
POLLUTION TRADING IN LA LA LAND

James L. Johnston

Southern California is the home of the defense industry, movie studios, religious cults, Disneyland, Muscle Beach, race riots, brush fires, earthquakes, floods, and celebrity murder trials. It is perhaps best known, however, for its ever-present smog.

Despite popular perceptions, the major cause of air pollution in Los Angeles is not industrial activity or a car-obsessed population but is instead the meteorology and topography of the region. The L.A. Basin is ringed by mountain ranges that trap the precursor emissions (volatile organic compounds and nitrogen oxide) that together are the main ingredients of low-level ozone, or smog. The air stagnation that results typically lasts up to two weeks or more in duration. When coupled with the high temperatures of Southern California (about 90 days a year above 90 degrees fahrenheit), an ideal environment exists for the formation of smog. Although L.A. is not unique in this circumstance (Mexico City and San Paulo, Brazil, experience

similar phenomena), L.A.'s meteorology and topography are unique among North American cities, which largely explains why air pollution over that city is more severe than smog over even heavier industrialized cities such as New York, Chicago, and Houston.

Southern California is well known as a national incubator for cultural and political trends, and that certainly holds true for L.A.'s war on air pollution. As both environmentalists and market economists grow increasingly disillusioned with the high cost and low effectiveness of additional command and control regulatory edicts, interest has turned toward a more market-oriented approach. Emission sources are allowed the freedom to use whatever abatement techniques achieve the required environmental ends. Although intermittently attempted on a small scale for decades (with, it must be noted, disappointing results), market-oriented regulation made the national big-time during the 1990 Amendments to the Clean Air Act, where sulphur dioxide emissions (the alleged cause of acid rain) will be regulated starting in 1995 under a "allowance trading" program for electric utilities. Heady from their political victory at the federal level, the proponents of allowance trading turned their attention to Southern California

James L. Johnston is a formerly the senior economist for Amoco. He is presently a policy adviser to the Heartland Institute and adjunct faculty in the Financial Market Trading Program at the Illinois Institute of Technology.

where regulators there were anxious to attempt an even more ambitious application of this new policy trend.

Thus on October 15, 1993, the South Coast Air Quality Management District (SCAQMD) adopted by a vote of 11 to 1 the Regional Clean Air Incentives Market (RECLAIM), a measure designed to allow point sources of certain air pollutants to buy and sell permits issued by the SCAQMD. But not everyone is totally happy with the plan. Some of the largest emission sources such as southern California's refiners only reluctantly have gone along while environmentalists are generally opposed to RECLAIM not necessary because of the trading regime itself but because of the delayed clean up requirements of the plan. However, Henry Wedaa, a Yorba Linda city councilman who chairs the SCAQMD Board, spoke for many diverse interests when he declared that "this is a very complex program, but it's going to work . . . RECLAIM will enable us to have clean air and a healthy economy."

Whether RECLAIM can actually live up to its advanced billing or will simply prove to be a myopic example of Gorbochevian market planning is addressed below.

RECLAIM Explained

The RECLAIM program covers 390 stationary emission sources of nitrogen oxides and 41 emitters of sulfur dioxide. The target reductions closely parallel those in an alternative command and control plan drafted by the SCAQMD. Table 1 demonstrates the dramatic nature of the NO_x and SO_x reductions that RECLAIM is designed to achieve.

Although it would appear that RECLAIM is bound to have a significant effect on the concentration of air pollutants in Southern California, the plan covers only stationary sources of those two compounds that emit more than 4 tons per year. Consequently, the system deals with just 17 percent of the total NO_x emissions in the South Coast Air Basin and 31 percent of the total SO_x emissions.

The district is considering the possibility, however, of establishing a market-based program for reactive organic compounds as well. Presentation of such a plan to the district's governing board is anticipated sometime in 1994. Unlike NO_x and SO_x, which have a great deal in

Table 1

Total RECLAIM Emissions (tons per day)			
YEAR	NO _x	SO _x	
1987	143	30	Actual
1994	106	24	Projected
1997	65	19	Projected
2000	35	26	Projected
2003	26	10	Projected
1994-2003	-80	-14	Projected

common with respect to source (fuel combustion), reactive organic compounds come from other sources such as coating and solvent operations.

