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ARTICLES

The Real Problem With New Source Review

by Shi-Ling Hsu

Editors' Summary: When the CAA was amended in 1977, the U.S. Congress imposed pollution control requirements on new stationary sources of air pollution, called new source review (NSR), but exempted existing facilities from such requirements. By creating a more favorable regulatory environment for existing facilities than for new ones, "grandfathering" creates an incentive to keep old facilities up and running. Moreover, as a command-and control program, requiring capital expenditures for pollution control equipment makes the capital sluggishness problem worse. Combined with often confusing EPA policies and a changing political environment, NSR has resulted in a running battle between the regulated community, environmentalists, and regulators over just how much work can be done on existing sources before they become "new" sources subject to expensive pollution control requirements. In this Article, Shi-Ling Hsu examines these issues and argues for an entirely new paradigm of pollution regulation—Pigouvian taxes and/or emissions trading. Although these two concepts are also controversial, Hsu argues that they are far better than the drag on capital turnover created by grandfathering and will be advantageous for environmentalists and industry alike by eliminating perverse incentives for keeping outdated stationary sources online to the disadvantage of newer, cleaner sources.

I. Introduction

The U.S. Department of Justice (DOJ) continues to press on with litigation against those suspected of violating the Clean Air Act's (CAA's) new source review (NSR) program by making a "major modification" on a polluting plant without installing, as NSR requires, state-of-the-art pollution control equipment.[1] In 2005, the DOJ reached settlements with the Ohio Edison Company and Illinois Power (the latest of nine settlements with electricity-generating firms), requiring them to install pollution control equipment to the tune of $1.1 billion and $500 million, respectively[2]; with ExxonMobil's refinery operations for $589 million (the latest of 17 settlements with refining companies)[3]; and even with a number of ethanol producers.[4] As well, the DOJ is pressing ahead with perhaps its biggest NSR case of all against the electricity giant American Electric Power Company for modifications made to its coal-fired power plants.[5] This apparently vigorous prosecution takes place even as the George W. Bush Administration continues to reform NSR in ways that limit the U.S. Environmental Protection Agency's (EPA's) ability to scrutinize and challenge plant modifications. Most significantly, the Bush Administration has promulgated new rules that dramatically change the routine maintenance, repair, and replacement (RMRR) exemption, essentially creating a safe harbor for polluters modifying their facilities. The rules also give polluters a more gener-

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1. NSR requires the installation of state-of-the-art pollution control equipment whenever a new plant is constructed or whenever a "modification" is made on an existing one. CAA §165(a)(4), 42 U.S.C. §7475(a)(4) (specifies that a permit must be obtained, and that it may only be issued if "the proposed facility is subject to the best available control technology [(BACT)]" for each pollutant regulated); CAA §173(a)(2), 42 U.S.C. §7503(a)(2) (provides that the permit may only be issued if the "proposed source is required to comply with the lowest achievable emission rate [(LAER)]").
2. Susan Bruninga, *Air Pollution: Ohio Edison Agrees to Pay $1.1 Billion to Cut Emissions 212,000 Tons From Plants*, Daily Env't Rep. (BNA), Mar. 21, 2005, at A-1; Steve Cook, *Air Pollution: Illinois Power Agrees to Reduce Emissions in $500 Million Settlement of EPA Lawsuit*, Daily Env't Rep. (BNA), Mar. 8, 2005, at A-1.
3. Steven D. Cook, *ExxonMobil to Spend $589.4 Million to Reduce Emissions at Seven Refineries*, Daily Env't Rep. (BNA), Oct. 12, 2005, at A-1.
4. Steven D. Cook, *Cargill Agrees to Spend $135 Million in Settlement Involving Corn, Oilseed Facilities*, Daily Env't Rep. (BNA), Sept. 2, 2005, at A-8; Linda Roeder, *Nebraska Company to Spend $5.5 Million for Clean Air Violations Under Agreement*, Daily Env't Rep. (BNA), Sept. 1, 2005, at A-8; Christopher Brown, *Missouri Ethanol Maker to Install $2 Million in Pollution Controls Under Consent Decree*, Daily Env't Rep. (BNA), Apr. 11, 2005, A-13.
5. At the time of writing of this Article, the trial had taken place and the parties were awaiting a verdict, the loser likely to appeal. *See, e.g.*, Darren Samuelsohn, *Courts Still in Play Despite NSR Policy Shift*, GREENWIRE, Oct. 17, 2005, *at* http://www.eenews.net/sr_nsr.htm (last visited Dec. 29, 2005).

ous baseline allowance in determining whether their modification will result in an emissions increase, a finding that would trigger NSR. Having survived a major court challenge,[6] the core parts of the policy appear to be in place for at least the duration of this Administration, and probably beyond.[7] Even if a Democrat gains the Presidency in 2008, it will be politically difficult to change it back, as many firms will claim to have relied upon this formulation for long-term planning.

Despite the apparently ephemeral nature of the DOJ victories, it is important to stop and examine some important lessons from the bruising legal battles that have characterized NSR for over a decade. This is especially true since neither the Bush Administration nor its critics grasp what is truly flawed with NSR. The problems with NSR are twofold: (1) it is part and parcel of the larger mistake of grandfathering; and (2) it is defined mostly in terms of the installation of pollution control equipment. Both of these aspects of NSR retard the turnover of polluting capital, locking in obsolete old facilities, such as 80-year-old coal-fired power plants, and giving them economic reasons to live well past their original intended retirement date. This capital sluggishness is bad from both an environmental and economic perspective.

II. NSR and Grandfathering

When the U.S. Congress amended the CAA in 1977 and imposed new pollution control requirements, or "new source review," on stationary sources of air pollution, it exempted existing facilities. Exempt facilities would not be subject to NSR, which requires the installation of best available control technology (BACT)[8] or equipment and processes that achieve the lowest achievable emissions rate (LAER),[9] effectively pegging the requirement to industry practices. The rationale behind the exemption was that a dramatic and sudden regulatory change frustrated the expectations of owners of existing facilities and would discourage investment. Democratically accountable governments do not change the rules in the middle of the game, it was argued.[10] Besides, it was reasoned, installing pollution control equipment was much more efficiently done at the new construction stage, rather than patched on at some point in the middle of a plant's life.[11] This concept of exempting certain existing investments has become known as "grandfathering."

The main problem with grandfathering seems obvious in retrospect: by creating a more favorable (in some cases much more favorable) regulatory environment for existing facilities than for new ones, grandfathering creates an incentive to keep old, grandfathered facilities up and running. The grandfather status of a plant becomes a valuable asset. NSR is part and parcel of the misguided concept of grandfathering. Grandfathering necessarily requires some distinction between those that will be exempt and those that will not. NSR is that dividing line. Without NSR, grandfathering is a nonsensical concept.

The grandfathering debate is already well underway, and the political stars may not be currently aligned to get rid of grandfathering. But the NSR debate is misdirected. Parties to the NSR debate argue over its form while failing to acknowledge its role in grandfathering or the perverse incentives the present NSR program creates. This Article is intended to redirect the NSR debate and identify what is truly at stake.

III. Grandfathering's Drag on Capital Turnover

Grandfathering, the exemption of certain existing facilities from pollution control requirements, produces a drag on the turnover of polluting capital by creating a huge incentive to patch up old plants and keep them running. In the normal course of business, aging plants with lower efficiencies and higher repair costs eventually give way to new plants. But grandfathering presents a compelling reason to defer that move: the fact that a new plant would require pollution controls that cost millions or hundreds of millions of dollars.

Estimates of the cost of installing pollution control equipment vary, even with respect to specific pollution control devices.[12] One widely respected study on coal-fired power plants reported by the National Research Council estimated installation costs for a full complement of pollution control devices to add approximately 25% to the cost of capital, increasing the cost of a new 600-megawatt power plant from approximately $600 million to $750 million.[13] Grandfathering in this example thus provides a $150 million asset. What would you do to protect a $150 million asset? Certainly, it would occur to you to band-aid over problems wherever and whenever possible to prolong the life of the plant and exploit this competitive advantage as long as possible. In addition to band-aiding, owners of grandfathered facilities have certainly found it worthwhile to incur some legal and lobbying expenses to help preserve their grandfathering asset. At the very least, it is worth some effort to defer such an expenditure as long as possible by keeping a grandfathered plant

6. New York v. EPA, 413 F.3d 3, 35 ELR 20135 (D.C. Cir. 2005).

7. The rules, discussed more fully below, were originally proposed in 2002 and 2003, finalized in 2004, and then re-opened for comment and reconsideration on July 1, 2004. 69 Fed. Reg. 40278 (July 1, 2004). After reconsideration, the rule was made final on June 10, 2005. 70 Fed. Reg. 33838 (June 10, 2005).

