Title IV of the 1990 Clean Air Act:

Analysis and Recommendations for the Acid Rain Program

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Beginning in 1970, the evolution and subsequent implementation of the Clean Air Act (CAA) has been objectively one of the most successful environmental policies in the legislative history of the United States. The first installment of the act was followed by further amendments in 1977 and 1990. The 1990 amendments included "Title IV," the provision that created the Acid Rain Program (ARP). In this essay, we argue that the passing of the 1990 CAA is due to the causal narrative that inherently comes from cleaning the air as well as the successes of previous iterations of the act. In particular, reports detailing the United States' addiction to emissions in the 80s helped bring the dangers of dirty air back into the public consciousness, leading to the 1990 CAA as explained by Baumgartner and Jones.[1] In totality, the ensuing success of the ARP shows how important narrative is when it comes to crafting successful energy policy legislation. Improving upon Title IV is possible and we suggest that increasing SO_2 cap regulation as well as working towards bringing the framework of the ARP internationally are ways in which it can be done.

Legislative History of the 1990 Clean Air ARP

To begin, the outlook for the survival of the CAA during the 1980s under President Reagan was particularly dim. Under Reagan, the CAA was seen as a cost on the taxpayers and the National Commision on Air Quality stated that it could be dramatically weakened.[2] After industry began to demand new amendments be added to the CAA to scrap the health laws, the

[1] Baumgartner, Frank R., Bryan D. Jones, and Peter B. Mortensen. "Punctuated-Equilibrium Theory: Explaining Stability and Change in Public Policymaking." *Theories of the Policy Process,* 2018.
[2] Waxman, Henry A. "AN OVERVIEW OF THE CLEAN AIR ACT AMENDMENTS OF 1990." *Environmental Law* 21, no. 4 (1991): 1721.

Reagan Administration began to craft new ways in which the CAA could be amended. This was, however, not without warning as Chairman of the Senate Committee on Environment and Public Works Senator Robert Stafford (R-VT), made clear: “"If the White House or industry groups make unreasonable demands for change we will have a contentious and lengthy period of legislating.”[3] However, despite the warning, industry pressure proved to be too much. It culminated in the Administration’s reauthorization draft, which “made enforcement lawsuits optional, entirely eliminated the PSD program, doubled tailpipe standards, eliminated motor vehicle emission control durability requirements, and deleted the law's secondary standards designed to protect agriculture and general welfare.”[4] This would be considered the first shot fired in a legislative battle that would last throughout the next decade

Over the next decade, a number of acid rain control proposals were passed out of committee by the 97th, 98th, and 100th Congresses. However, as noted by Representative Henry A. Waxman (D-CA), they were not considered on the floor due to both “the strong opposition of Senate Majority Leader Robert Byrd [(D-WV)]” and the feeling that “Senators felt that floor action was premature until legislation was approved by the House Energy and Commerce Committee.”[5] In the House, legislation drafted by Representatives Sikorski (R-MN) and Conte (R-MA) were stifled by the millions spent by the utility and coal industries in order to block bills, despite approval by a sixteen to nine vote in the health sub-committee.

It was not until the Subcommittee on Health and the Environment conducted the first nationwide survey of emissions in 1985 did the seriousness of America’s emissions problem become apparent. It found that total emissions exceeded eighty million pounds, despite the

[3] Ibid, 1723
[4] Ibid, 1724
[5] Ibid, 1725

information being incomplete due to companies not being legally required to submit data. This changed, however, in 1987, when Congress adopted a provision to legally require these companies to submit emissions data. The Toxic Release Inventory (TRI) report found that, in 1987, 2.7 billions of toxic air pollutants were released into the air in 1987.[6] These findings, along with the tragic Bhopal accident in India in 1984, brought American attention to the dangers of toxic air pollutants.