The alternative to RECLAIM is a "command and control" approach where abatement is specified in meticulous technical detail. The SCAQMD staff has forecast the cost of a command and control plan based upon a list of equipment and process changes that might have been ordered under the regulations. They have

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also estimated the cost of RECLAIM based upon three main calculations: the anticipated prices of the RECLAIM Trading Credits (RTCs); the record keeping and measurement costs for trading; and a conjecture about the "opportunity cost" of the initial endowment of the credits. The primary determinate of the cost savings supposedly delivered by the RECLAIM program, however, is the trading process itself and that process is in turn largely dependent upon the estimated market clearing prices for the RECLAIM trading credits. The prices for those RTCs, as estimated by the SCAQMD, are shown in Table 2.

Table 2			Table 3			
Average Prices for RTCs (1987 dollars per ton)			Cost and Savings Estimates (millions of 1987 dollars)			
YEAR	NO _x	SO _x	YEAR	C&CP	RECLAIM	Savings
1994	577	577	1994	49	10	38
1995	577	1531	1995	112	14	98
1996	9434	6246	1996	123	76	47
1997	9151	3062	1997	127	94	33
1998	8877	2970	1998	193	125	68
1999	11257	2882	1999	229	165	64
			Ave.	139	71	58

Table 3 summarizes the cost estimates for the command and control plan drafted by the SCAQMD and the RECLAIM alternative. Also included are the differences between the two, which are the notional "savings" from adopting RECLAIM. If Table 3 can be believed, the emissions trading scheme contained in the RECLAIM plan promises substantial savings over the command-and-control alternative.

Most firms will have to struggle to meet the implied reduction in emissions represented by the initial allocation of trading credits.

Surcharge for Credits—Complicating the Problem

In the middle ages, it was a custom for the condemned to tip the executioner so that he would swing the axe effectively and bring death quickly. The district has resurrected this quaint tradition by charging a fee on the RECLAIM credits allocated to facilities as though the credits are a gift from the district. It should be remembered that the initial allocation of trading credits represents the reduced level of emissions. Thus, in a very real sense, the allocation already represents a taking from the emission source. Most firms will have to struggle to meet the implied reduction in emissions represented by the initial

allocation of trading credits. The imposition of a fee on top of that effort, will be the *coup de grace* for many firms in the basin.

The assertion on the part of the district is that the RECLAIM emission allocation fee is a straight-forward replacement for the annual emission fee that exists in the SCAQMD. That may well be. However, it raises a serious question—why have both a regime to limit emissions and a system of fees on emissions as well? Moreover, overlaying an emission fee on top of mandated reductions should bring about an adjustment in the schedule of emission decreases.

The existence of a fee also raises another question. An emission fee is often viewed as an alternative to command and control and other policies to reduce pollution. A fee has the important advantage of neutrality with respect to abatement choices. On the other hand a fee policy requires a stable relationship between the fee and the improvement in environmental quality.

That complication, it is interesting to note, has been resolved already in the RECLAIM effort. As reported above, a set of equilibrium prices has been assembled that achieves the desired emission reduction. If there is any validity to that exercise, then all the economic conditions are in place for designing a viable fee-based system of emission reduction.

There is a drawback that a fee system shares with the command and control alternative. When emission reduction occurs as a result of shutting down a stationary source, there is no benefit from acquiring that source by a firm that continues operations in the basin. Such a firm will still have to pay the fee on its emissions

without obtaining credit from acquiring and closing down other sources.

The ostensible purpose of the fee system, whether it is command and control or RECLAIM, is to finance the district's operations. This is a questionable arrangement. It is like the IRS deciding its own cases. This design casts doubt on the expectation that the regulatory decisions will be free of financial conflicts of interest.