8. CAA §165(a)(4), 42 U.S.C. §7475(a)(4). BACT is required in "attainment areas," airsheds in which ambient levels of pollution are below levels established by EPA and determined not to pose a hazard to human health.

9. *Id.* §173(a)(2), 42 U.S.C. §7503(a)(2). Technology and practices achieving the LAER are required in "nonattainment areas," airsheds in which ambient levels of pollution exceed the levels established by EPA and deemed to be acceptable for human health.

10. This point, often raised in connection with regulatory takings cases, was first raised in the electric utility regulation area in an influential white paper by three economists that warned of the consequences of allowing unfettered electricity deregulation without compensating existing plant owners for the loss in value of "stranded costs," claiming that those plants would become far less valuable because of the sudden changeover into a competitive environment. *See* William J. Baumol et al., The Challenge for Federal and State Regulators: Transition From Regulation to Efficient Competition in Electric Power 33 (1994) (on file with author).

11. National Research Council, Interim Report of the Committee on Changes in New Source Review Programs for Stationary Sources of Air Pollutants 23 (Nat'l Academies Press 2005), *available at* http://www.nap.edu/books/0309095786/html/ (last visited Jan. 3, 2006).

12. For a review of some of the cost studies, see National Research Council, *supra* note 11, at 111-12 . This estimate contemplates up-to-date pollution control equipment to control emissions of oxides of nitrogen (NO_x), sulfur dioxide (SO_2), and particulate matter.

13. The study is E.S. Rubin et al., *Integrated Environmental Modeling of Coal-Fired Power Systems*, 47 J. Air & Waste Mgmt. Ass'n 1180 (1997), cited in National Research Council, *supra* note 11, at 111, and the estimate was based on costs of installing controls of SO_2 and NO_x emissions.

running. As a policy matter, then, breaking out of this regulatory paradigm has been problematic for political and economic reasons.

What about the perspective of the new entrant, which faces NSR requirements that incumbents do not? A new entrant will deploy new and cleaner technologies with lower variable costs, but it must achieve a variable cost advantage great enough to overcome the cost of new capital. In this numerical example, the cost of new capital is increased by $150 million, and the relative disadvantage vis-à-vis the incumbent rivals $150 million greater, pushing some new plant investments further into the future. The net effect of grandfathering is that newer, cleaner plants are sometimes left unbuilt. Older, dirtier plants keep running.

Several widely accepted empirical studies now confirm these economic intuitions. There is a clearly emerging consensus in the scholarly literature that grandfathering retards capital turnover.[14] And a quick look at the electric utility sector is sobering: 57% of all power plants were built before 1972, while 35% are more than 50 years old.[15]Some power plants even were built in the 1920s.[16] The 1990 CAA Amendments, which brought into being the first large-scale "cap-and-trade" form of emissions trading program, was enacted by Congress with an expectation that many of the oldest and dirtiest power plants would be retired. This has not exactly panned out: from 1990 to 2000, only 10 of the 263 coal-fired plants originally subject to the CAA Amendments were retired.[17]

This capital sluggishness in the coal-fired power industry is especially surprising since the 1990s was a decade in which natural gas deregulation delivered fairly stable and historically lower natural gas prices.[18] There were also technical reasons to prefer natural gas. Natural gas-fired power plants convert usable energy more efficiently than coal-fired power plants.[19] Natural gas-fired power plants start up and shut down quickly, making them more able to respond to peak loads and spikes in energy usage.[20] Capital and fixed costs of natural gas-fired power plants are substantially lower than those of coal-fired plants—barely one-third—making them a less daunting capital investment.[21] So what happened in the 1990s? From 1990 to 1999, the share of electricity produced by natural gas increased from 10.67% to 13.40%, while the share produced by coal decreased from 54.19% to 52.65%[22]—hardly a sea change.

There are a number of possible reasons for the failure of natural gas power plants to take root. Electricity remains, despite rumblings of deregulation in the 1990s, a regulated industry. Significant changes such as fuel switching are not encouraged in regulated environments. Shedding capital is not encouraged in an industry already incentivized for overcapitalization.[23] Siting difficulties for new plants may also have played a part, although this does not explain the failure to repower existing coal-fired plants at their existing locations as natural gas plants. In the past six years, volatile

14. *See, e.g.*, Michael T. Maloney & Gordon L. Brady, *Capital Turnover and Marketable Pollution Rights*, 31 J.L. & Econ. 203 (1988); Randy A. Nelson et al., *Differential Environmental Regulation: Effects on Electric Utility Capital Turnover and Emissions*, 75 Rev. Econ. & Stat. 368 (1993); Frank M. Gollup & Marc J. Roberts, *Environmental Regulations and Productivity Growth: The Case of Fossil-Fueled Electric Power Generation*, 91 J. Pol. Econ. 654 (1983); Robert N. Stavins, The Effects of Vintage-Differentiated Environmental Regulation (Related Publication 05-03) (AEI-Brookings Joint Center for Regulatory Studies 2005).

15. U.S. General Accounting Office, Emissions From Older Electricity Generating Units 2 (2002).

16. Tina Kaarsberg et al., The Clean Air-Innovative Technology Link: Enhancing Efficiency in the Electricity Industry (Northeast-Midwest Inst. 1999).

17. The 1990 CAA Amendments created a new regulatory regime governing the emissions of SO_2 and NO_x, known as the Acid Rain Program. The Acid Rain Program established an aggregate allowable tonnage of SO_2 emissions, applied this "cap" to 263 named electricity-generating units, and issued tradable allowances to these units to emit a reduced quantity of SO_2 emissions. These units, specified in §404 of the CAA, were almost exclusively coal-fired plants, and it was expected that the cost of a tradable allowance would cause a substantial number of them to be retired. Richard E. Cohen, Washington at Work 68 (1995). The expected wave of retirements has not occurred, however. From 1990 to 1999, only 7 of the original 263 were retired. U.S. EPA, 1998 Compliance Report: Acid Rain Program app. B (1999) (EPA-430-R-99-010), *available at* http://www.epa.gov/airmarkt/cmprpt/app98index.html (last visited Jan. 3, 2006). In 2000, an additional three were retired. U.S. Energy Information Administration, U.S. Department of Energy (DOE), Inventory of Electric Utility Power Plants in the United States 2000, at 9 (2001), *available at* http://www.eia.doe.gov/cneaf/electricity/ipp/ipp00.pdf (last visited Jan. 3, 2006).

18. From 1981 to 1986, the average wellhead price of natural gas produced in the United States was $2.35 per thousand cubic feet. From 1987 to 1999, the average wellhead price was $1.86 per thousand cubic feet. U.S. Energy Information Administration, *U.S. Natural Gas Wellhead Prices, at* http://tonto.eia.doe.gov/dnav/ng/hist/n9190us3A.htm (last visited Nov. 22, 2005). Of course, with the energy crises of the turn of the century, this decline in natural gas prices infamously and dramatically reversed itself in 2000. The point here is that even while gas prices were declining, natural gas power plants did not proliferate.

19. Energy efficiency is measured by the average thermal conversion rate, or "heat rate." Heat rate data collected by DOE's Energy Information Administration is considered confidential information. U.S. Energy Information Administration, U.S. DOE, Electric Power Annual 2003, at 65 (2003), *available at* http://tonto.eia.doe.gov/FTPROOT/electricity/034803.pdf (last visited Dec. 20, 2005). Accurate data on heat rates are therefore elusive, but it is clear that natural gas-fired power plants almost invariably have lower (more efficient) heat rates than coal-fired power plants. *See, e.g.*, II U.S. Energy Information Administration, U.S. DOE, Electric Power Annual 2000, at 110 (2002); Richard L. Bain et al., Biomass-Fired Power Generation, Conference Paper for Biomass Usage for Utility and Industrial Power, Snowbird, Utah, at 10, tbl. 2 (1996), *at* http://www.portalenergy.com/common/tech/tech017/bio09.pdf (last visited Nov. 22, 2005).

