in Table 11.

**Table 11: Average Coal Mine Mouth and Henry Hub Natural Gas Prices (1999\$/MMBtu)**

Fuel	LADCO_PC_2a			LADCO_PC_1d		
	2009	2012	2018	2009	2012	2018
Coal	0.59	0.58	0.56	0.59	0.59	0.56
Natural Gas	3.68	3.60	3.60	3.70	3.60	3.60

## D. Limitations of Analysis

The LADCO analysis using IPM is based on various economic and engineering input assumptions that are inherently uncertain, such as assumptions for future fuel prices, electricity demand growth and the cost and performance of control technologies. As configured, IPM does not take into account demand response (i.e., consumer reaction to changes in electricity prices).

We would also note that because emission banking was allowed for both SO<sub>2</sub> and NO<sub>x</sub> emissions under the EGU1 and EGU2 policies, the actual emission limits are not reached in any given year in the run.

## E. Appendix

### 1. Emission Results

Tables A1, A2, A3 and A4 present NO<sub>x</sub> and SO<sub>2</sub> emissions from LADCO\_PC\_1d and LADCO\_PC\_2a by state in 2009, 2012 and 2018 run years.

**Table A1 State Level LADCO\_PC\_1d Case NO<sub>x</sub> Emissions by Season (Thousand Tons)**

NO <sub>x</sub> Emission (LADCO_PC_1d)	Winter			Summer		
	2009	2012	2018	2009	2012	2018
<b>CAIR Affected States</b>						
Alabama	51.81	52.43	38.62	40.37	42.34	31.09
District of Columbia	0.06	0.16	0.37	0.05	0.13	0.28
Florida	42.36	42.56	38.40	38.43	39.88	33.59
Georgia	52.72	52.83	51.41	43.12	43.60	42.16
Illinois	33.21	34.37	33.22	24.60	26.59	28.12
Indiana	42.13	32.30	29.18	32.09	24.86	23.00
Iowa	29.56	30.35	29.30	21.05	22.97	22.80
Kentucky	64.62	64.94	47.19	49.05	51.03	37.14
Louisiana	17.28	17.75	16.19	15.21	15.52	14.27
Maryland	9.37	10.77	12.04	7.59	8.82	9.78
Michigan	31.11	30.51	24.62	21.74	22.85	19.12
Minnesota	23.46	23.51	23.56	18.17	18.18	18.74
Mississippi	19.53	19.94	4.66	16.27	16.75	4.23
Missouri	45.33	45.48	45.44	34.65	36.60	36.74
New York	32.63	28.44	17.99	27.31	22.72	14.19
North Carolina	34.85	32.95	36.19	22.07	22.87	26.13
Ohio	39.02	37.15	35.22	27.65	28.80	27.52
Pennsylvania	83.46	72.48	49.70	62.02	55.20	38.91
South Carolina	24.79	25.67	27.12	19.74	20.21	21.48
Tennessee	26.31	26.34	21.76	19.85	21.07	17.49
Texas	86.10	81.23	79.28	86.14	82.78	83.32
Virginia	37.80	34.17	32.49	29.00	26.42	25.27
West Virginia	46.21	41.38	34.80	33.61	31.78	26.80
Wisconsin	22.50	21.25	18.32	16.26	15.91	14.43
<b>Total</b>	<b>896.23</b>	<b>858.96</b>	<b>747.08</b>	<b>706.04</b>	<b>697.87</b>	<b>616.61</b>
<b>Non CAIR States</b>						
Arizona	44.51	44.70	45.54	35.92	35.50	36.06
Arkansas	17.83	18.31	18.24	14.48	14.60	14.84
California	20.80	13.27	15.92	14.57	10.52	12.43
Colorado	38.73	38.84	39.03	29.98	30.26	30.98
Connecticut	2.14	2.07	2.31	1.58	1.62	1.82
Delaware	6.74	6.81	6.86	4.77	5.48	5.50
Idaho	0.83	0.47	0.47	0.63	0.36	0.36
Kansas	45.96	46.07	46.15	36.80	36.86	37.16
Maine	2.55	1.72	1.21	1.13	1.51	0.94