There is something to be said for conforming the RECLAIM fees to the existing district plan—it leaves the institutional conditions unchanged. But the economy and the emissions in the Basin will surely be evolving (one hopes for the better). That suggests going to a more neutral fee, such as a lump sum levy which does not affect the firm's marginal cost. Since the fee arrangement is not yet settled, the district should consider cleaning up its act with respect to fees.

Hoarding and Risk Management

Another complication of the RECLAIM program is the fact that RTCs are limited to a term of one year. The reason offered in the RECLAIM documentation for limiting the term of the credits is to reduce the chances of hoarding. The district is ostensibly trying to avoid the problem incurred by the lack of expiration date on the SO₂ allowances in the federal 1990 Clean Air Act. The effect of the latter is to allow "banking" of allowances to cover future volatility and uncertainty. Since there are two phases laid out in the Clean Air Act (the latter phase contains more stringent requirements), the effect of the nonexpiring allowance is to stimulate the early reduction of emissions. In that way an electric utility gains more flexibility in its future operations. It is prepared, for example, for an unusually warm summer when the surge in demand for electricity is especially great. The utility can increase generation and handle the overproduction of emissions by drawing from its "bank."

In a very real sense, the allowance in the Clean Air Act is like a futures contract with a linked option. And because of this, the utility has an extra tool in its risk management efforts.

While the RECLAIM credit has only a one-year life, it is also a combined futures and option contract. An emission source with extra RECLAIM credits can either sell them or hold

them in reserve until the end of the year in case emissions grow larger than were originally expected. The unsold credits are like insurance and consequently part of a firm's risk management plan.

The RECLAIM credit, and therefore the option component, is exercisable only on a specific date. That means that the option is a so-called European, as opposed to an American, type. The fair value of such options has been successfully modeled by economist Fischer Black. The model is very robust and is used extensively by arbitrageurs in commodity exchanges. The table below presents the calculations of option premiums for several times to expirations, along with the associated assumptions about interest rates and expected volatilities.

The use of the word "hoarding" puts a perjorative spin on a perfectly reasonably risk management strategy—there is nothing wrong with setting aside precautionary stocks in advance of a crisis.

Three of the four expected volatilities are taken from the recent trading of natural gas options on the New York Mercantile Exchange. Natural gas is the fuel of choice for reducing SO₂ and NO_x and therefore its implied volatility is a relevant indicator for the RECLAIM trading credits. The expected volatility for the ten-year option is an extrapolation. The interest rates are taken from the Treasury yield curve. The times to expiration are those relevant to the RECLAIM trading credit. The three, six, and twelve month periods are three points in the life of the RECLAIM credit. The ten-year period coincides with the case where the expiration is the end of the RECLAIM program in 2003.

A couple of conclusions can be drawn from the calculations. First, while the ten-year premiums add 21 percent to the value of a reclaim credit, the lesser premiums for the shorter periods are still substantial. They are, nevertheless, sufficiently large to generate what some would call hoarding. Of course, the use of the word "hoarding" puts a pejorative spin on a perfectly reasonably risk management strategy—there is

Table 4

RECLAIM Options Assumptions and Premiums				
	3 months	6 months	12 months	10 years
Volatility	.45	.40	.35	.30
Interest %	3.1	3.3	3.5	5.7
Premium	8%	11%	14%	21%

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Another implication of the options interpretation is that a longer life for the RECLAIM credit would dispose of the flurry of trading at years-end when information is less reliable and price volatility is greater. It might be remembered that this was the rationale for a two-cycle RECLAIM contract. A longer term for the credit could also have simplified the reduction schedule and provided an incentive to accelerate the actual decrease of emissions. When structuring a plant's operations, it is easier to accommodate a single environmental event than a series of annual reduction targets.

Finally, incorporation of the option premiums in the pricing of the trading credits raises the net cost of RECLAIM. In the context of the revised estimates presented above, the option premium would further raise the anticipated cost difference between RECLAIM and the command and control alternative.