20. Larry Goldstein et al., Gas-Fired Distributed Energy Resource Technology Characterizations 15, 18 (Report No. NREL/TP-620-34783) (2003), *available at* http://www.nrel.gov/docs/fy04osti/34783.pdf (last visited Aug. 18, 2005); Christopher F. Thornburg, Of Megawatts and Men: Understanding the Causes of the California Power Crisis 14 (UCLA Anderson Forecast 2001), *available at* http://www.anderson.ucla.edu/faculty/christopher.thornberg/docso/pdfoth/Megawatts.pdf (last visited Nov. 22, 2005).

21. U.S. Energy Information Administration, U.S. DOE, Annual Energy Outlook 2005 fig. 71 (2005), *available at* http://www.eia.doe.gov/oiaf/aeo/electricity.html (last visited Nov. 22, 2005). *See also* U.S. Energy Information Administration, U.S. DOE, Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity 73, tbl. 16 (1998), *available at* http://tonto.eia.doe.gov/FTPROOT/service/oiaf9803.pdf (last visited Nov. 22, 2005).

22. U.S. Energy Information Administration, U.S. DOE, Annual Energy Review 2004, at 229, tbl. 8.2b (2005), *available at* http://www.eia.doe.gov/emeu/aer/pdf/aer.pdf (last visited Nov. 22, 2005).

23. A long-admired and often-cited article has hypothesized, with some evidence, that regulated firms such as electric utilities tend to acquire more capital than would a profit-maximizing firm in a competitive environment, a result of the incentives created by the regulatory commission structure. Harvey Averch & Leland L. Johnson, *Behavior of the Firm Under Regulatory Constraint*, 52 Am. Econ. Rev. 1052 (1962).

natural gas prices have been a factor,[24] but this does not explain the reluctance to switch to natural gas in the 1990s. Thus, while the power-plant fuel choice decision is an enormously complicated decision to model, the grandfathering explanation still seems to be a powerful one.

The capital sluggishness caused in part by grandfathering is an economic distortion with economic costs. Any governmental policy-induced preference for an allocation of resources creates a distortion that creates deadweight loss. In the case of grandfathering, the distortion is particularly pernicious because it slows the pace of technological progress. Older plants with older processes are simply less reliable and less efficient than new plants in converting usable energy into electricity.[25] Slowing the replacement of old plants slows the march of technological progress and, as a result, perpetuates higher product costs. Such is the irony of an incentive to retain capital: firms may actually choose a more costly production process because the new one would require expensive pollution controls.

Of course, a distortion in one market may be justified by its corrective effect in another market. A gasoline tax alters consumer behavior but internalizes pollution externalities related to the production and consumption of gas. Could we say something similarly ameliorative about coal-fired power plants? Hardly. Rather, with technological advances in pollution control equipment, a bias toward older capital is a bias against better pollution control equipment and a perpetuation of pollution externalities. Per megawatt hour (Mwh) of electricity produced, coal-fired power plants built before 1950 emitted an average of 20.58 pounds (lbs.) of sulfur dioxide (SO_2) per Mwh of electricity produced, while coal-fired power plants built after 1990 emitted only 3.88 lbs.[26] The average nitrogen oxide (NO_x) emissions rate for pre-1950 plants was 5.51 lbs. per Mwh, while for post-1990 plants the rate was 3.15.[27] From the environmental perspective, a better choice of fuel would be natural gas, the combustion of which per unit of energy produced emits only 33% of the carbon dioxide (CO_2), 10% of the NO_x, and virtually none of the SO_2, particulate matter, or mercury emitted by coal-fired plants.[28] But even this modest technological advance is evidently not in the cards, given the incentives to patch up old coal-fired plants, and especially given high natural gas prices.

What of the argument that failure to grandfather would chill investment? This argument has clearly been taken too far, with the original grandfathering provision now going on 33 years. But maybe this argument should hold no water at all. Given the rate at which we are learning about the harmful effects of pollution, a slight chill in investment might not be a bad thing from the standpoint of overall social welfare. Entrepreneurs contemplating expensive capital investments are extremely sophisticated in projecting the economics of the investment for decades hence. Is it so unreasonable to expect some environmental foresight as well? Perhaps, rather than having myopia rewarded by grandfathering, entrepreneurs should have some incentive to look beyond the narrow profit focus and consider the possible environmental consequences of a large capital investment. Perhaps grandfathering is really just an unwise reinforcement of a human propensity to forge ahead without adequate consideration of the consequences.

Grandfathering seems like a sensible policy to a layperson, drawing as it does on notions of fairness. It seems unfair to change regulation after someone has invested in something as expensive as a power plant or an oil refinery. This perception of unfairness overlooks the moral hazard[29] problems created by this sympathy, as any fairness-based exemption does. One never knows if an entrepreneur had a legitimate expectation of regulatory stability when making an expensive investment or if the entrepreneur was racing to beat a clock that she knew was ticking. This leads to difficult and ultimately intractable line-drawing exercises. On a more fundamental level, this kind of fairness-thinking is flawed in that it focuses on the hardships, real or perceived, on incumbents—those with existing facilities that would be grandfathered—and ignores the hardships that are visited upon those that might have planned for, but did not begin, construction of a new plant.

Thus, grandfathering is not, as its beneficiaries would argue, the sign of a democratically accountable government paying heed to property rights or of an open government maximizing overall societal welfare. Grandfathering is a simple transfer payment to those with grandfathered plants from those that lack them.

IV. NSR's Drag on Capital Turnover

NSR's harmful economic and environmental effects are not limited to it being part of the bad idea of grandfathering. NSR is a command-and-control program that requires the installation of expensive polluting capital, making the capital turnover problem *worse*. While the core legal problem

24. From 2000 to 2004, the average U.S. wellhead price has been $4.20 per thousand cubic feet. U.S. Energy Information Administration, *supra* note 18. Spot prices in California rose from about $3 per million British thermal units (mmBtus) in mid-1999 to over $6 per mmBtus by December of 2000. Federal Reserve Bank of San Francisco, *Mary Daly, Economic Letter 2001-04, February 9, 2001: Economic Impact of Rising Natural Gas Prices, at* http://www.frbsf.org/publications/economics/letter/2001/el2001-04.html (last visited Nov. 22, 2005).

25. Thermal efficiency for fossil fuel-fired power plants is often measured as "heat rate," which is essentially the conversion of usable energy in fuel (coal, natural gas, or oil) into usable electricity. *See, e.g.*, National Research Council, *supra* note 11, at 82, tbl. 3-3b (showing how average heat rates show increasing efficiency with more recent vintages); Peter Huber, *Electricity and the Environment: In Search of Regulatory Authority*, 100 Harv. L. Rev. 1002, 1046-47 (1987). Note also that many modifications undertaken at power plants are intended to improve the heat rate. *See, e.g.*, United States v. Ohio Edison Co., 276 F. Supp. 2d 829, 838, 33 ELR 20253 (S.D. Ohio 2003).

26. National Research Council, *supra* note 11, tbl. 3-3b.

27. *Id.* at 81, tbl. 3-3a.

28. State and Territorial Air Pollution Program Administrators & Association of Local Air Pollution Control Officials (STAPPA & ALAPCO), Reducing Greenhouse Gases and Air Pollution: A Menu of Harmonized Options xv (2000). This assumes that the natural gas-fired power plants are of the "combined-cycle" variety, which involves the recovery of waste heat to power a separate turbine. *See also* Byron Swift, The Benefits and Costs of Moving From Coal to Natural Gas Power Generation (Envtl. L. Inst. 2000).

29. "Moral hazard" is the term given to problems of information asymmetry in which one party must act in relation to another based on the other's actions, but which are not known to the first party. This produces an incentive for the second party to "shirk" or deceive the first. This problem receives much attention in areas such as insurance where insurers have no way of controlling or monitoring the behavior of the insured that may increase the risk of an insurance payout. *See, e.g.*, Andreu Mas-Colell et al., Microeconomic Theory 478-88 (1995).

with sluggish capital turnover in the electricity generating industry is grandfathering, NSR exacerbates the capitalization problem by requiring power plants to install pollution control equipment, adding to their capital base and creating an even stronger incentive to maintain and prolong the life of existing facilities. Once pollution control equipment is installed, the firm will strive to protect that equipment, particularly against further regulation that would devalue it. Nobody buys a multimillion dollar piece of equipment and then abandons it willingly.