NO <sub>x</sub> Emission (LADCO_PC_1d)	Winter			Summer		
	2009	2012	2018	2009	2012	2018
Massachusetts	10.69	10.95	11.01	8.17	8.51	8.65
Montana	21.41	21.47	21.47	16.99	17.03	17.04
Nebraska	28.26	28.26	28.27	22.51	22.51	22.59
Nevada	25.76	26.48	26.49	20.25	21.09	20.96
New Hampshire	2.06	2.04	2.22	1.56	1.52	1.71
New Jersey	7.08	7.50	7.29	5.66	6.24	6.54
New Mexico	40.84	40.84	41.05	32.79	32.79	32.97
North Dakota	38.15	39.97	39.97	30.11	30.31	31.75
Oklahoma	39.32	39.25	39.35	36.49	38.89	36.54
Oregon	7.39	6.47	6.48	5.77	5.05	5.06
Rhode Island	0.36	0.38	0.40	0.33	0.33	0.30
South Dakota	8.10	8.10	8.12	6.44	6.44	6.46
Utah	33.88	33.88	33.88	26.91	26.91	26.91
Vermont	0.05	0.07	0.11	0.09	0.10	0.13
Washington	14.98	14.90	14.93	11.83	11.74	11.76
Wyoming	45.24	45.24	45.25	35.93	35.94	35.94
Total	503.67	498.05	502.02	401.66	402.09	405.38
<b>National Total</b>	<b>1,399.90</b>	<b>1,357.01</b>	<b>1,249.10</b>	<b>1,107.70</b>	<b>1,099.96</b>	<b>1,021.98</b>

**Table A2 State Level LADCO\_PC\_1d Case SO<sub>2</sub> Emissions (Thousand Tons)**

SO <sub>2</sub> Emission (LADCO_PC_1d)			
	2009	2012	2018
<b>CAIR Affected States</b>			
Alabama	376.11	343.06	294.70
District of Columbia	0.00	0.07	0.54
Florida	212.81	212.81	194.44
Georgia	622.96	566.43	320.32
Illinois	169.29	127.10	76.69
Indiana	163.80	160.79	131.26
Iowa	141.65	148.50	148.21
Kentucky	397.97	399.91	317.28
Louisiana	111.31	111.31	74.29
Maryland	233.04	75.26	48.19
Michigan	51.39	56.45	45.94
Minnesota	87.19	87.21	84.61
Mississippi	85.63	85.63	85.63
Missouri	280.24	286.65	287.25
New York	142.64	117.25	63.66
North Carolina	175.79	144.90	118.31
Ohio	139.53	122.20	113.37
Pennsylvania	699.79	327.66	171.21
South Carolina	169.09	160.03	123.35
Tennessee	299.93	263.69	222.98
Texas	425.27	425.27	375.15
Virginia	199.33	170.75	132.71
West Virginia	458.73	265.96	162.85
Wisconsin	64.17	49.93	40.54
Total	5,707.66	4,708.85	3,633.49
<b>Non CAIR States</b>			
Arizona	60.55	60.59	60.66
Arkansas	82.63	82.63	82.63
California	6.79	7.01	7.01
Colorado	87.19	87.20	87.21
Connecticut	6.57	6.57	8.19
Delaware	32.56	35.13	35.50
Idaho	0.05	0.05	0.05
Kansas	80.52	81.49	81.49
Maine	15.21	12.60	6.20
Massachusetts	17.12	17.16	20.48
Montana	19.88	20.01	23.51
Nebraska	73.63	73.63	73.63
Nevada	30.73	31.30	31.30
New Hampshire	7.62	7.52	8.74
New Jersey	60.00	34.40	34.81

SO <sub>2</sub> Emission (LADCO_PC_1d)			
	2009	2012	2018
New Mexico	52.92	52.92	52.92
North Dakota	175.30	184.23	190.28
Oklahoma	113.68	115.83	115.83
Oregon	10.18	10.18	10.18
Rhode Island	0.00	0.00	0.37
South Dakota	12.09	12.09	12.09
Utah	53.16	53.16	37.82
Vermont	0.04	0.04	0.27
Washington	10.09	12.40	11.18
Wyoming	70.10	72.69	40.26
Total	1,078.62	1,070.83	1,032.60
<b>National Total</b>	<b>6,786.29</b>	<b>5,779.67</b>	<b>4,666.09</b>

Table A3 State Level LADCO\_PC\_2a Case NO<sub>x</sub> Emissions by Season (Thousand Tons)

