



Economic Impact Analysis Virginia Department of Planning and Budget

9 VAC 5-140 – Regulation for Emissions Trading Department of Environmental Quality March 13, 2006

Summary of the Proposed Regulation

The State Air Pollution Control Board (board) proposes to add three new parts to the Regulation for Emissions Trading (9VAC5-140), as per request of the federal Clean Air Interstate Rule (CAIR). Major changes include:

1. A new nitrogen oxides (NO_x) Annual Trading program (Part II) will be established.
2. A NO_x Ozone Season Trading program (Part III) will replace the current NO_x Budget Trading Program (SIP Call).¹
3. A Sulfur dioxide (SO₂) Annual Trading Program (Part IV) will replace the current federal-administered Acid Rain Program.

Results of Analysis

There is insufficient data to accurately compare the magnitude of the benefits versus the costs. Detailed analysis of the benefits and costs can be found in the next section.

Estimated Economic Impact

The Acid Rain Program and the NO_x Budget Trading Program (SIP Call) are two well-known market-based regulatory programs designed by U.S. Environmental Protection Agency (EPA) to improve air quality. The Acid Rain Program was established under Title IV of the 1990 Clean Air Act Amendments to reduce acid rain and improve public health by dramatically reducing emissions of SO₂ and NO_x.² Using a market-based cap and trade approach, the

¹ SIP: State Implementation Plan. A SIP delineates a state's strategies for compliance with the National Ambient Air Quality Standards (NAAQS).

² Acid rain occurs when emissions of SO₂ and NO_x react in the atmosphere (with water; oxygen, and oxidants) to form various acidic compounds.

program sets a permanent cap on the total amount of SO₂ that may be emitted by electric power plants nationwide. The cap is set at about one half of the amount of SO₂ emitted in 1980, and the trading component allows flexibility for sources to select the method of compliance. The program also sets NO_x emission rate limitations for coal-fired units with some compliance flexibility, representing about a 27 percent reduction from 1990 levels. The Acid Rain Program is fully administered by EPA.

In October 1998, EPA finalized the “Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone” (commonly called the NO_x SIP call), which requires ozone season³ NO_x reductions across 22 states including the District of Columbia that were found by EPA to significantly contribute to another state’s inability to achieve the one-hour ozone standards. Affected states under the NO_x SIP call, including the State of Virginia, were required to submit revised State Implementation Plans (SIPs), begin monitoring emissions in 2003, and reduce emissions beginning in the 2004 ozone season. For states opting to meet the obligations of the NO_x SIP call through a cap and trade program, EPA included a model NO_x Budget Trading Program rule. States choosing to participate in the NO_x Budget Trading Program have the flexibility to modify certain provisions within the model rule. Accordingly, the board promulgated Regulations for Emission Trading (9VAC 5-140), which became effective on July 17, 2002. The NO_x Budget Trading Program has significantly reduced the NO_x emissions in the affected states. According to EPA, by the year of 2007, the completion date of phase II, the NO_x SIP Call will reduce NO_x emissions by approximately 1 million tons per year. And the NO_x reduction for Virginia is projected by EPA to be approximately 45,000 tons per year.

The success of the Acid Rain Program and the NO_x Budget Trading Program affirms the use of cap and trade as an effective means of controlling multiple pollutants over broad regions. On May 12, 2005,⁴ EPA issued the final rule, “Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule); Revisions to Acid Rain Program; Revisions to NO_x SIP call”, a rule that will achieve the largest reduction in air pollution in more than a decade. The Clean Air Interstate Rule (CAIR) requires the 28 States, including the District of Columbia, to revise their State Implementation Plans to include control measures to reduce

³ Ozone season is from May 1st through September 30th.