The problem with NSR is that it is defined in terms of requiring the installation of pollution control equipment. Pursuant to the CAA, EPA has specified seven criteria air pollutants—pollutants for which EPA has established a threshold of exposure above which adverse human health effects may occur. For each pollutant, then, an airshed can be in "attainment" status—the pollutant concentration is below the threshold level—or "nonattainment" status—the pollutant concentration exceeds the threshold level. For areas designated as being in attainment status, NSR requires new sources or those undergoing a major modification to install the BACT.[30] For areas designated under the CAA as in "nonattainment" status, NSR requires new sources or those undergoing a major modification to face a more demanding requirement, installing equipment that obtains the LAER.[31]

Defining compliance in terms of expensive pollution control equipment installation makes some sense if one is a lawyer. It is a corrective action that matches the punishment with the offense, using the punishment to ameliorate the harm from the offense, like requiring some criminal offenders to perform community service as part of their punishment. But this is wrong-headed for dealing with polluters. This sort of corrective action creates its own incentives for ex post behavior that runs counter to the overall goal of reducing pollution. With most polluting industries, expensive capital is purchased to mass produce consumer goods that yield profit margins that are orders of magnitude less than the cost of capital. Thus, the small profit margins on these goods must be multiplied by the sale of the thousands of items produced in order for the capital to begin to pay for itself. Plants are thus designed to last long periods of time to enable the plant owner to recoup the large capital costs. Electricity, sold to thousands of customers in relatively small quantities and for relatively small amounts of money, must be sold in large quantities and for many years in order for the power plant to recoup its cost.

What happens to the economic environment when a plant owner is forced by legal mandate to add to the cost of the plant? It might pass these costs onto consumers, but it might not. In a highly regulated environment such as electricity, the state electricity regulatory commission may not allow cost pass-through. Alternatively, in a highly competitive environment, a plant owner may not be able to pass these costs onto consumers because competitors will undercut them in the marketplace. Thus, in many instances, when a plant owner is legally required to install pollution control equipment, it will simply find a way to operate the plant longer in order to maintain profitability.

The advantage of defining NSR in terms of pollution control requirements is, obviously, that pollution control equipment reduces emissions. At the same time, NSR is probably forestalling the retirement of some facilities, which may, over the long run, emit more pollution. Whether the immediate emissions reductions outweigh the long-term effect of keeping an old plant running is an empirical question. With pollution control equipment such as flue gas desulfurization, or "scrubbers," that remove 85% to 90% of the SO_2 content from power plant emissions,[32] it is unlikely that the life-extending effects of NSR would have the net effect of increasing SO_2 emissions, even over the long term. For other devices that are less effective in reducing emissions, it is entirely possible that the life-extending effects of NSR would result in more pollution over time.

There is also the bigger problem of pollutants other than those controlled by the pollution control equipment. While scrubbers dramatically reduce emissions of SO_2 from coal-fired power plants, a separate piece of equipment must be purchased and installed to control NO_x emissions. While some scrubbers also reduce emissions of mercury,[33] they do nothing about the elephant in the room, the problem of CO_2 emissions. And in no case do any of these pollution control measures account for other, pre-combustion externalities, such as the environmental harm of finding, extracting, and transporting coal.

The nine NSR settlements with electric utilities in 2005 netted $3.9 billion in pollution control equipment.[34] How long will it take for the utilities to recoup the cost of these investments? Making utilities spend this kind of money may be somewhat satisfying, but we must consider how this changes their decisionmaking environment.

In terms of emissions, therefore, it is an important and open empirical question as to whether pollution control equipment required by NSR results in overall lower emissions of the controlled pollutant. But the even more important question is whether NSR's piecemeal approach to pollution will, in the grand scheme of things, facilitate a solution or bring about a political train wreck when the United States finally reckons with the problem of greenhouse gas emissions. Environmental organizations seem to believe that in the end, they can politically and legally prevail on all counts. My own guess is that the best of several bad outcomes could be a massive, costly, and poorly administered taxpayer-financed switchover of electricity-generated technologies.

While pollution controls *are* reducing current emissions, they are also further entrenching older technologies. Saddling firms with expensive pollution control technology gives them something to care about, and it's not the environment. Rather, the expensive nature of the equipment will almost guarantee that the firm's main interest will be in preserving the value of the pollution control equipment. In the meantime, the plethora of other environmental externalities will not only be ignored by the polluter, but will represent salient threats to the pollution control equipment.

30. CAA §165(a)(4), 42 U.S.C. §7475(a)(4).

31. *Id.* §173(a)(2), 42 U.S.C. §7503(a)(2).

32. National Research Council, *supra* note 11, at 83. Babcock and Wilcox, makers of flue gas desulfurization systems, advertises a 95% removal efficiency. The Babcock & Wilcox Company, *Environmental Projects*, *at* http://www.babcock.com/pgg/tt/brochures-environmental.html (last visited Nov. 22, 2005). Another maker, Ducon, advertises a removal efficiency of 99%. Ducon, *Flue Gas Desulfurization*, *at* http://www.ducon.com/flue-gas-desulfurization.php (last visited Jan. 3, 2006).

33. *See* Ducon, *supra* note 32.

34. National Research Council, *supra* note 11, at 43-44, tbl. 2-1.

V. The Legal Battlefield and the Bush Administration Interventions

Apart from the perverse incentives created by NSR and grandfathering, there is a problem with the inevitably legalistic nature of NSR. The problem arises when, instead of tearing down a plant and building a new one—an event that would clearly trigger NSR and require the installation of pollution control equipment—a plant owner rebuilds a plant piece by piece, gradually changing the plant, but without ever triggering NSR and without ever installing pollution control equipment. To address this issue, EPA promulgated regulations that provide that any "major modification" would also trigger NSR.[35] "Major modification" was defined as "a physical change in or change in the method of operation of a major stationary source that would result in: (1) a significant emissions increase of a regulated NSR pollutant; and (2) a significant net emissions increase of that pollutant from the major stationary source."[36] However, plants that undertake what are deemed to be RMRR will not be deemed to have undertaken a "major modification" and will not be subject to NSR requirements.[37]

It is not hard to imagine how all this verbiage, at the crux of the American Electric Power, Illinois Power, and Ohio Edison cases as well as the scores of other NSR cases, can serve as an endless source of litigation. Indeed, in the many years of NSR practice, it has provided lucrative employment for many private firm lawyers and a decent living for government lawyers and environmental advocates. On the one side of the NSR battlefield are the trade associations of polluting industries. On the other side are the environmental organizations and state attorneys general of northeastern states suffering from downwind pollution from midwestern power plants. It may only be a mild overstatement to say that these parties are the only people who believe that NSR makes any sense. They just happen to disagree on what NSR should mean. Industry trade associations argue that NSR should be less stringent, less ambiguous, and infrequently applied.[38] This is their ideal regulatory environment because grandfathering is preserved to protect their market power and lock out new entrants, while a lenient NSR program permits them a free hand in revamping their plants without governmental interference. Litigating environmental organizations and the northeastern states offer a much more inclusive interpretation of "major modification," hoping to sweep as many plant operation changes into NSR as possible and force plant owners to either build new plants or install modern pollution controls.[39]

A variety of issues have cropped up in litigation and rulemaking in attempting to establish the confines of NSR. A short description of just a few of these follows.