Regrettably, it is not now possible to change the term of the RECLAIM credit. What can be done, however, is to avoid misrepresenting the genuine effects of the one-year term and to adjust further the estimated costs of the RECLAIM program, and once again, to adjust those costs upwards of even the revised figures presented in Table 4.

Property Rights—The Forgotten Prerequisite for "Market" Regulation

Proponents of emissions trading often defend their artificial market by associating it with the

economic theories of Nobel prize winning economist Ronald Coase. Philip R. O'Connor, the chair of the EPA's Allowance Tracking and Trading Subcommittee of the Acid Rain Committee, for example, asserts that "allowances are consistent with economic theory (Coase)." O'Connor and others seem to believe that their emissions trading model is exactly the kind of market exchange that Coase had in mind in his classic essay "The Problem of Social Cost." Coase is better

known, however, for stressing the importance of well-defined property rights in promoting efficiency in the allocation of resources.

As is often the case with Nobel laureates, Coase is more honored in ceremony than in practice. The allowances in the Clean Air Act that O'Connor believes are consistent with Coase's emphasis on well defined property rights are in fact denied property rights status. Essentially, the federal government did not want to be required by the Fifth Amendment to the Constitution to be responsible for actions that might affect the value of allowances.

The situation is similar for RECLAIM. RECLAIM credits which are to be traded are explicitly denied property-right status. Rule 2007(b)(3) says "An RTC [RECLAIM Trading Credit] shall not constitute a security or other form of property ..."

The mistake is compounded in the next section (4) which says

Nothing in District rules shall be construed to limit the District's authority to condition, limit, suspend or terminate any RTCs or the authorization to emit which is represented by a Facility Permit.

As with the federal Clean Air Act, the district in Rule 2007 is insisting on being exempt from responsibility for its actions. At the same time the district is demanding that all other parties be strictly liable for their mistakes, including penalty fees for exceeding emission caps.

The lack of property rights for RTCs has several rather important implications for

RECLAIM participants. With all the uncertainties of a new system and the prospect that any mistakes by the district will be imposed on the participants, investment will more likely be diverted outside the Basin. The alternative is a dubious gamble on the consistency and predictability of SCAQMD regulators who will undoubtedly be tempted to revamp and fine-tune the permit levels as the grand RECLAIM experiment begins to yield (either poor or good) results.

Emission sources that plan to remain in the Basin, (albeit at a reduced level of operations) will acquire the assets of emission sources that are departing the area rather than installing the costly abatement measures. By doing this, the acquiring firm gains better defined property rights in the emission reductions from the shut down installation than would be obtained from the RECLAIM trading credits alone. The acquisition is equivalent to an averaging of emissions over a larger number of sources, all of which are now within the corporate boundaries.

There are other ways to average emissions and "game" the new RECLAIM system. One method is a joint venture of firms that stay in the area which purchases assets of the departing sources. The joint venture would allocate the eliminated emissions among its equity partners by a contract that could be subsequently enforced through the courts. This legal form exists in many operations, notably among pipelines.

Another way of aggregating over emission sources is for the local electric or gas utility to purchase the assets of the departing firms. The utilities could then repackage the reductions with their ordinary energy services, for which property rights are well defined. Of course, such an action would have to pass muster with the state utility commission. It would also have to survive legal scrutiny on antitrust grounds, and both are sizable hurdles.

Also problematic for the district is the tax treatment of credits. There are myriad ways to characterize purchased credits, all of which have unique tax and fiscal implications. The Internal Revenue Service may treat RTCs as



inventory, financial instruments, property used in trade or business, materials and supplies, ordinary and necessary business expense, or costs of producing inventory. Observers feel that

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the most likely arrangement to be approved by the IRS for purchasers of credits is "property used in trade or business."

Without property status, however, it is not clear that the tax treatment of allowances can be successfully reconciled with the body of tax law that is based on the assumption that an asset is indeed property. Thus, firms that trade credits will not be certain of their future tax liability. That is, except for the standard assumption that the IRS has a tendency to decide ambiguous issues in its favor.