The TRI report was thought to be the catalyst that would lead to new CAA amendments but this was not the case. Ensuing political infighting in Congress led Reagan to delay attainment deadlines until December 31st, 1989, ensuring that the next President would have to deal with the CAA. This, coupled with the announcement that Senator Byrd would not seek to be Senate Majority Leader, sparked fresh hope that legislation could be enacted in the new decade.[7] Furthermore, as Representative Waxman explains, the narrative around the clean air debate had changed, "shift[ing] from radical proposals to eliminate health standards and roll back automotive controls, to a series of bills that would toughen all parts of the law."[8]

This change also helps to explain how the causal narrative of the 1990 CAA was based on policy perceptions: "by the late 1980s, there was growing concern that acid rain was damaging aquatic ecosystems, forests, and buildings in the northeastern United States and southeastern Canada."[9] Add to this the concerning TRI reports and the Bhopal accident, and it is clear, according to Punctuated Equilibrium theory, that these events disrupted the status quo surrounding acid rain policy. Once the policy equilibrium was distorted, advocates in both the

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[6] Ibid, 1726
[7] Ibid, 1727
[8] Ibid, 1728
[9] Chan, Stavins, Stowe, Sweeney. "The SO2 Allowance-Trading System and the Clean Air act Amendments of 1990: Reflections on 20 Years of Policy Innovation." *National Tax Journal*, 421

House and the Senate of the 101st Congress were able to push through with the CAA. Legislators were surprised at how quickly the bill passed through the House floor in only two days as well as how strong in scope and regulation the bill was compared to attempted iterations of the bill.[10] According to Waxman, there was no individual factor that lead to the passing of the CAA: "A decade worth of effort, a change in presidential and congressional leadership, broad congressional support, persistent press coverage, and renewed public interest all played essential roles."[11] The resulting law was one that was not only more powerful than either the House or Senate could have imagined, but carried behind it the support of both political parties as well as U.S. industry. However, most importantly, the content of Title IV created permanent change in how energy policy was conducted as well as lead to the direct, unquestionable improvement in American lives.

Description Section

Title IV of the CAA, as noted by Schmalensee and Stavins, would have been thought of as impossible in the 1980s for one reason: cap-and-trade policy.[12] Prior to the ARP, the environmental policy of the 1980s was primarily command-and-control based, with the government "either specifying the type of pollution-control equipment to be installed or...setting uniform limits on emission levels or rates."[13] However, economists believed that cap-and-trade would overall greatly reduce the cost of regulation and, thus, was inserted in as the core policy

[10] Ibid, 1728
[11] Ibid, 1733
[12] Schmalensee, Richard, and Robert N. Stavins. 2015. "Lessons Learned From Three Decades Of Experience With Cap-And-Trade". *SSRN Electronic Journal*, 2.
[13] Ibid

component of the ARP.[14] As stipulated by Title IV, two phases of regulation were created with the goal of "reducing annual SO_2 emissions below 1980 levels, as well as 2 million ton reduction in NOx emission by the year 2000."[15] Phase I (from 1995 to 1999) required substantial reductions in emissions "from the 263 most polluting coal-fired electric generating units."[16] Phase II began in 2000 and placed "an aggregate national emissions cap of 8.95 million tons per year on approximately 3,200 electric generating units," which was almost the entirety of all fossil fueled plants in the contiguous United States.[17]

In the cap-and-trade model, the government created "allowances," permits to emit, that plants could trade with each other in order to "reduce SO_2 emissions at the lowest cost." The government based these allowance allotments off of the fuel use between the years 1985 and 1987.[18] By permitting these allowances, it made it possible for facilities to find ways to reduce their SO_2 emissions at the lowest cost rather than making compliance immediate and nearly impossible to achieve like it is under command-and-control policies**.** The system was also designed to incentivize plants to reduce emissions without trading, "whether by installing pollution controls, changing the mix of fuels used to operate the facility, or scaling back operations."[19] If plants were able to find alternative ways of becoming more efficient without trading allowances, they could save the allowances for the future or sell them to polluting

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[14] Chan, Gabriel, Robert N. Stavins, Robert Stowe, and Richard Sweeney. 2012. "The So2 Allowance Trading System And The Clean Air Act Amendments Of 1990: Reflections On Twenty Years Of Policy Innovation". *SSRN Electronic Journal*, 424

[15] Martella, R. 2010. "Market-Based Regulation Under The Clean Air Act". *Carbon & Climate Law Review* 4 (2): 140

[16] Chan, Stavins, Stowe, Sweeney. "The SO2 Allowance-Trading System and the Clean Air act Amendments of 1990: Reflections on 20 Years of Policy Innovation." *National Tax Journal.* Page 422.