NO <sub>x</sub> Emission (LADCO_PC_2a)	Winter			Summer		
	2009	2012	2018	2009	2012	2018
<b>CAIR Affected States</b>						
Alabama	40.95	41.60	27.37	31.86	33.77	22.55
District of Columbia	0.06	0.15	0.31	0.05	0.12	0.23
Florida	42.32	42.67	31.37	38.43	39.32	28.13
Georgia	52.72	51.97	38.26	43.11	43.60	31.76
Illinois	34.80	36.60	37.13	25.92	27.74	30.01
Indiana	70.09	61.29	39.68	51.51	47.08	29.76
Iowa	28.07	28.56	29.30	20.17	21.56	22.54
Kentucky	62.36	58.79	42.91	47.18	45.96	33.61
Louisiana	17.28	17.74	16.30	15.19	15.45	14.48
Maryland	8.07	9.31	11.25	6.85	7.75	9.15
Michigan	51.46	50.73	48.62	38.36	39.05	36.88
Minnesota	23.31	23.51	23.56	18.15	18.18	18.56
Mississippi	5.99	6.36	4.60	5.51	5.82	4.26
Missouri	45.33	45.46	45.01	34.57	36.54	36.43
New York	30.57	28.05	15.48	25.91	22.40	12.40
North Carolina	34.62	32.41	35.47	22.28	23.08	25.52
Ohio	47.17	39.36	39.10	35.30	30.56	30.25
Pennsylvania	67.39	67.11	48.56	49.38	50.20	38.89
South Carolina	23.30	23.92	26.60	18.63	19.00	20.95
Tennessee	23.17	23.19	19.98	17.35	18.35	16.09
Texas	85.85	81.18	79.75	86.03	82.71	83.69
Virginia	35.12	34.12	31.75	26.88	26.01	24.50
West Virginia	46.21	41.33	34.00	30.45	31.75	26.09
Wisconsin	24.17	22.50	21.56	17.00	16.81	17.05
<b>Total</b>	<b>900.39</b>	<b>867.91</b>	<b>747.93</b>	<b>706.06</b>	<b>702.80</b>	<b>613.78</b>
<b>Non CAIR States</b>						
Arizona	44.51	44.70	45.54	35.92	35.50	36.06
Arkansas	17.83	18.31	18.34	14.53	14.56	14.89
California	20.81	13.27	15.92	14.57	10.52	12.43
Colorado	38.73	38.84	39.03	29.97	30.22	30.98
Connecticut	2.14	2.07	2.20	1.58	1.62	1.74
Delaware	6.74	6.86	6.88	4.77	5.48	5.50
Idaho	0.83	0.47	0.47	0.63	0.36	0.36
Kansas	45.96	46.07	46.13	36.80	36.87	37.24
Maine	2.56	1.69	1.17	0.95	1.51	0.90
Massachusetts	11.07	11.11	10.90	8.43	8.62	8.58
Montana	21.41	21.47	21.47	16.99	17.03	17.04
Nebraska	28.26	28.26	28.27	22.51	22.51	22.53
Nevada	25.74	26.48	26.49	20.24	21.07	20.96
New Hampshire	2.06	2.04	2.14	1.56	1.55	1.65

NO <sub>x</sub> Emission (LADCO_PC_2a)	Winter			Summer		
	2009	2012	2018	2009	2012	2018
New Jersey	6.91	7.51	7.33	5.27	6.20	6.70
New Mexico	40.84	40.84	41.05	32.79	32.79	32.96
North Dakota	38.15	39.97	39.97	29.15	30.31	30.31
Oklahoma	39.32	39.25	39.35	36.49	38.89	36.91
Oregon	7.39	6.47	6.48	5.77	5.05	5.06
Rhode Island	0.36	0.38	0.38	0.33	0.33	0.29
South Dakota	8.10	8.10	8.12	6.44	6.44	6.46
Utah	33.88	33.88	33.88	26.91	26.91	26.91
Vermont	0.05	0.07	0.10	0.10	0.10	0.12
Washington	14.98	14.90	14.93	11.83	11.74	11.76
Wyoming	45.24	45.24	45.25	35.93	35.93	35.94
Total	503.87	498.25	501.79	400.44	402.11	404.25
<b>National Total</b>	<b>1,404.26</b>	<b>1,366.17</b>	<b>1,249.71</b>	<b>1,106.50</b>	<b>1,104.91</b>	<b>1,018.03</b>