⁴ The Clean Air Interstate Rule was issued on March 15, 2005.

emissions of NO_x and/or SO₂ that significantly contribute to unhealthy levels of Fine Particulate Matter (PM_{2.5}) or 8-hour ozone in downwind states. CAIR will permanently cap emissions of sulfur dioxide (SO₂) and nitrogen oxides (NO_x), and achieves large reductions of SO₂ and/or NO_x emissions in the eastern United States. According to EPA, when fully implemented, CAIR will reduce SO₂ emissions in these states by over 70 percent and NO_x emissions by over 60 percent from 2003 levels. This will result in 85 to 100 billion dollars in health benefits and nearly \$2 billion in visibility benefits per year by 2015 and will substantially reduce premature mortality in the eastern United States.⁵ The benefits will continue to grow each year with further implementation.

In order to fulfill the CAIR requirements and to reduce SO_x and NO_x emissions so as to eliminate their contribution to nonattainment or interference with maintenance of the National Ambient Air Quality Standards in downwind states and to protect Virginia's air quality and its natural resources, the board proposes to add three new parts (II, III and IV)⁶ to the existing Regulation for Emissions Trading (9VAC5-140), addressing the permitting, allowance methodology, monitoring, banking, compliance determination, and opt-in provisions, for a new NO_x Annual Trading program (part II), a NO_x Ozone Season Trading program (part III) that will replace the current NO_x Budget Trading Program (SIP Call), and a SO₂ Annual Trading Program (part IV) that will replace the current Acid Rain Program.

1. CAIR Annual SO₂ Program

The CAIR annual SO₂ program is designed to replace the current Acid Rain Program and is similar with the latter except for the reduction of SO₂ budget. Like the Acid Rain Program, electric generating units (EGUs)⁷ with a nameplate capacity greater than 25MWe will be allocated from the budget a specific limited number of allowances (measured in tons per year) during the period from January 1 to December 31 (control period).⁸ If a unit does not use all of its allowances for a specific control period, those extra tons may be banked for future use or sold. If a unit exceeds the allocated allowances, additional allowances may be purchased or the source

⁵ Source: <http://www.epa.gov/cair/index.html>

⁶ The current regulation will become part I of 9VAC5-140.

⁷ An EGU is a fossil fuel-fired stationary boiler or combustion turbine serving at any time a generator with nameplate capacity of more than 25 MWe producing electricity for sale.

⁸ Smaller sources within the affected source categories are allowed to opt-in to the program.

may use banked allowances to offset the amount of SO₂ generated above the allocated allowances. The SO₂ budget allocations will be carried over from the Acid Rain Program, however, the value of SO₂ allowance will be reduced overtime, which results in a reduction of the budget by 40-50% under the CAIR annual SO₂ program.⁹ According to the Department of Environment Quality (DEQ), the projected SO₂ emission in 2010 (the first year of phase I of CAIR SO₂ program) under the Acid Rain Program is 136,000 tons. However, the SO₂ CAIR annual budget is only 63,478 tons, which requires either emission reductions or allowance purchases or both of more than 70,000 tons for the year of 2010. DEQ has provided that approximately 10 units will install additional SO₂ emissions control equipment between now and 2015. The estimated annualized costs of installation, operation and maintenance vary from \$10,043,817 to \$33,272,775 (in 1998 dollars), with the total cost statewide being \$166,029,581 (in 1998 dollars) annually. Based on the known equipment retrofits that have taken place or will take place between now and 2015, Virginia firms will still need to buy SO₂ allowance from out of state to meet the various caps, with 36,607 tons of allowance needed in 2010 and 45,178 tons in 2015. Supposing that the average market price of SO₂ allowance remains \$200 per ton,¹⁰ the estimated total cost for allowance purchases will be \$7,300,000 in 2010 and \$9,000,000 in 2015. Therefore, as shown in Table 1, the proposed change for the SO₂ program will cause an annual cost of \$166,029,581 between now and 2009, \$173,329,581 between 2010 and 2014, and \$9,000,000 in 2015 and thereafter.