[17] Ibid, 422; "Lessons Learned," 2

[18] Richard Schmalensee and Robert Stavins, "Lessons Learned from Three Decades of Experience with Cap-and-Trade". Page 5.

[19] "Lessons Learned," 5

facilities. Watching over the system was the EPA, who monitored and verified all emissions and allowances.[20]

Implementation of the ARP

Most air regulation policies prior to the 1990 CAAA took more of a "prescriptive approach, either by setting uniform emission limits on classes of emitters or by specifying the type of pollution-controlled equipment to be installed."[21] This approach overtime proved that it is highly inflexible and it attempts to address an array of different facilities all while ignoring the fact that compliance is harder to achieve for certain facilities. These prior regulation policies were subsequently termed "command-and-control" due to the inflexible nature of the sets of regulations.

During the political debate of the CAAA, many concerns were brought up mainly circulating around the issue of whether or not a cap-and-trade policy approach would actually work well in practice since it had never been done before. At the time, the main political opposition to the proposal of market-based policies as a solution to environmental problems were actually from environmental advocacy groups and from Democrats. Their opposition mainly stemmed from the fact that these advocates thought that "...a policy based on the principle that firms could 'pay to pollute' was morally bankrupt; they were worried that the very creation of tradable allowances implied that firms had a right or an entitlement to emit."[22] These groups believed at the time that the harshness of command-and-control regulation was the only way to

[20] Ibid
[21] "SO2 Allowance-Trading System," 422
[22] Chan, Stavins, Stowe, Sweeney. "The SO2 Allowance-Trading System and the Clean Air act Amendments of 1990: Reflections on 20 Years of Policy Innovation." *National Tax Journal.* Page 445.

truly lower emissions. Environmental advocates and Democrats obviously had good intentions with their concerns, but as history has proved, Title IV was largely a successful route to regulating facilities and their emittance levels.

One major concern that people had with the Title IV was that there would be too few buyers and sellers of allowances and that it would affect the overall success of the policy. They felt that this would negatively impact the effectiveness of the policy because then it would become a potential issue of facilities needing more allowances in order to comply, but not being able to buy additional allowances from others because no one would have any left over. By raising this issue, policymakers responded by making it so "...approximately three percent of the allowances allocated to installations were retained by EPA and auctioned annually…"[23] In hindsight, this potential problem of having too few buyers and sellers did not materialize, and this provision became an unnecessary function of Title IV.

Another concern that was highlighted during the CAAA debate was that the SO_2 allowance market information on who was selling and who needed to buy would have accessibility problems and that the transaction costs between buyers and sellers would be high- therefore thwarting the purpose of the market by discouraging transactions. Again, this concern did not actually become an issue and "...by March 1998, 20.3 million allowances had been traded between unrelated entities and another 1.3 million allowances had been purchased through EPA auctions."[24] Since the function of allowance transactions were solid from the start, the banking provisions that had been included into Title IV weren't exactly necessary but at the same time,

[23] Chan, Stavins, Stowe, Sweeney. "The SO2 Allowance-Trading System and the Clean Air act Amendments of 1990: Reflections on 20 Years of Policy Innovation." *National Tax Journal,* 433
[24] Chan, Stavins, Stowe, Sweeney. "The SO2 Allowance-Trading System and the Clean Air act Amendments of 1990: Reflections on 20 Years of Policy Innovation." *National Tax Journal,* 433

the provisions did overtime help out if there were any fluctuations in regard to supply and demand.

The successful passage of the CAAA and with it, Title IV, has been credited to the Environmental Defense Fund (EDF), because they became a necessary catalyst in regard to the policy receiving congressional support. EDF was one of the main environmental advocacy groups that stood apart from those in opposition by supporting the market-based approach that Title IV introduced. The Bush Administration worked together with EDF in order to design the allowance trading component of the Acid Rain Program, which has since become a major innovation seen within the history of public policy in the United States.