**Table A4 State Level LADCO\_PC\_2a SO<sub>2</sub> Emissions (Thousand Tons)**

SO <sub>2</sub> Emission (LADCO_PC_2a)			
	2009	2012	2018
<b>CAIR Affected States</b>			
Alabama	376.41	343.06	282.62
District of Columbia	0.00	0.07	0.31
Florida	212.81	212.81	183.26
Georgia	585.26	479.40	223.90
Illinois	213.71	181.32	153.95
Indiana	249.81	215.30	170.70
Iowa	141.21	146.12	147.61
Kentucky	397.94	386.22	316.27
Louisiana	111.31	111.31	74.54
Maryland	203.88	75.85	40.07
Michigan	103.48	103.22	72.81
Minnesota	86.91	87.21	87.78
Mississippi	85.63	85.63	85.70
Missouri	280.09	286.65	283.07
New York	142.64	116.57	54.59
North Carolina	170.30	130.48	114.84
Ohio	177.65	146.57	138.70
Pennsylvania	517.84	326.81	167.64
South Carolina	171.56	151.41	120.39
Tennessee	275.69	264.36	231.66
Texas	425.27	424.27	369.35
Virginia	221.78	152.26	127.78
West Virginia	426.49	254.72	152.05
Wisconsin	102.75	88.76	50.74
Total	5,680.40	4,770.39	3,650.33
<b>Non CAIR States</b>			
Arizona	60.55	60.59	60.66
Arkansas	82.63	82.63	82.77
California	6.67	6.79	7.01
Colorado	87.19	87.20	87.21
Connecticut	6.57	6.57	7.14
Delaware	32.17	35.44	35.50
Idaho	0.05	0.05	0.05
Kansas	80.52	81.49	81.49
Maine	14.13	12.47	5.77
Massachusetts	17.52	17.17	18.31
Montana	16.72	19.88	24.33
Nebraska	73.63	73.63	73.63
Nevada	30.73	31.30	31.30
New Hampshire	7.62	7.52	7.94
New Jersey	60.00	34.40	32.91

SO <sub>2</sub> Emission (LADCO_PC_2a)			
	2009	2012	2018
New Mexico	52.92	52.92	52.92
North Dakota	171.29	184.23	184.23
Oklahoma	113.68	115.83	115.83
Oregon	10.18	10.18	10.18
Rhode Island	0.00	0.00	0.13
South Dakota	12.09	12.09	12.09
Utah	53.16	53.16	37.82
Vermont	0.04	0.04	0.12
Washington	10.09	12.40	12.40
Wyoming	69.01	72.62	40.26
Total	1,069.16	1,070.59	1,022.01
<b>National Total</b>	<b>6,749.57</b>	<b>5,840.98</b>	<b>4,672.33</b>

## 2. Generation Results

Tables A5 and A6 present the generation in LADCO\_PC\_1d and LADCO\_PC\_2a by state and season in 2009, 2012 and 2018 run years.

Table A5 State Level LADCO\_PC\_1d Generation by Season (GWh)

LADCO_PC_1d Generation	Winter			Summer		
	2009	2012	2018	2009	2012	2018
<b>CAIR Affected States</b>						
Alabama	89,974	97,602	108,952	74,411	79,893	90,807
District of Columbia	36	213	1,047	35	161	783
Florida	109,541	122,564	145,878	98,609	107,466	120,765
Georgia	91,819	92,448	120,537	74,820	79,028	94,996
Illinois	116,251	118,011	120,832	86,142	88,710	95,130
Indiana	80,429	82,140	85,751	61,154	63,044	66,417
Iowa	30,467	34,008	35,706	23,765	24,947	27,173
Kentucky	60,964	61,629	63,574	47,284	48,621	50,150
Louisiana	31,451	37,561	38,634	29,820	31,475	32,323
Maryland	30,638	33,075	43,474	22,954	24,853	32,787
Michigan	70,143	74,286	88,924	51,280	53,872	62,966
Minnesota	30,178	30,680	32,472	23,610	23,913	25,581
Mississippi	20,773	26,352	35,703	22,112	24,791	30,692
Missouri	53,046	53,828	55,548	41,878	44,403	46,230
New York	85,465	92,862	97,895	66,911	70,845	73,668
North Carolina	65,912	67,079	84,335	47,276	49,295	62,291
Ohio	99,800	101,105	109,213	75,548	78,430	82,330
Pennsylvania	136,193	142,697	139,259	98,853	103,899	104,401
South Carolina	63,112	68,534	77,058	49,582	51,724	61,573
Tennessee	55,591	56,355	56,958	43,165	44,282	44,962
Texas	185,451	198,278	207,646	183,564	199,810	220,819
Virginia	55,171	59,364	67,169	40,906	44,329	53,242
West Virginia	60,789	60,680	63,466	46,729	47,755	49,902
Wisconsin	37,885	38,986	43,111	28,743	29,923	33,232
Total	1,661,081	1,750,338	1,923,141	1,339,149	1,415,469	1,563,221
<b>Non CAIR States</b>						
Arizona	79,723	80,980	94,304	64,102	63,613	72,842
Arkansas	34,388	38,882	39,406	27,396	28,550	31,055
California	137,631	140,019	178,734	107,608	113,073	141,289
Colorado	28,609	29,019	29,569	18,546	20,536	23,308
Connecticut	22,737	21,031	22,514	14,869	14,816	16,070
Delaware	4,271	4,411	4,632	3,148	3,667	3,824
Idaho	7,424	7,967	8,012	5,557	5,924	5,956
Kansas	27,696	27,986	30,453	22,210	22,378	24,740
Maine	6,920	5,804	5,805	4,000	4,389	4,143
Massachusetts	36,561	38,330	40,449	27,318	28,577	29,436
Montana	15,717	16,631	16,659	12,609	13,281	13,301