2. CAIR seasonal NO_x program

Similar to the current NO_x Budget Trading Program (SIP Call), under the CAIR seasonal NO_x program, EGUs with a nameplate capacity greater than 25 MWe and non-electric generating units (non-EGUs)¹¹ above 250 mmBtu¹² will be allocated from the budget a specific limited number of NO_x allowances (measured in tons per season) during the period from May 1

⁹ According to DEQ, the Acid Rain Budget cannot be changed since it is in the Federal Clean Air Act. Therefore, EPA will reduce the value of the SO₂ allowance in CAIR, which means that one SO₂ allowance will give the holder a conditional right to emit less than one ton of emission.

¹⁰ \$200 is the estimate of current market price provided by DEQ.

¹¹ A on-EGU is a fossil fuel-fired stationary boiler or combustion turbine that (i) at no time serves a generator producing electricity for sale under firm contract to the grid or (ii) at any time serves a generator producing electricity for sale under firm contract to the grid, if any such generator has a nameplate capacity of 25 MWe or less and has the potential to use no more than 50% of the potential electrical output capacity of the unit.

¹² Small units within the affected source categories are allowed to op-in the program.

through September 30 (control period)¹³. If a unit does not use all of its allowances for a specific control period, those extra tons may be banked for future use or sold. If a unit exceeds the allocated allowances, additional allowances may be purchased or the source may use banked allowances to offset the amount of NOx generated above the allocated allowances.

Compared with the current NOx Budget Trading Program (SIP Call), the CAIR seasonal NOx program will significantly reduce the budget for EGUs, especially in phase II (2015 and thereafter). For example, Virginia CAIR NOx ozone season budgets for EGUs are 15,994 tons in 2009 through 2014 which requires 1,097 tons reduction from the 17,091 SIP Call 2007 budget.¹⁴ The second phase requires an additional reduction of 2,666 tons to meet the 13,328 budget. These budget reductions will require either emission reductions or allowance purchases or both to comply. The non-EGUs will not be affected since no NOx reductions will be required beyond what the sources are doing under the NOx SIP Call.

Unlike the NOx Budget Trading Program, the CAIR seasonal NOx Program restricts compliance within the nonattainment areas to only allowances allocated to a facility. A facility in a nonattainment area may not trade to comply with the regulation under the CAIR program. This provision will avoid localized high NOx emissions, and will push the sources in the nonattainment areas to take emission control measures. The CAIR seasonal NOx Program also allows for a 36 ton/season energy efficiency and renewable energy set-aside, which is not available in the current NOx budget program. Moreover, a Virginia public health set-aside account will be established under the CAIR NOx Program which allows industries to voluntarily contribute and retire allowances for the betterment of air quality.

3. CAIR annual NOx program

The CAIR annual NOx program is new and is designed to ensure that NOx control at the sources is operated year-round instead of just during the ozone season (May through September). The rationale is that NOx is a precursor to particulate matter as well as ozone, and particulate matter is problematic in time periods other than the summer months.

¹³Ground-level ozone is created by chemical reactions between NOx and volatile organic compounds (VOC) in the presence of sunlight. Ozone pollution is the worst during the summer months.

¹⁴The year of 2007 is the completion date of Phase II of NOx SIP Call.

The CAIR annual NO_x program applies to EGUs only. EGUs with a nameplate capacity greater than 25 MWe will be allocated from the budget a specific limited number of allowance (measured in tons per year) during the period of January 1 through December 31 (control period). The NO_x annual budgets are 36,074 tons for each control period in 2009 through 2014, and 30,062 tons for each control period in 2015 and thereafter. According to DEQ, the 2005 NO_x annual emissions is 54,993 tons, which is 18,919 tons higher than the 2009 CAIR NO_x annual budget and 24,931 tons higher than the 2015 budget. The CAIR annual NO_x program will require either emission reductions or allowance purchases or both of 18,919 tons by 2009 and 6,012 tons more by 2015.