All of the above factors tend to lessen open trading of emission credits. This in turn will make it more difficult for the district to monitor activities and will dramatically complicate the assessment of the RECLAIM trading system.

Halfway through the first year of RECLAIM, the trading has been modest, to put it charitably. The auction designed to handle high trading volume has twice been postponed for lack of demand. As of the end of June 1994, there has been only one substantial trade. Union Carbide's Torrance plant sold \$1.2 million worth of credits covering 1,700 tons of NO_x to Anchor Glass

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Container Corporation. That is an average price of \$700 per ton, which is larger than the \$577 price predicted in the final draft of the RECLAIM report. It is also 4.5 percent of the total number of 37,511 credits that make up the 1994 starting allocation.

Citizens for a Better Environment claims in a lawsuit that the lack of more substantial trading is due to too many credits being issued, leaving a glut on this new market. Yet if an oversupply of credits exists, the actual price would be lower than predicted, not higher.

One might believe that instead of trading, each firm is actually planning to install air pollution control equipment. But if this were true, the equipment business would be booming. The reality is that it is not. One firm, Wahlco Environmental Systems of Santa Ana, took a \$56 million pre-tax loss in the second quarter of 1994 because the market for air pollution control products has failed to meet expected levels.

One explanation that is consistent with the pattern of early trading is that the market is being affected by the credits being denied property-right status. It might well be the case that firms are adopting a more defensive strategy. That is, many firms faced with high costs of abatement are planning to shut down operations

in the L.A. Basin with the expectation that they will sell their physical assets, including the emission reductions, to firms that plan to stay in the area. Thus, trading disappears from the organized RECLAIM credit market and reappears later as an internal transfer within the new larger corporate structure of the firms that stay in the area.

Failing the Cost-Benefit Test

The rationale for reducing emissions in Southern California is ostensibly to improve public health in the South Coast Air Basin. The RECLAIM report asserts that the system "has been designed to achieve equivalent or better pollution reductions necessary to protect public health as would have been attained under the current regulatory program."

Yet other than detailing the state and federal standards that apply to emissions, there is no quantification of the benefits to be derived from implementing a program that drains \$200 million or so from the economy of Southern California. Are the benefits from "pollution reductions necessary to protect public health" worth the costs? The RECLAIM report does not address that question, except to describe how the command and control alternative and the RECLAIM system both satisfy the legal mandates of state and federal statutes. In a very revealing admission, the RECLAIM report acknowledges that

Over the last decade and a half, there has been significant improvement in air quality in the district. . . . In 1992, there were no recorded exceedances of either the state or federal SO₂ standards. Annual average concentrations of NO₂ decreased over the period 1976-1992. By 1992, there were no monitored exceedances of the federal NO₂ standard. Los Angeles County was the last area in the United States to meet the federal standard. The state NO₂ standard was, however, still exceeded in 1992 at three of the district locations in which it was monitored. The highest one-hour average concentration in 1992 was 20 percent above the state standard.

Although NO_x is a contributing factor to low-level ozone, it is generally agreed that volatile organic compounds play a much greater

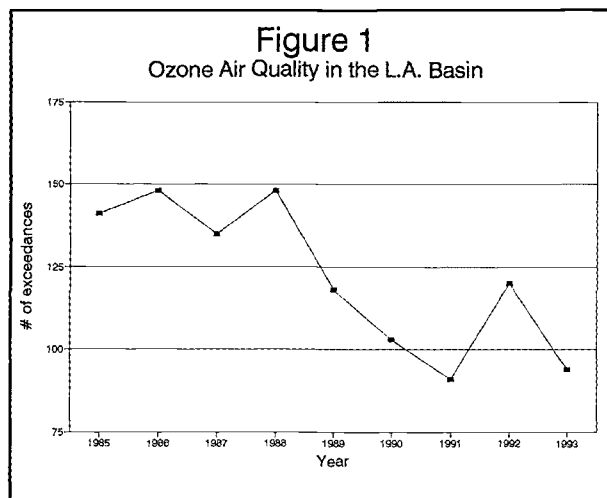
role in smog formation in L.A. than does NO_x . Moreover, L.A. has experienced a dramatic decline of days in which it has exceeded the federal ozone standard over the past decade, as Figure 1 demonstrates.