A. What Constitutes RMRR

NSR is not triggered if the modification can be characterized as RMRR[40] (the RMRR exclusion). Courts have created several fault lines on what is "routine." A split among the courts opened up in *United States v. Ohio Edison Co.*[41] and *United States v. Duke Energy Corp.*,[42] with the *Ohio Edison* court finding it "highly probative" that a modification was characterized as a "capital expense" in their financial statements,[43] while the *Duke Energy* court looked to industry practice to determine how routine a modification was.[44] In *United States v. Alabama Power*,[45] the court reached the same result as in *Duke Energy*, but explicitly rejected the *Duke Energy* court's statutory construction exercise, preferring to interpret "routine" based on EPA's practices and policies.[46] If one is looking for some certainty or consistency in this area of law, this line of cases does not provide any encouragement. One of the few points of agreement between the litigating parties in *United States v. Southern Indiana Gas & Electric Co.*[47] was that considering the applicability of the RMRR exclusion "entails a fact-intensive, case-by-case determination, taking into account factors such as the project's nature, extent, frequency, and cost."[48]

This would have seemed to be a fertile source of litigation, but the Bush Administration has created a bright-line test, generally allowing modifications to be characterized as routine if the modification costs less than 20% of the original plant construction cost.[49] This change is certainly helpful to those plant owners thinking about updating plant operations—it quite possibly sweeps just about everything that plant owners could want to do to their plants under the RMRR exclusion. An enormous fraction of common repair and replacement activities can be accomplished for less than 20% of the original plant construction cost,[50] and for those that typically cost more, plant owners will almost certainly find ingenious ways to gradually update their plants in increments costing less than 20% of the original plant cost. A 20% threshold is about as clear as a rule could be and laudably makes NSR less bureaucratic. But the problem with regulatory certainty in this case is that the breadth of this accommodating version of the RMRR exclusion virtually guarantees that NSR will never be triggered.

35. 50 C.F.R. §§51.166, 52.21.
36. *Id.* §§51.166(b)(2)(i), 52.21(b)(2)(i).
37. *Id.* §§51.166(b)(2)(iii)(a), 52.21(b)(2)(iii)(a).
38. *See, e.g.*, Edison Electric Institute, Straight Talk About Electric Utilities and New Source Review (2001), *available at* http://www.eei.org/industry_issues/environment/air/New_Source_Review/NSRST.pdf (last visited Nov. 22, 2005). See also other Edison Electric Institute position papers at Edison Electric Institute, *New Source Review, at* http://www.eei.org/industry_issues/environment/air/New_Source_Review/ (last visited Nov. 22, 2005).
39. *See, e.g.*, New York v. EPA, 413 F.3d 3, 10, 35 ELR 20135 (D.C. Cir. 2005).
40. 40 C.F.R. §§52.01(d)(1), 52.21(b)(2)(iii), 52.24(f)(5).
41. 276 F. Supp. 2d 829, 33 ELR 20253 (S.D. Ohio 2003).
42. 278 F. Supp. 2d 619 (M.D.N.C. 2003).
43. *Ohio Edison*, 276 F. Supp. 2d at 860.
44. *Duke Energy*, 278 F. Supp. 2d at 633-34.
45. 372 F. Supp. 2d 1283 (N.D. Ala. 2005).
46. *Id.* at 1294-95.
47. 245 F. Supp. 2d 944 (S.D. Ind. 2003).
48. *Id.* at 999.
49. 68 Fed. Reg. 61248 (Oct. 27, 2003). There are other requirements that must be met before the RMRR exclusion applies. The replaced component: (1) must be identical or functionally equivalent; (2) must not alter the basic design parameters of the process unit; and (3) must not cause the process unit to exceed any emission limitation or operational limitation (that has the effect of constraining emissions) that applies to any component of the process unit and that is legally enforceable. 70 Fed. Reg. at 33838-01.
50. National Research Council, *supra* note 11, at 216-26. Tables D-1 to D-3 show typical costs of repair activities in coal-fired power plants, refineries, and pulp and paper mills. Note that the typical original capital cost of coal-fired power plants is on the order of $1,000 per kilowatt, dwarfing most of the repair costs listed in Table D-1.

B. Measuring Past Emissions

A modification only triggers NSR if it results in a significant net increase in emissions of a criteria pollutant regulated under the CAA. How does one determine what the future emissions will be after the modification? And how does one measure the past emissions?

Measuring past emissions seems like the easier task, but has been nearly as fraught with litigation as the future emissions question. Following the 1977 CAA Amendments that led to the NSR program, EPA took the position that the baseline emissions would be based upon the potential to emit, and that a modification triggered NSR if it "increases the potential emission rate of any air pollutant regulated under the act."[51] Parts of the EPA rule were struck down by the U.S. Court of Appeals for the District of Columbia Circuit in *Alabama Power Co. v. Costle*,[52] after which EPA promulgated a new rule specifying that the baseline would be determined by the average emissions rate (in tons per year) over the two years immediately preceding the modification, subject to EPA making some exceptions on a case-by-case basis if the previous two years do not represent "normal operation."[53]

The Bush Administration has made it considerably easier for polluters to avoid a showing of a significant net increase in emissions by allowing polluters to choose a baseline period. Rather than being forced to use the immediately preceding 2 years to establish baseline emissions, electric utilities now can use any consecutive 24 months out of the 5 years preceding the modification to establish their baseline, and non-utilities can "look back" in any of the preceding 10 years to find an appropriate 24-month averaging period.[54]

C. Measuring Future Emissions

And what is an "increase"? How does one determine what the future, post-modification emissions will be? Does an increase in the hours of production constitute an increase? What if the modification makes the plant more efficient, but leads to a productivity increase that increases emissions? That was the fact pattern that led to the cases *Puerto Rican Cement Co. v. U.S. Environmental Protection Agency*,[55] and *Wisconsin Electric Power Co. v. Reilly*,[56] in which EPA took the position that future emissions would be determined by the sources' *potential* to emit after the modification, the so-called actual-to-potential test. The U.S. Court of Appeals for the First Circuit and the U.S. Court of Appeals for the Seventh Circuit split on the actual-to-potential test issue, with the Seventh Circuit invalidating its application and distinguishing its case from *Puerto Rican Cement* on factual grounds.[57] Thereafter, EPA promulgated a new test only for electric utilities, measuring future emissions by a projection of post-modification emissions (now referred to as the actual-to-projected-actual test), while maintaining the actual-to-potential test for non-utilities.[58] Significantly, and predictably the source of more litigation, the new actual-to-projected-actual test excluded increases in emissions that cause growth in demand for electricity, the so-called demand growth exclusion.[59]

The Bush Administration has again intervened, putting its thumb decisively down on the scale and again helping polluters avoid a determination that their modification resulted in a significant net increase in emissions. By regulation in 2002, the Bush Administration now allows all pollution sources, rather than just power plants, to use the actual-to-projected-actual test.[60] It also expanded the utilities' demand growth exclusion to non-utilities.[61] Even more recently, EPA proposed a rule that would exclude any power plant modifications that do not increase *hourly* emissions, another way to avoid triggering NSR.[62] Combined with the changes that make it easier for a polluter to choose a favorable 24-month baseline period, these rule changes will make it difficult for EPA to demonstrate a significant net emissions increase.

VI. Whither, *Spy vs. Spy*?

The environmental side—environmental organizations and northeastern state attorneys general—is right to be outraged. But they are outraged at the wrong thing. They seem outraged that they have lost and that many plants will never be required to install pollution control equipment under the NSR program. The target of their outrage should be the fact that the Bush Administration's kinder, gentler NSR policy will cause much polluting capital to stay with us for a long, long time. Instead, the environmental side seems to long for a return to the legal battlefield and the decades-old legal wrangling that has become reminiscent of the old *Spy vs. Spy* cartoons, a comic symbol of futility in conflict. Do we still believe that we can wrestle the legal issues down and impose the putative environmental solution—the installation of pollution control equipment—on the polluting industries?

This advocacy view fails to comprehend the fruitlessness of drawing a workable dividing line for the argument over the meaning of "major modification." Is there really any general resolution to the highly litigated legal issues discussed above—the routineness of modifications, the measure of past and future emissions? With such high stakes, this is doomed to be a never ending debate. There is simply no principled way of drawing an NSR line between grandfathered plants and non-grandfathered plants that will be free of controversy and litigation.