LADCO_PC_1d Generation	Winter			Summer		
	2009	2012	2018	2009	2012	2018
Nebraska	18,035	18,040	17,849	15,341	15,341	15,360
Nevada	25,228	27,021	30,269	20,565	21,405	23,451
New Hampshire	13,773	13,713	15,302	10,242	10,150	11,460
New Jersey	36,661	38,425	37,914	27,796	29,748	30,922
New Mexico	16,634	16,673	19,935	13,686	13,706	16,138
North Dakota	15,689	16,154	16,156	12,387	12,476	12,846
Oklahoma	41,520	41,740	47,038	36,178	38,487	42,058
Oregon	37,891	43,525	43,762	27,598	31,541	31,711
Rhode Island	3,194	3,236	3,612	2,511	2,456	2,264
South Dakota	5,621	5,624	5,656	4,594	4,596	4,628
Utah	18,663	18,663	18,626	14,894	14,894	14,864
Vermont	3,394	3,422	3,667	2,229	2,226	2,303
Washington	65,659	79,688	80,163	46,291	56,334	56,677
Wyoming	24,780	24,783	24,738	19,665	19,677	19,640
Total	728,418	761,769	835,223	561,341	591,840	650,285
<b>National Total</b>	2,389,499	2,512,106	2,758,364	1,900,489	2,007,309	2,213,506

Table A6 State Level LADCO\_PC\_2a Generation by Season (GWh)

LADCO_PC_2a Generation	Winter			Summer		
	2009	2012	2018	2009	2012	2018
<b>CAIR Affected States</b>						
Alabama	89,315	97,274	110,033	74,337	79,893	90,430
District of Columbia	36	205	811	35	156	600
Florida	109,417	122,519	145,317	98,609	107,475	120,702
Georgia	91,819	91,554	120,362	74,807	79,190	94,746
Illinois	116,798	119,423	123,538	86,345	89,020	95,827
Indiana	81,042	82,231	86,140	61,018	64,336	66,268
Iowa	30,345	32,853	35,707	23,765	24,606	26,481
Kentucky	60,917	61,583	62,909	47,144	48,458	49,576
Louisiana	31,444	37,476	38,469	29,644	31,330	32,973
Maryland	30,603	32,989	40,606	23,054	24,725	30,478
Michigan	72,076	76,302	92,696	52,785	55,710	66,342
Minnesota	30,046	30,680	32,472	23,537	23,912	25,522
Mississippi	20,794	25,857	34,660	22,112	23,441	30,875
Missouri	53,026	53,768	55,399	41,772	44,292	46,038
New York	85,197	92,869	97,995	66,949	70,789	73,603
North Carolina	65,706	66,310	84,163	47,456	49,012	61,992
Ohio	101,717	102,781	110,280	78,508	79,389	82,514
Pennsylvania	135,291	142,407	138,297	98,064	103,312	105,069
South Carolina	62,815	67,491	76,899	49,582	52,053	61,023
Tennessee	55,537	56,321	56,930	42,911	44,140	44,747
Texas	184,164	198,273	206,606	183,443	199,822	220,776
Virginia	54,433	59,021	66,714	40,941	43,786	52,576
West Virginia	60,789	60,512	62,701	45,551	47,632	49,372
Wisconsin	38,692	39,655	43,130	28,919	30,344	33,789
Total	1,662,020	1,750,354	1,922,836	1,341,287	1,416,820	1,562,320
<b>Non CAIR States</b>						
Arizona	79,722	80,980	94,303	64,102	63,613	72,841
Arkansas	34,388	38,875	39,788	27,517	28,096	31,180
California	137,646	140,039	178,734	107,608	113,070	141,283
Colorado	28,586	29,020	29,569	18,540	20,349	23,308
Connecticut	22,739	21,089	22,578	14,874	14,862	16,104
Delaware	4,271	4,452	4,713	3,148	3,667	3,857
Idaho	7,424	7,973	8,012	5,557	5,928	5,956
Kansas	27,696	27,986	29,991	22,208	22,387	24,649
Maine	6,921	5,790	5,831	3,836	4,396	4,157
Massachusetts	36,889	38,284	40,364	27,441	28,491	29,405
Montana	15,717	16,634	16,658	12,609	13,284	13,301
Nebraska	18,035	18,040	17,849	15,341	15,341	15,293
Nevada	25,175	27,028	30,269	20,552	21,363	23,461
New Hampshire	13,759	13,732	15,350	10,243	10,165	11,486
New Jersey	35,818	38,485	38,275	25,974	29,704	31,104
New Mexico	16,634	16,671	19,932	13,686	13,704	16,124