If there is any relationship between emission standards and the effect of emissions on public health, it would seem that the additional post-1994 improvements in the South Coast Air Basin's public health from either SCAQMD plan are small. Perhaps they are too small to be measured and that may be the reason the district did not include them in the RECLAIM report.

The omission of this salient consideration brings to mind the contribution of Ronald Coase which was part of the basis for his Nobel prize. He discusses the reciprocal nature of pollution. The traditional environmental problem, he says, is commonly thought of as one in which A inflicts harm on B and what has to be decided is: how should we restrain A? But this is wrong. We are dealing with a problem of a reciprocal nature. To avoid the harm to B would inflict harm on A. The real question has to be decided is: should A be allowed to harm B or should B be allowed to harm A? The problem is to avoid the more serious harm.

In order to do this, it is necessary to evaluate not only the cost of abatement but also the cost of not reducing emissions. In other words, a proper environmental impact analysis must include a continuing reassessment of the benefits from improving the air quality. Failure to do this risks a loss in public support for pollution abatement.

An example of the kind of mistake that can take place is the policy problem of global warming, in which NO_x plays a role. In 1988, the Intergovernmental Panel on Climate Change was established, and in a 1990 report it predicted a possible increase in average temperatures of from one to five degrees celsius. Two years later that same IPCC reported that over the last century global mean temperatures have risen only 0.3 to 0.6 degrees Celsius. Moreover, the 1992 report concluded that no definite association can be made between warming and human activity, nor will scientists be able to verify such a hypothesis for a decade or more. Notwithstanding this revised opinion about the threat of global warming and the estimate of the long-term cost of reducing global carbon emissions on the order of four percent of world GDP,



the Clinton Administration in April 1993 reversed U.S. policy and is expected to press for the addition of substantive protocols to the Framework Convention on Climate Change.

The science behind the supposed threat posed by SO_x is also less than one would presume. The major problem in connection with SO_2 is acid rain. An authoritative study of the acidity of lakes and soil was conducted in the late 1980s as a part of the National Acid Precipitation Assessment Program. It was found

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that there was little correlation between SO_2 emissions and the acid condition of lakes and soil in the northeastern United States. Moreover, even if there were a connection, there are less costly ways of reversing acidity than to reduce SO_2 emissions from electric power generation. In any case, "acid rain" is an eastern—and primarily northeastern—phenomenon, and is simply not a problem on either the Pacific Coast or in the mountain states.

The need for NO_x or SO_x emissions reductions under RECLAIM or the command and control alternative has simply not been proven. It is certainly questionable whether or not

improving reducing those emissions is worth hundreds of millions of dollars per year under either plan.

Trading-Up the Level of Pollution?

The task of reducing emissions is a difficult and costly one. If it were not, the problem would have been solved long ago. One of the complications from the effort to reduce emissions is that the process itself creates emissions and stunts industrial competition.

Two examples have already arisen under RECLAIM. One is the process that reduces the discharge of reactive organic compounds at sta-

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tionary sources. The other is the making of reformulated gasoline which has the potential of reducing emissions from mobile sources. In both of these cases, NO_x emissions are increased somewhat in order to achieve more substantial reductions in reactive organic compounds.

The R.R. Donnelley plant in Torrance is the first case. In testimony on October 15, 1993, Dale Colina of R.R. Donnelley described how the increase in NO_x emissions at the plant is a direct result of the mandated reductions in reactive organic compounds. The problem was aggravated because the abatement equipment was installed after the base period. This effectively lowers the starting allocation in the reduction schedule and makes it more difficult for Donnelley to remain in the Basin. RECLAIM does not offer even a 5-percent allowance in cases like these. The District's response is for such firms to purchase credits from other sources. Clearly, activities like printing can be done outside the Basin and shipped into the market. Thus, the NO_x victory will force many such firms out of the basin and may also result in an increase in mobile emissions.