Thus, as EPA and the DOJ trot out one victorious settlement after another, there are thousands of unlitigated cases against plant owners that have simply updated their plants without updating pollution controls and taken the position that they are undertaking something less than a "major modification" and instead are engaging in routine maintenance, repair, and replacement exempt from NSR. These plant owners are comforted by the ambiguity of the law and by the fact that even if they have gone too far in self-serving interpretation, the chances of an enforcement action are ex-

51. 43 Fed. Reg. 26380, 26403 (June 19, 1978).
52. 636 F.2d 323, 10 ELR 20001 (D.C. Cir. 1979).
53. 45 Fed. Reg. 52676, 52736 (Aug. 7, 1980).
54. 67 Fed. Reg. 80189, 80278 (Dec. 31, 2002).
55. 889 F.2d 292, 20 ELR 20259 (1st Cir. 1989).
56. 893 F.2d 901, 20 ELR 20414 (7th Cir. 1990).
57. *Wisconsin Electric*, 893 F.2d at 917.
58. 57 Fed. Reg. 32314 (July 21, 1992).
59. *Id.* at 32323-28.
60. 67 Fed. Reg. at 80275.
61. *Id.* at 80277.
62. 70 Fed. Reg. 60181 (Oct. 20, 2005).

tremely low, given the resource limitations of enforcement officials. An Ohio district court, in hearing an NSR case, took note of this and lambasted EPA for "an abysmal breakdown in the administrative process following the passage of the" CAA. The court repeatedly scolded EPA for inconsistent enforcement:

> This Court takes note of the fact that three decades after passage of the Clean Air Act the EPA finally moved, through this and several other lawsuits, to finally resolve this fundamental issue under the Act. While the law has always been clear, the enforcement strategies of the EPA have not. It is clear to this Court that at various times since 1970 officials of the EPA have been remiss in enforcing the law and clarifying its application to specific projects.[63]

The court's criticism of EPA is misplaced. "Clarifying its application to specific projects" will be a constant exercise in ad hoc determinations, and all the while with EPA at a distinct informational advantage vis-à-vis the applicant. It is inconceivable that EPA could make enough determinations to create a settled law of what does trigger NSR and what does not. When millions or hundreds of millions of dollars are at stake, there will always be an argument made as to why a specific project is not a modification that triggers NSR.

True reform requires attacking the entire grandfathering concept and moving to an entirely new paradigm of pollution regulation. Environmentalists should not be, as they currently are, arguing for their particular conception of NSR; they should be recognizing the ultimate futility in trying to distinguish between "new" and "existing" sources and looking for ways to regulate that do not require the drawing of unpalatable distinctions. Besides, this never ending game does nothing to move our economy along in transitioning to newer and hopefully cleaner technologies.

VII. The Ignored Economist's Solution

It is incredible that at least in North America, economists have been united for decades on the best pollution control policy instrument and that they are bitterly opposed by both environmentalists and industry. What economists have proposed often and loudly is the levy of Pigouvian,[64] or per-unit-of-pollution, taxes. A tax levied per quantity of pollution emitted would accomplish three things: (1) it would send a price signal to polluters that their activity is causing harm to others; (2) it would induce firms to adopt pollution reduction measures where and when they are most effective; and (3) it would provide incentives to polluters to find new ways to reduce pollution. All this assumes that a Pigouvian tax is enforceable. While this is not necessarily true, in most cases it seems fair to say that enforcement of a Pigouvian tax program would at least be no more of a problem than it is with traditional, pollution control equipment-oriented, command-and-control programs, in which enforcement is expensive and, as the NSR program demonstrates, litigation-intensive.

An alternative to pollution taxes is the use of tradable emissions permits, licenses to emit a quantity of pollution that can be bought and sold among polluters. Ideally, the number of permits is capped at some level that is deemed to be an acceptable level of pollution.[65] These programs are typically referred to as "cap-and-trade" programs. As with a pollution tax, a cap-and-trade program imposes a price on pollution, since emitting an extra ton of pollution costs the polluter whether it is in the form a tax or the cost of purchasing an extra pollution permit.

Both Pigouvian tax schemes and cap-and-trade programs raise a number of important program design issues. For example, a voluminous body of economic literature has sought to address the question of how, in cap-and-trade programs, emissions permits are to be distributed—whether they should be distributed by auction or on the basis of past emissions, a weak form of grandfathering.[66] And most impor-

63. *Ohio Edison*, 276 F. Supp. 2d at 833.

64. "Pigouvian" taxes, named after the economist Alfred Pigou, are fees levied on a unit of pollutant emitted. For a more detailed discussion of this theory, see WILLIAM BAUMOL & WALLACE OATES, THE THEORY OF ENVIRONMENTAL POLICY 21-23 (3d ed. 1996). This Pigouvian emission tax is very closely related to a cap-and-trade program; both seek to place a specific cost on the emission of a specified unit of a pollutant, with theoretically the same effects. The difference is only that of who pays for the emissions reductions—in the case of an emission tax, polluters pay and taxpayers benefit, and in the case of a cap-and-trade program, there is revenue neutrality. While there has been strong resistance to cap-and-trade programs, hostility toward taxes in the United States has, for the time being, ruled out virtually any kind of a Pigouvian tax, no matter what economists may say.

65. The "cap"—the level of total pollution that will be allowed—need not be a fixed target. Canada's proposed strategy to meet its commitment under the Kyoto Protocol contemplates the setting of the cap by "carbon intensity" targets. Under this system, the cap is established by multiplying productive output by some CO_2 emissions rate, which becomes the cap for any given year. CANADA GAZETTE, July 16, 2005, at 2489.

66. This is a weak form of grandfathering because, in comparison with the form of grandfathering created by the CAA criticized in this Article, distribution of emissions permits on the basis of historical emissions at least does not interfere with the incentive to retire capital, since keeping around old and polluting capital still represents an opportunity cost in the form of foregone opportunities to sell those emissions permits.

The economic literature on the choice between auctioning permits and giving them away on a "weak grandfathering" basis—giving them away on the basis of historical emissions—has considered the problem from a number of different viewpoints. First, virtually all of the work done in this area finds that overall social welfare is greater under an auctioning scheme than under a weak grandfathering scheme. The most commonly cited reason for this economic result is that the governmentally collected proceeds from an auction can be redistributed to reduce existing tax distortions. *See, e.g.*, DALLAS BURTRAW ET AL., THE EFFECT OF ALLOWANCE ALLOCATION ON THE COST OF CARBON EMISSION TRADING (Resources for the Future Discussion Paper No. 01-30, 2001), *available at* http://www.rff.org/Documents/RFF-DP-01-30.pdf (last visited Nov. 22, 2005); PETER CRAMTON & SUZI KERR, TRADABLE CARBON PERMIT AUCTIONS: HOW AND WHY TO AUCTION NOT GRANDFATHER (Resources for the Future Discussion Paper No. 98-34, 1998), *available at* http://www.rff.org/rff/Documents/RFF-DP-98-34.pdf (last visited Nov. 22, 2005); Ian W.H. Parry et al., *When Can Carbon Abatement Policies Increase Welfare? The Fundamental Role of Distorted Factor Markets*, 37 J. ENVTL. ECON. & MGMT. 52 (1999); Ian W.H. Parry & Wallace E. Oates, *Policy Analysis in the Presence of Distorting Taxes*, 19 J. POL'Y ANALYSIS & MGMT. 603 (2000). This rationale disappears, of course, if the proceeds from an auction are used to fund pork-barrel projects rather than recycling the revenues back to taxpayers. IAN W.H. PARRY, ARE TRADABLE EMISSIONS PERMITS A GOOD IDEA? (Resources for the Future Issues Brief No. 02-33, 2002), *available at* http://www.rff.org/rff/Documents/RFF-IB-02-33.pdf (last visited Nov. 22, 2005). Another, less discussed reason for favoring auctioning over weak grandfathering is the rent-seeking behavior that takes place over the critical question of what formula to use in determining historical emissions. Shi-Ling Hsu, *Fairness Versus Efficiency in Environmental Law*, 31 ECOLOGY L.Q. 303, 372 (2004); Lisa Heinzerling, *Selling Pollution, Forcing Democracy*, 14 STAN. ENVTL. L.J. 300, 323-24 (1995). Some have explicitly considered the distributional impacts of auc-

tantly, the price signal transmitted by the tax or the permit price must be an appropriate and binding one; otherwise, there is no environmental gain at all. But the key characteristic of both Pigouvian taxation and cap-and-trade programs is that they do not mandate specific pollution control equipment installations. It does not, as traditional pollution regulations do, tell the polluter what to do about the pollution.