(Lack of) Policy Change

Due to the overall effectiveness of the Acid Rain Program's implementation and success overtime, not much policy change has not occured to the actual policy itself. Since there was a large amount of concerns brought to the forefront during the implementation process of Title IV, many potential problems were fine tuned and avoided by changing the language of the bill preemptively - which has resulted in the lack of need for changing the actual policy itself since its introduction.

However, there have been instances of policies trying to lower the cap on SO_2 emissions. For example, in 2005 under the Bush Administration, the Clear Skies Act of 2002 was proposed, and it wanted to attempt to tighten the SO_2 cap - but the bill failed to pass Congress due to lack of support. Although, again in 2005, the U.S. EPA successfully passed the Clean Air Interstate Rule (CAIR), "...which both effectively reduces the Title IV cap and treats facilities differently

based on their location...the purpose of the CAIR is to reduce SO_2 emissions in upwind states that contribute to violates of EPA's primary ambient air quality standards for fine particulates in the eastern United States."[25] Even though the CAIR SO_2 program only applies to eastern states, it was successful in that it was able to build further upon what Title IV started.

In more recent times, congressional debates have been sparked over Title IV to try to find pathways to strengthen the program due to increased worries associated with climate change. Potential improvements are being sought by researchers but nothing significant has passed because of legal uncertainty, heightened political partisanship, and the fact that the program has largely been successful and doesn't require immediate intervention to fix any problems.

Policy Success: Effectiveness of Title IV

The effectiveness of Title IV has become vastly apparent ever since its implementation in 1990. Due to the overall success of the SO_2 allowance-trading program, features that it encompasses can be seen in almost all other cap-and-trade systems created since. The article by Schmalensee and Stavins shows that "SO_2 emissions from electric power plants decreased 36 percent between 1990 and 2004, even though electricity generation from coal-fired power plants increased 25 percent over the same period."[26] With these new provisions, emissions were cut by a third but overall production of electricity has actually increased - proving that environmental regulation doesn't necessarily mean it will have a negative impact on the economy. These emissions reductions were seen more quickly than most expected and "...it was remarked that

[25] Palmer, Karen, and David Evans. 2019. "The Evolving SO2 Allowance Market: Title IV, CAIR, And Beyond". *Resources For The Future*.
[26] Richard Schmalensee and Robert Stavins, "Lessons Learned from Three Decades of Experience with Cap-and-Trade," 5.

this was the most significant, abrupt decline in emissions in the history of air pollution regulation."[27] Major factors contributing to the success of Title IV were effective monitoring and compliance mechanisms, as well as the $2,000 per ton statutory fine[28] that was used to divert facilities from exceeding their emittance allowances. Because of this, compliance amongst different facilities was nearly 100 percent.

The environmental goal of the Acid Rain Program was certainly reached, but there were also unintentional and unforeseen benefits that have been observed since. One of the most impactful benefits reached from Title IV "...were in the form of avoided health damages from reduced levels of airborne fine particles derived from SO_2 emissions. Estimates of these health benefits...appear to be on the order of $50 billion per year by 2010."[29] By reducing the overall emission levels of the pollutants, we see a direct correlation to positive health benefits nationwide - therefore sparing our nation the financial burden of dealing with the aftermath of poor air quality and its negative impact on human health.

On top of environmental harm reduction and avoided health damages, Title IV and its associated costs were very low compared to what would have been under traditional regulatory approaches. In 1990, the United States EPA estimated that the Acid Rain Program would cost nearly $6 billion and in 1998, an independent think tank estimated that the total implementation costs associated were less than $2 billion.[30] A huge reason for why this program was far less

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[27] Chan, Stavins, Stowe, and Sweeney. "The SO2 Allowance-Trading System and the Clean Air Act Amendments of 1990: Reflections on 20 Years of Policy Innovation," 432.
[28] Richard Schmalensee and Robert Stavins, "Lessons Learned from Three Decades of Experience with Cap-and-Trade," 5.
[29] Chan, Stavins, Stowe, and Sweeney. "The SO2 Allowance-Trading System and the Clean Air Act Amendments of 1990: Reflections on 20 Years of Policy Innovation," 422-423
[30] Chan, Stavins, Stowe, and Sweeney. "The SO2 Allowance-Trading System and the Clean Air Act Amendments of 1990: Reflections on 20 Years of Policy Innovation," 424.

costly than what was expected is because the policy experienced few litigation situations. This was largely due to the fact that since there was an option to buy more emittance allowances from other facilities - rather than feeling unable to comply with emission reductions standards that would have been seen under command and control policy structures.