LADCO_PC_2a Generation	Winter			Summer		
	2009	2012	2018	2009	2012	2018
North Dakota	15,689	16,154	16,156	12,142	12,476	12,476
Oklahoma	41,523	41,669	46,976	36,178	38,459	42,031
Oregon	37,891	43,554	43,761	27,598	31,561	31,711
Rhode Island	3,194	3,242	3,627	2,511	2,480	2,259
South Dakota	5,621	5,624	5,656	4,594	4,596	4,628
Utah	18,663	18,663	18,626	14,894	14,894	14,864
Vermont	3,394	3,426	3,676	2,231	2,227	2,308
Washington	65,659	79,742	80,162	46,291	56,374	56,676
Wyoming	24,776	24,783	24,742	19,662	19,669	19,635
Total	727,832	761,934	835,598	559,338	591,155	650,098
<b>National Total</b>	2,389,852	2,512,288	2,758,434	1,900,625	2,007,975	2,212,418

### 3. Cost Results

Tables A7, A8, A9 and A10 present the fixed operation and maintenance cost (FOM), variable operation and maintenance cost (VOM), fuel cost and the capital cost in LADCO\_PC\_1d and LADCO\_PC\_2a by state in 2009, 2012 and 2018 run years respectively.

**Table A7 State Level FOM Cost (Million 1999\$)**

FOM Cost by State	LADCO_PC_1d			LADCO_PC_2a		
	2009	2012	2018	2009	2012	2018
<b>CAIR Affected States</b>						
Alabama	989	1,013	1,073	990	1,013	1,078
District of Columbia	14	17	22	14	16	21
Florida	1,391	1,433	1,551	1,391	1,432	1,554
Georgia	860	862	1,037	860	881	1,083
Illinois	2,038	2,075	2,384	2,022	2,057	2,346
Indiana	718	747	772	705	750	781
Iowa	283	286	290	282	286	290
Kentucky	494	504	545	494	509	544
Louisiana	544	555	625	530	541	614
Maryland	448	511	601	452	509	585
Michigan	1,164	1,165	1,294	1,165	1,167	1,306
Minnesota	441	447	452	441	447	452
Mississippi	334	334	378	335	335	379
Missouri	449	458	503	449	458	505
New York	1,438	1,458	1,541	1,438	1,453	1,535
North Carolina	981	1,042	1,214	981	1,037	1,214
Ohio	1,097	1,108	1,163	1,108	1,123	1,174
Pennsylvania	1,965	2,021	2,207	1,984	2,021	2,206
South Carolina	935	953	1,121	935	949	1,120
Tennessee	659	735	754	663	735	754
Texas	2,061	2,197	2,430	2,061	2,197	2,444
Virginia	648	714	817	648	711	817
West Virginia	528	561	599	528	561	599
Wisconsin	532	551	593	519	536	590
Total	21,012	21,744	23,969	20,997	21,724	23,992
<b>Non CAIR States</b>						
Arizona	723	726	852	723	726	852
Arkansas	384	415	426	384	415	448
California	1,498	1,508	1,708	1,498	1,508	1,708
Colorado	203	206	209	203	206	209
Connecticut	439	442	481	439	442	479
Delaware	59	61	62	59	61	62
Idaho	48	51	51	48	51	51
Kansas	345	361	402	345	361	402
Maine	56	57	62	56	57	62
Massachusetts	419	428	447	419	428	444
Montana	142	144	147	142	144	147

FOM Cost by State	LADCO_PC_1d			LADCO_PC_2a		
	2009	2012	2018	2009	2012	2018
Nebraska	310	314	314	310	314	314
Nevada	191	194	209	191	194	208
New Hampshire	216	218	226	216	218	225
New Jersey	885	921	964	885	921	965
New Mexico	180	185	194	180	185	194
North Dakota	133	138	151	133	138	151
Oklahoma	320	338	366	320	338	364
Oregon	253	264	264	253	264	264
Rhode Island	32	32	35	32	32	34
South Dakota	45	45	45	45	45	45
Utah	162	162	178	162	162	178
Vermont	120	120	122	120	120	122
Washington	582	614	642	582	614	642
Wyoming	229	236	247	229	236	246
Total	7,974	8,179	8,804	7,974	8,180	8,817
<b>National Total</b>	<b>28,986</b>	<b>29,923</b>	<b>32,773</b>	<b>28,971</b>	<b>29,904</b>	<b>32,809</b>