The CAIR annual NO_x program and CAIR ozone season NO_x program will impose significant costs to the affected EGUs. DEQ has estimated that approximately 10 EGUs will install additional NO_x emissions control equipment between now and 2015. The estimated annualized costs of equipment installation, operation and maintenance will vary from \$75,685 to \$6,228,271 (in 1998 dollars), with the total annualized cost being \$17,537,027 statewide (in 1998 dollars). Based on the known equipment retrofits that have taken place or will take place between now and 2015, Virginia firms will still need to buy NO_x allowances from out of state to meet the various caps, with 1,933 tons of ozone season allowances and 18,919 tons of annual allowances needed per season/year between 2009 and 2014, and 4,599 tons of ozone season allowances and 24,931 tons of annual allowances per season/year in 2015 and thereafter. Supposing that the average market price of NO_x allowance remains \$1,500 per ton,¹⁵ the estimated total cost for seasonal allowance purchases will be \$2,900,000 per season between 2009 and 2014 and \$6,900,000 in 2015 and thereafter. The estimated total cost for annual allowance purchases will be 28,400,000 per year between 2009 and 2014, and \$37,400,000 in 2015 and thereafter.¹⁶ The proposed CAIR NO_x annual and ozone season programs will cause an annual cost of approximately \$17,537,027 between now and 2008, \$48,837,027 between 2009 and 2014, and \$44,300,000 in 2015 and thereafter.

¹⁵ Source: DEQ

¹⁶ Source: DEQ. The number of allowances needed in 2009 and 2015 are calculated based on the actual NO_x annual and ozone season emissions in 2005. Since the NO_x SIP Call budget is further reduced in phase II (2007), the costs from allowance purchases under CAIR are overestimated.

Table 1 provides the summary of the costs of the Clean Air Interstate Rule. The estimated annual cost from the three CAIR programs will be 183,566,608 between now and 2008, 214,866,608 in 2009, 222,166,608 between 2010 and 2014, and 53,300,900 in 2015 and thereafter. The increase in costs will reduce profits for the affected units. However, part of the increased costs may be passed on to consumers in the form of increased rate of electricity.

On the other hand, reductions of NO_x and/or SO₂ emissions will have significant benefits on public health and the environment. CAIR is expected to yield significant health benefits by reducing the emissions of two key contributors to particulate matter and ozone formation. SO₂ contributes to the formation of particulate matter, and NO_x contributes to the formation of both particulate matter and ground-level ozone. EPA has estimated that CAIR would yield health benefits in 2015 of \$101 billion (based on a 3% discount rate) and \$86.3 billion (based on a 7% discount rate) nationally that include the value of avoiding approximately 17,000 premature deaths, 22,000 nonfatal heart attacks, 12,300 hospitalizations for respiratory and cardiovascular diseases.¹⁷ CAIR will also result in environmental and societal benefits, such as reductions in damage to ecosystems, improved visibility and improvements in recreational and commercial fishing, agricultural yields, and forest productivity, though some of these benefits can not be monetized. The benefits for the State of Virginia from the CAIR emission reductions are not available by EPA or DEQ.

In sum, CAIR will result in estimated annualized costs to Virginia of 38,600,000 in 2010, and 53,300,900 in 2015. Emission reductions of NO_x and SO₂ will have significant benefits on public health and the environment. Since the benefits for the State of Virginia from the CAIR emission reductions are not available by EPA or DEQ, whether the total benefit exceeds the total cost will not be known without substantial further research.¹⁸

¹⁷ Source: EPA "Regulatory Impact Analysis for the Final Clean Air Interstate Rule"

¹⁸ EPA has estimated that nationally the Clean Air Interstate Rule will result in an estimated annual net benefit of \$71.4 billion in 2010 and \$98.5 billion in 2015 (based on a 3% discount rate), or \$60.4 billion in 2010 and \$83.2 billion in 2015 (based on a 7% discount rate).¹⁸

Table 1. Estimated Annual Costs of the Clean Air Interstate Rule (1998 dollars)