This lack of control over the polluter has been the subject of intense debate. Some who argue for the traditional form of command-and-control, equipment-based regulation argue that the certainty of emissions reductions provided by command-and-control regulation is much more certain than the speculative (in their view) emissions reductions achieved by market-based mechanisms such as Pigouvian taxes or a cap-and-trade program.[67] Others argue that regulators often lack the monitoring and enforcement tools necessary to carry out market-based mechanisms and that command-and-control can make the best use of scarce administrative resources.[68] And a cap-and-trade program must deal with at least the theoretical possibility of the development of pollution "hot spots" in which a polluter could comply by simply buying up pollution allowances.[69] On the other hand, it has been argued by economists and other proponents of market-based mechanisms that mandated pollution controls may not be the most economically efficient ones and that a Pigouvian tax program or a cap-and-trade program would permit polluters to find the lowest-cost ways of reducing emissions.[70] As well, it has been argued that traditional command-and-control regulation imposes a heavy information burden upon the regulator, relying as it does on technical information that is in the hands of the regulated parties, which have no incentive to share that information with the regulator.[71] These arguments have been made extensively elsewhere and need not be re-hashed here. But there are two arguments that have been overlooked by the parties to this debate.

First, an important but unnoticed psychological effect of command-and-control regulation is that it has lulled polluters into a pollution stupor. Regulated firms may comply with regulatory requirements (or not) without thinking about other ways to reduce pollution. What is there to think about if, by simply installing pollution control equipment, one achieves compliance? If we leave with polluters the task of reducing pollution, and give them rewards for doing so, we stand a chance of engaging them in the overall goal of reducing pollution. The experience with SO_2 emissions trading under the 1990 Acid Rain Program under the CAA is testimony to this. While SO_2 emitters—almost exclusively coal-fired power plants—reacted with ingenuity to the SO_2 emissions trading program, they responded to the more traditional regulation of other pollutants with litigation.[72]

Possibly the most difficult thing for some environmentalists to accept is that aligning business incentives with pollution reduction objectives only recruits the attention of the business side because it appeals to their profit motive. It somehow seems objectionable to these environmentalists that polluters have not internalized environmental norms and are merely trying to reduce costs.[73] But this seems meddlesome. Of what relevance is the motivation for pollution reduction as long as the reductions are actually achieved? Who could have predicted, before the advent of emissions trading, that a pollution control program could have been designed that would have induced a chief financial officer of a polluting firm to ask: "How can we reduce emissions?"

Almost everyone at least pays lip service to the notion that pollution reduction must be accomplished "in partnership" with industry, or with the help or cooperation of industry itself. Few believe we can simply bludgeon industrial polluters into being green. The SO_2 trading program, even though it had the unfortunate distributive attribute of giving away the emissions permits for free, achieved what very few

tioning versus weak grandfathering, finding that low-income households would be worse off and high-income households better off under a weak grandfathering scheme. U.S. Congressional Budget Office, U.S. Congress, Who Gains and Who Pays Under Carbon-Allowance Trading? The Distributional Effects of Alternative Policy Designs (2000), *available at* http://www.cbo.gov/ftpdocs/21xx/doc2104/carbon.pdf (last visited Nov. 22, 2005). Some have even considered the question from the perspective of the polluting firms, in modeling the polluting asset values under the auctioning and weak grandfathering schemes. Dallas Burtraw et al., The Effect on Asset Values of the Allocation of Carbon Dioxide Emission Allowances (Resources for the Future Discussion Paper No. 02-15, 2002), *available at* http://www.rff.org/Documents/RFF-DP-02-15.pdf (last visited Nov. 22, 2005).

67. David M. Driesen, *Does Emissions Trading Encourage Innovation?*, 33 ELR 10094, 10094 (Jan. 2001); David M. Driesen, *Is Emissions Trading an Economic Incentive Program? Replacing the Command-and-Control/Economic Incentive Dichotomy*, 55 Wash. & Lee L. Rev. 289, 311-22 (1998); Richard Toshiyuki Drury et al., *Pollution Trading and Environmental Injustice: Los Angeles' Failed Experiment in Air Quality Policy*, 9 Duke Envtl. L. & Pol'y F. 231, 274-83 (1999).

68. Daniel H. Cole & Peter Z. Grossman, *When Is Command-and-Control Efficient?* 1999 Wis. L. Rev. 887; Sidney A. Shapiro & Thomas O. McGarity, *Not So Paradoxical: The Rationale for Technology-Based Regulation*, 1991 Duke L.J. 729; and Thomas O. McGarity & Sidney A. Shapiro, *OSHA's Critics and Regulatory Reform*, 31 Wake Forest L. Rev. 587 (1996).

69. Lee Anne Fennell, *Revealing Options*, 118 Harv. L. Rev. 1399, 1409 (2005); Jonathan Remy Nash & Richard L. Revesz, *Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 Ecology L.Q. 569, 624-58 (2001). In practice, the few cap-and-trade programs that have been implemented have not generated hot spots. Under the SO_2 cap-and-trade program under the 1990 CAA Amendments, however, only one of the hundreds of regulated utilities chose to purchase emissions allowances as its sole basis of compliance, Illinois Power, and that utility still emitted considerably less than it did before the 1990 Amendments. Byron Swift, *How Environmental Laws Work*, 14 Tul. Envtl. L.J. 309, 329 (2001); Hsu, *supra* note 66, at 390-91.

70. Daniel J. Dudek & John Palmisano, *Emissions Trading: Why Is This Thoroughbred Hobbled?*, 13 Colum. J. Envtl. L. 217 (1988), Robert W. Hahn, *Economic Prescriptions for Environmental Problems: How the Patient Followed the Doctor's Orders*, 3 J. Econ. Persp. 95 (1989), Byron Swift, *Command Without Control: Why Cap-and-Trade Should Replace Rate Standards for Regional Pollutants*, 31 ELR 10330 (Mar. 2001).

71. This in turn leads to a protracted and unproductive debate over what Jamie Colburn calls the "politics of the feasible." Jamison E. Colburn, *The Future of Air Pollution Control in the Corporatist State*, 34 ELR 10577, 10600 (June 2004).

72. Swift, *supra* note 69, at 357.

73. Michael Sandel, *It's Immoral to Buy the Right to Pollute*, N.Y. Times, Dec. 15, 1997, at A23; Mark Sagoff, The Economy of the Earth: Philosophy, Law, and the Environment 52 (1988) (decrying the consideration of private preferences, which Michael Sagoff views as corrupt and irrelevant for public policy purposes, and trumpeting the advancement of what he views as public interest preferences); Frank Ackerman & Lisa Heinzerling, Priceless: On Knowing the Price of Everything and the Value of Nothing 221 (New Press 2004) ("Recycling is the gateway drug of the environmental movement: get the kids hooked on sorting out their trash and soon they'll be addicted to harder stuff."). *Id.*

other environmental measures have: it recruited attention and energy from the business side of regulated industries.[74]

The second overlooked argument in favor of a Pigouvian tax or cap-and-trade program is that these programs would achieve pollution reduction in a capital-neutral manner. That is, these programs would not mandate or encourage the overinvestment of polluting capital as other pollution control regulations do. Regulation that requires the installation of pollution control equipment *creates* a market for pollution control devices that might or might not otherwise exist. A pollution tax or tradable permit scheme also creates a market, but the vital difference is that they do not narrow the market to pollution control devices. To curb the cost of polluting, a firm might find a number of other ways to reduce their pollution bill, some of which might not involve pollution control equipment at all. Before the advent of the SO_2 emissions trading program under the 1990 CAA Amendments, it was thought that the primary means of compliance would involve the installation of scrubbers.[75] Once SO_2 emissions trading began, however, firms found a variety of ways to collect enough emissions permits to cover their emissions, without necessarily installing scrubbers.[76]