**Table A8 State Level VOM Cost (Million 1999\$)**

VOM Cost by State	LADCO_PC_1d			LADCO_PC_2a		
	2009	2012	2018	2009	2012	2018
<b>CAIR Affected States</b>						
Alabama	255	275	337	260	280	346
District of Columbia	0	1	5	0	1	3
Florida	362	401	480	362	400	488
Georgia	249	257	400	249	288	433
Illinois	339	379	433	319	366	400
Indiana	454	472	492	420	445	482
Iowa	93	101	108	94	99	107
Kentucky	291	294	338	292	304	340
Louisiana	83	91	108	83	91	111
Maryland	105	137	195	108	137	175
Michigan	300	305	396	273	279	415
Minnesota	105	105	108	104	105	108
Mississippi	62	72	102	69	77	102
Missouri	167	171	180	167	171	180
New York	169	189	223	170	190	223
North Carolina	238	244	346	238	239	337
Ohio	551	557	578	559	564	583
Pennsylvania	416	506	543	452	508	541
South Carolina	179	192	280	179	189	272
Tennessee	176	189	192	185	190	193
Texas	625	681	763	623	681	780
Virginia	135	161	240	135	157	231
West Virginia	330	376	413	328	375	411
Wisconsin	145	160	180	138	154	183
<b>Total</b>	<b>5,830</b>	<b>6,317</b>	<b>7,440</b>	<b>5,806</b>	<b>6,291</b>	<b>7,445</b>
<b>Non CAIR States</b>						
Arizona	202	206	243	202	206	243
Arkansas	72	78	82	72	77	94
California	558	535	645	558	535	645
Colorado	97	101	104	97	100	104
Connecticut	50	47	55	50	48	53
Delaware	19	20	21	19	20	21
Idaho	4	7	7	4	7	7
Kansas	105	106	114	105	106	113
Maine	16	14	12	15	14	11
Massachusetts	92	95	108	92	95	103
Montana	49	51	51	49	51	51
Nebraska	48	48	48	48	48	47
Nevada	94	100	112	93	100	112
New Hampshire	30	29	35	30	29	33
New Jersey	98	108	111	96	108	112

VOM Cost by State	LADCO_PC_1d			LADCO_PC_2a		
	2009	2012	2018	2009	2012	2018
New Mexico	87	87	99	87	87	99
North Dakota	65	66	70	65	66	70
Oklahoma	114	121	138	114	121	138
Oregon	30	49	49	30	49	49
Rhode Island	5	5	7	5	5	6
South Dakota	5	5	6	5	5	6
Utah	88	88	91	88	88	91
Vermont	6	6	7	6	6	6
Washington	56	98	99	56	98	99
Wyoming	117	117	123	117	117	122
Total	2,106	2,186	2,435	2,104	2,185	2,437
<b>National Total</b>	<b>7,936</b>	<b>8,503</b>	<b>9,876</b>	<b>7,910</b>	<b>8,476</b>	<b>9,882</b>

**Table A9 State Level Fuel Cost (Million 1999\$)**

Fuel Cost by State	LADCO_PC_1d			LADCO_PC_2a		
	2009	2012	2018	2009	2012	2018
<b>CAIR Affected States</b>						
Alabama	2,046	2,341	2,725	2,022	2,332	2,758
District of Columbia	0	4	29	0	4	26
Florida	3,995	4,422	5,134	3,975	4,428	5,119
Georgia	2,359	2,440	3,319	2,373	2,385	3,317
Illinois	1,693	1,746	1,845	1,699	1,740	1,878
Indiana	1,515	1,562	1,704	1,454	1,504	1,588
Iowa	587	671	722	585	641	712
Kentucky	1,044	1,063	1,051	1,041	1,045	1,027
Louisiana	839	1,029	1,035	831	1,021	1,030
Maryland	546	579	854	554	572	826
Michigan	1,345	1,427	1,640	1,366	1,456	1,668
Minnesota	468	460	469	462	458	468
Mississippi	641	850	1,195	641	798	1,168
Missouri	933	996	1,001	928	991	1,006
New York	2,050	2,132	2,257	2,032	2,132	2,272
North Carolina	1,213	1,223	1,499	1,213	1,229	1,521
Ohio	1,892	1,965	2,203	1,926	1,954	2,127
Pennsylvania	2,346	2,618	2,364	2,322	2,596	2,374
South Carolina	1,166	1,303	1,358	1,150	1,288	1,377
Tennessee	859	848	832	843	839	823
Texas	7,202	7,372	7,848	7,134	7,374	7,708
Virginia	1,270	1,350	1,365	1,234	1,357	1,361
West Virginia	1,064	1,012	1,024	1,065	1,008	1,007
Wisconsin	655	691	781	645	692	727
<b>Total</b>	<b>37,729</b>	<b>40,105</b>	<b>44,254</b>	<b>37,496</b>	<b>39,843</b>	<b>43,888</b>
<b>Non CAIR States</b>						
Arizona	2,239	2,195	2,670	2,229	2,190	2,670
Arkansas	868	993	1,039	869	981	1,040
California	4,873	3,951	5,652	4,848	3,950	5,652
Colorado	508	553	616	506	547	619
Connecticut	545	468	498	543	470	515
Delaware	126	142	143	127	142	146
Idaho	127	114	115	126	114	115
Kansas	425	433	511	424	433	504
Maine	257	223	186	250	222	193
Massachusetts	1,374	1,415	1,412	1,380	1,409	1,437
Montana	105	137	132	107	137	131
Nebraska	259	252	240	259	252	237
Nevada	749	794	877	744	792	878
New Hampshire	214	202	221	213	202	234
New Jersey	831	914	918	743	913	936