Due to the cap-and-trade nature of Title IV, we have seen how it has actually encouraged innovation due to the incentivization of facilities wanting to out-perform the standards that have been set - whereas this phenomena isn't observed under command and control regulations. This incentivization for wanting to out-perform or over-comply is based on the fact that with every "...additional ton of reduction that can be achieved for less than the market price of an allowance creates value for the entity that produces those reductions."[31] Facilities can either sell their allowances to others for profit or stock them up for future years - and it is the main reason that facilities chose to over-comply.

Framework for Success: Improving Upon Title IV

A bonus of the success of Title IV and the subsequent "hands-off" policy that followed after the CAA was passed is that there is a clear framework for which further policy improvement could be made. As shown above, a cap-and-trade model works exceptionally well for mitigating SO_2 and NO_x emissions. As such, we recommend that the EPA institute create a scheduled cap decrease every 5 years, starting in 2021 and ending in 2045. The goal would be to reach total emissions of one fourth of the amount in 1980. Industrial facilities would be responsible for reporting once every year to update on efficiency efforts as well as compile

[31] Chan, Stavins, Stowe, and Sweeney. "The SO2 Allowance-Trading System and the Clean Air ACt Amendments of 1990: Reflections on 20 Years of Policy Innovation," 440

five-year reports prior to the cap decrease to show compliance with the schedule. As shown by Palmer and Evans, the current cap is not taking full advantage of the net economic benefit of the program and strengthening the cap regulation would lead to a further one-to-three million tons of emissions reduced and "a $3.6 billion to $23.5 billion increase in annual net benefits."[32]

While increasing the cap domestically would lead to increased benefits, the United States should also seek to apply the success of the ARP domestically to international treaties as well. The 1991 US-Canada Air Quality Agreement (USCAQA) was the last major international air quality agreement the United States signed onto, with further regulations added in 2000.[33] While significant progress has been made both up north as well as in the US, further progress could be made by increasing the cap of the agreement. The recognition of the effect transboundary SO_x emissions have on acid rain in the years since the USCAQA means that other nations, including Mexico and China, should sign onto future international agreements as well. The US leading the charge on international emissions would also be a prime opportunity to demonstrate commitment towards solving global environmental issues and could help restore the US' reputation abroad as a global environmental leader after leaving the Paris Climate Accord in 2016.[34]

Looking Towards A Clean-Air Future

The success of Title IV and the ARP are testaments to the applicability of cap-and-trade policy to solving environmental problems. As shown by the Punctuated Equilibrium theory,

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[32] "Palmer, Karen, and David Evans. 2019. "The Evolving SO2 Allowance Market: Title IV, CAIR, And Beyond". *Resources For The Future*.

[33] Canada-United States Air Quality Committee. 2016. "Canada-United States Air Quality Agreement Progress Report 2016". Washington, D.C.: Canada-United States Air Quality Committee.

[34] Pickering, Jonathan, Jeffrey S. McGee, Tim Stephens, and Sylvia I. Karlsson-Vinkhuyzen. 2017. "The Impact Of The US Retreat From The Paris Agreement: Kyoto Revisited?". *Climate Policy* 18 (7): 818-827

growing concern over air quality has shown the need for addressing these problems within our lifetime as well as the possibility to do so. Through increased cap regulation as well as international efforts, the US can continue to efficiently regulate SO_x and NO_2 emissions as well as build upon the legacy of the ARP. Doing so would give future generations of Americans healthier lives, save billions of dollars in regulation and health costs, and preserve the unique environment of the United States. Ultimately, the ARP has given American citizens the chance to dream of a clean-air future.

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