This is not to argue that emissions reductions are irrelevant. I do not argue that this industrial feel-good story should not be viewed as the ultimate purpose of market-based instruments such as Pigouvian taxes and cap-and-trade programs. Rather, the point of a Pigouvian tax or cap-and-trade program is to accomplish the same emissions reductions, or perhaps greater emissions reductions, *overall*, as does a traditional command-and-control program. An insufficient reduction in emissions should not be blamed on the *concept* of Pigouvian taxation or emissions trading. The environmental success of such a program is predicated upon the appropriateness of the price signal sent by the tax or tradable permit price. That is, the tax should be high enough, or the number of tradable permits small enough, to actually result in sufficient emissions reduction. The greatest problem with President George W. Bush's "Clear Skies" pollution program, for example, is its lack of ambition, setting lenient pollution reduction targets that culminate in 2018.[77] Fairly dramatic cuts in pollution can be achieved, and *must* be achieved, far earlier than 2018. But it would be misguided to blame the emissions trading concept, and not President Bush, for this fecklessness. Two competing pollution control bills were pending before the 108th Congress, both of which would have introduced far more ambitious goals for pollution reduction, and both of which contemplated emissions trading.[78]

The point of a Pigouvian tax or cap-and-trade program is to incentivize emissions reductions while avoiding distortion of the pollution reduction decision. To be sure, the installation pollution control equipment should be among the options available to polluters looking to reduce emissions. But other options must be available, including those that retain polluters' ability to forestall capital decisions. Depriving polluters of that option and mandating the immediate installation of pollution control equipment may deprive us of an opportunity in the future to achieve potentially greater emissions reductions. This may take the form of an even more effective means of pollution reduction, or a transformation of the production process, outcomes that may not seem feasible with pollution control equipment locked into place.

There are other prophylactic advantages to a Pigouvian tax or emissions trading scheme. If the level of the tax or the quantity of permits proves to be inappropriate, it is a less daunting legal prospect to change them. It may still be very daunting—no regulated industry will quietly accept a ratcheting up of stringency. But some might, in a competitive environment, if they sense that the higher cost of compliance might be more of a problem for their competitors. The high price of jet fuel, for example, has hit all of the commercial airlines hard, but in relative terms, it has worked to the advantage of the healthier ones, such as Southwest Airlines, by pushing their competitors closer to the brink of insolvency.[79] In any case, changing the level of a Pigouvian tax or the quantity of emissions permits, while politically difficult, would certainly be easier than requiring the installation of new pollution control equipment.

The final advantage to a Pigouvian tax or emissions trading scheme may be the most important of all: a Pigouvian tax or tradable permit scheme leaves open the possibility of future regulation of other pollutants. This is of particular importance since at some point, the Bush Administration's recalcitrance notwithstanding, some form of regulation of CO_2 emissions will come to the United States. World opinion of the United States is already that of an environmental pariah; it is only a matter of time when American self-interest will require that it adopt some CO_2 emissions measures just to appease its trading partners, if not an epiphany that global climate change is a problem.[80]

As is the case when we seek to further reduce emissions by raising the Pigouvian tax level or the quantity of emissions permits, it must certainly be easier to introduce new regulation of CO_2 emissions if a polluting firm has not yet sunk hundreds of millions of dollars into a SO_2-reducing scrubber or a NO_x-reducing device. Especially now, when many CO_2-emitting firms are smart enough to look beyond the Bush Administration and anticipate CO_2 regulation,[81]

74. Hsu, *supra* note 66, at 384-85.

75. Swift, *supra* note 69, at 330-31.

76. *Id.* at 327-28.

77. Clear Skies Act of 2003, S. 485, 108th Cong. §§410, 453, 473 (2003).

78. S. 485, the president's Clear Skies plan, sponsored by Sen. James Inhofe (R-Okla.), would have capped NO_x emissions, SO_2 emissions, and mercury emissions in incremental stages from 2008 to 2018. Competing bills S. 843, cosponsored by Sens. Thomas Carper (D-Del.), Lincoln Chafee (R-R.I.), and Judd Gregg (R-N.H.), and S. 5366, sponsored by Sen. James Jeffords (I-Vt.), would have imposed lower caps and at earlier dates. *See, e.g.*, STAPPA & ALAPCO, Analysis of Associations' May 7, 2002 Principles for a Multi-Pollutant Strategy for Power Plants (2003), *available at* http://www.4cleanair.org/members/committee/energy/MultiPollutantChart2.pdf (last visited Nov. 23, 2005).

79. Mary Schlangenstein, *Southwest Airlines Profit Jumps: Lower Fuel Costs Let Airliner Nearly Triple Its Bottom Line*, Wash. Post, Apr. 15, 2005, at E5. Of course, subsequent to publication of that article, Delta and Northwest Airlines have entered bankruptcy proceedings.

80. Senator Inhofe, the Chair of the Senate Committee on Environment and Public Works and the Senate sponsor of President Bush's "Clear Skies" pollution bill, is still calling global climate change "the greatest hoax ever perpetrated on the American people." Senate Floor Statement by James M. Inhofe, Jan. 4, 2005, *available at* http://inhofe.senate.gov/pressreleases/climateupdate.htm (last visited Nov. 23, 2005).

81. For example, American Electric Power, one of the largest coal-burning utilities in the United States, has voluntarily joined the Chicago Climate Exchange for trading emissions permits for CO_2.

allowing them to leave their options open rather than forcing them down the path of certain pollution control equipment seems to be the best "no-regrets" approach. Also, as deadly a pollution problem as SO_2, NO_x, and mercury pose, a strong argument can be made that CO_2 poses the most serious problem in that it poses a catastrophic risk.[82] Choosing the regulatory instrument that best paves the way for (or least gets in the way of) CO_2 regulation seems to be the safest strategy.

VIII. Conclusion

NSR is a rotten concept. Implicit in the very existence of NSR is the concept of grandfathering, the idea that we should discriminate on the basis of timing, NSR being the means of discrimination. Our hubris as lawyers prevents us from seeing the impossibility of devising a rule that is fair for everyone, and also prevents us from seeing the gross inefficiencies created by our good intentions. Environmentalists must discard this legalistic way of thinking, arguing not for a specific conception of NSR but a wholesale abandonment of grandfathering. There is nothing fair about allowing polluters to continue polluting just because they have always done so.

NSR also highlights the core problem with traditional notions of pollution control regulation. Bizarre as it may seem, a public policy of requiring the installation of pollution controls may be the wrong way to proceed environmentally. It seems so simple and logical to simply require the installation of pollution control equipment as a way to reduce pollution. And yet, this is mistaken. It is mistaken because pollution reduction is too closely intertwined with a variety of private operating decisions that are best left to the operator.

What government does best is determine what is harmful to the public, not meddle with complex operational decisions. A governmental agency like EPA can readily determine the extent of harm caused by various amounts of pollution and translate that into a Pigouvian tax level or a quantity of emissions permits. Certainly, this process would be fraught with political peril, but at least EPA does not have the information disadvantage that it has when it tries to determine what pollution control equipment it can require of polluters.[83] There is even the hope that in an argument over the appropriate level of taxation or the appropriate quantity of emissions permits, the debate will shift to the harm caused by pollution. This would be a welcome shift, away from the perplexing debates we currently have over what kinds of pollution control mechanisms are affordable or cost effective. This is the information problem that cripples EPA when it tries to implement traditional, command-and-control forms of pollution regulation.[84]

We have, after 35 years of experience with environmental law, failed to learn a fundamental lesson about government regulation: we cannot, through requiring the installation of pollution controls, instill in polluters a sense of environmental stewardship. We simply cannot treat polluters as we treat criminals. It works only passably in our criminal justice system (although some would disagree), and it is grossly inappropriate in our system of environmental law. Polluting is sometimes worth it, sometimes not, but the underlying productive activity is often impossible to separate from the harmful act of polluting. The only way to reconcile the productive activity with the harmful byproduct of pollution is to price the pollution and let the market sort out what pollution is worth it, and what is not worth it. Government must not get involved with the noble yet doomed effort to obsess with treating everyone fairly. That is the invitation to rent-seeking that has plagued environmental law. If government concentrates on that which it has the expertise to handle—the harm side of the ledger—we might get an environmental law that is actually focused on the environment and not on the regulated industries.

82. Richard Posner has recently completed the book *Catastrophe*, arguing for greater regulation of greenhouse gas emission because of the catastrophic risks posed by global climate change. Richard Posner, Catastrophe: Risk and Response (2005).

83. Colburn, *supra* note 71, at 10601.

84. *See, e.g.*, Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 Geo. L.J. 257, 263-70 (2001) (discussing the "information bottlenecking" that limits the ability of EPA to carry out conventional regulation).