Fuel Cost by State	LADCO_PC_1d			LADCO_PC_2a		
	2009	2012	2018	2009	2012	2018
New Mexico	405	378	527	405	377	527
North Dakota	221	220	234	218	220	230
Oklahoma	1,335	1,389	1,515	1,329	1,387	1,520
Oregon	633	751	756	629	752	757
Rhode Island	175	168	161	174	169	165
South Dakota	36	35	36	36	35	35
Utah	223	215	192	223	210	193
Vermont	22	21	28	22	21	30
Washington	525	954	963	523	955	963
Wyoming	298	294	276	298	290	276
Total	17,373	17,212	19,920	17,225	17,172	20,003
<b>National Total</b>	<b>55,101</b>	<b>57,317</b>	<b>64,173</b>	<b>54,721</b>	<b>57,015</b>	<b>63,891</b>

**Table A10 State Level Capital Cost (Million 1999\$)**

Capital Cost by State	LADCO_PC_1d			LADCO_PC_2a		
	2009	2012	2018	2009	2012	2018
<b>CAIR Affected States</b>						
Alabama	24	29	317	40	45	343
District of Columbia	2	13	47	2	12	37
Florida	51	273	789	51	262	802
Georgia	0	6	513	0	49	612
Illinois	155	225	509	98	167	396
Indiana	359	391	512	242	306	465
Iowa	0	0	2	2	2	2
Kentucky	0	1	145	3	22	141
Louisiana	0	4	70	0	4	92
Maryland	76	275	732	86	269	617
Michigan	247	249	867	179	186	885
Minnesota	84	84	84	84	84	84
Mississippi	0	0	93	18	19	101
Missouri	13	13	87	13	13	92
New York	119	360	677	121	358	682
North Carolina	267	347	936	267	319	920
Ohio	400	462	606	388	463	591
Pennsylvania	12	146	354	76	154	347
South Carolina	12	58	585	14	36	570
Tennessee	13	27	34	28	32	37
Texas	99	871	1,721	100	871	1,811
Virginia	2	97	586	6	75	570
West Virginia	2	94	254	2	92	244
Wisconsin	71	114	272	36	78	297
<b>Total</b>	<b>2,008</b>	<b>4,140</b>	<b>10,791</b>	<b>1,857</b>	<b>3,916</b>	<b>10,737</b>
<b>Non CAIR States</b>						
Arizona	0	0	198	0	0	198
Arkansas	0	2	21	0	2	52
California	26	750	1,349	26	750	1,349
Colorado	0	0	0	0	0	0
Connecticut	87	102	179	87	105	167
Delaware	10	10	18	10	10	19
Idaho	0	25	25	0	25	25
Kansas	0	0	62	0	0	59
Maine	32	39	71	32	40	66
Massachusetts	197	247	397	197	249	371
Montana	0	14	15	0	14	15
Nebraska	0	0	0	0	0	0
Nevada	0	0	49	0	0	49
New Hampshire	71	83	141	71	85	132
New Jersey	6	24	76	6	24	82

Capital Cost by State	LADCO_PC_1d			LADCO_PC_2a		
	2009	2012	2018	2009	2012	2018
New Mexico	0	1	51	0	1	51
North Dakota	0	0	8	0	0	8
Oklahoma	0	16	177	0	15	167
Oregon	0	139	143	0	139	143
Rhode Island	18	22	39	18	22	36
South Dakota	0	0	0	0	0	0
Utah	0	0	10	0	0	10
Vermont	11	13	24	11	14	23
Washington	0	263	271	0	264	271
Wyoming	0	0	25	0	0	24
Total	459	1,750	3,349	459	1,758	3,317
<b>National Total</b>	<b>2,467</b>	<b>5,890</b>	<b>14,140</b>	<b>2,316</b>	<b>5,674</b>	<b>14,053</b>