	Annualized Equipment Cost (now through 2008)	Annualized Cost (2009)			Annualized Cost (2010-2014)			Allowance purchase costs (2015 and thereafter)
		Total Annualized Cost	Annualized equipment cost	Allowance purchase costs	Total Annualized Cost	Annualized equipment cost	Allowance purchase costs	
SO ₂ Annual Program ^a	166,029,581	166,029,581	166,029,581	--	173,329,581	166,029,581	7,300,000	9,000,000
NO _x Ozone Season Program ^b				2,900,000			2,900,000	6,900,900
NO _x Annual Program ^c	17,537,027	48,837,027	17,537,027	28,400,000	48,837,027	17,537,027	28,400,000	37,400,000
Total Costs for CAIR	183,566,608	214,866,608	183,566,608	31,300,000	222,166,608	183,566,608	38,600,000	53,300,900

Source: DEQ

^a The allowance needed is calculated based on the projected SO₂ emissions in 2010 and 2015.

^b The allowance needed is calculated based on the 2005 NO_x ozone season emissions.

^c The allowance needed is calculated based on the 2005 NO_x annual emissions.

Businesses and Entities Affected

According to DEQ, there are approximately 64 EGUs that will be affected by the CAIR NO_x annual and ozone season programs, and approximately 10 units that will be affected by the SO₂ annual program. These units will have to either install additional emission control equipment or purchase allowances from the open market, or both. On the other hand, firms providing pollution control equipment will be positively affected by the proposed regulation. Business in recreational and commercial fishing, agriculture and forest may benefit from the improved environment due to emission reductions of NO_x and/or SO₂. And citizens of the Commonwealth of Virginia will benefit from reduced exposure to pollutants that are known to cause chronic bronchitis, asthma, hospitalizations for cardiac and respiratory diseases, and premature death.

Localities Particularly Affected

The proposed regulation applies to localities throughout the Commonwealth. Facilities in the two ozone non-attainment areas (Fredericksburg Ozone Nonattainment Area and Northern Virginia Ozone Nonattainment Area) may not trade allowances to comply.

Projected Impact on Employment

The increased cost from emission reductions will reduce profits for the utilities and will likely reduce the number of people employed. On the other hand, the proposed regulation will likely have a positive effect on employment in industries providing pollution control equipment, as well as industries such as recreational and commercial fishing, agriculture and forest. Also, average working hours and worker productivity may increase as a result of improved health conditions.

Effects on the Use and Value of Private Property

The proposed regulation will cause increased costs for the utility companies, which may reduce their profits and therefore the asset value of these businesses. Firms that provide pollution control equipment as well as those in industries such as recreational and commercial fishing, agriculture and forest will benefit from an improved environment and may experience increases in their profits and property values. In addition, improvements in the air quality may

have a positive impact on the value of the residential properties in Virginia compared to states that are not under the CAIR program.

Small Businesses: Costs and Other Effects

According to DEQ, no small businesses will be adversely affected by the proposed regulation.

Small Businesses: Alternative Method that Minimizes Adverse Impact

The proposed regulation will not have any adverse impact on small businesses.

Legal Mandate

The Department of Planning and Budget (DPB) has analyzed the economic impact of this proposed regulation in accordance with Section 2.2-4007.H of the Administrative Process Act and Executive Order Number 21 (02). Section 2.2-4007.H requires that such economic impact analyses include, but need not be limited to, the projected number of businesses or other entities to whom the regulation would apply, the identity of any localities and types of businesses or other entities particularly affected, the projected number of persons and employment positions to be affected, the projected costs to affected businesses or entities to implement or comply with the regulation, and the impact on the use and value of private property. Further, if the proposed regulation has adverse effect on small businesses, Section 2.2-4007.H requires that such economic impact analyses include (i) an identification and estimate of the number of small businesses subject to the regulation; (ii) the projected reporting, recordkeeping, and other administrative costs required for small businesses to comply with the regulation, including the type of professional skills necessary for preparing required reports and other documents; (iii) a statement of the probable effect of the regulation on affected small businesses; and (iv) a description of any less intrusive or less costly alternative methods of achieving the purpose of the regulation. The analysis presented above represents DPB's best estimate of these economic impacts.