The other case of pollution interaction involves the production of reformulated gasoline

in the Basin. Most refineries there have been given up to a 5-percent increase in NO_x emissions if they commit to producing reformulated gasoline. It is unlikely that this is a sufficient incentive for refiners in the Basin to generate reformulated gasoline to comply with federal clean fuel requirements and the California Air Resources Board's Phase II regulations for fuel. Several smaller refiners have suggested that a 20 percent allowance would better facilitate the production of reformulated gasoline. With just a 5-percent allowance, production of this environmentally superior gasoline will take place largely outside of the Basin. Oil companies with refineries both inside and outside the Basin will be able to handle the regulation better than those with a single refinery in the Basin. That may have repercussions on competition among refiners in the Southern California.

There was a last minute change in the RECLAIM regulations for refiners that produce reformulated gasoline.

[A] refinery may not exceed five percent of any refiner total starting Allocation, unless any facility emits less than 0.0135 tons of NO_x per thousand barrels of crude processed, in which case the Allocation increases shall not exceed twenty percent. This provision was included so as not to provide a competitive disadvantage among refiners.

Complicated last minute changes provoke skepticism, especially when the rationale is the promotion of competition. The question that arises is which refiners are affected and which are not. To answer that question, the 1994 starting allocations for NO_x were collected from the RECLAIM documentation, and the 1993 crude oil runs were taken from the *Oil & Gas Journal*. The data and the rough calculation for the tons of NO_x emissions per barrel of crude oil capacity at the refineries are shown in the following table.

From these rough calculations, it can be seen which refiners are likely to qualify for the 20-percent reformulated gasoline allowance. The first six refiners (ranked by NO_x tons per barrel of crude oil capacity) are small by industry standards and without the capability to produce reformulated gasoline in competition with refiners outside the Basin. Of the larger refineries, none are within striking distance of the RECLAIM threshold with the sole exception of

the ARCO refinery located in Carson. One concludes therefore that the last minute exception inserted in the RECLAIM regulations applies only to the ARCO refinery and hardly qualifies as a provision that promotes competition as is claimed.

Emissions Trading and Auto Scrapping

Proponents of emissions trading schemes often acknowledge the nature of the problems addressed above but still maintain that there are plenty of examples of such schemes actually working and that RECLAIM is designed to build upon those demonstrable successes. RECLAIM proponents often suggest that their program is modeled after one such example often billed as perhaps the most striking "emissions trading" success—the automobile scrapping program undertaken by Unocal Corporation. In fact, in 1992 the President's medal for innovation in the environment and conservation was awarded to the Unocal, and the President's Council on Environmental Quality deemed the program

an unprecedented effort to improve air quality in the Los Angeles Air Basin by scrapping heavily polluting pre-1971 cars. In four months, the company purchased and crushed for recycling 8,376 old cars. SCRAP reduced air pollutants by 13 million pounds per year at a cost of 50 cents per pound.

RECLAIM contains a specific rule governing the scrapping of old vehicles. Actually the rule predates RECLAIM, having been adopted in January 1993. And the program itself predates the adoption of the rule. Moreover, another oil refiner, Chevron, has also begun a scrapping exercise.

There appears to be an important lesson in this experience. While scrapping of old vehicles is the one demonstrable trading success, it involves a trading partner that is outside the main RECLAIM market.

Note also that it is a variation on the type of trading discussed above. One source buys and then eliminates another source, in this case a mobile source. Since the buying institution acquires a wider array of emission sources, the emission trading takes place totally within the institution's corporate structure and thereby finesses the problem of ill-defined property rights.

Table 5

NO_x Starting Allocations per Barrel of Crude oil

Refiner	start tons/yr	1,000 bbl/day	start tons/bbl
Chemoil	11	22	0.0014
Edgington	26	42	0.0017
Huntway	8	6	0.0037
Ultramar	327	68	0.0132
Fletcher	159	30	0.0147
Paramont	225	40	0.0156
ARCO	1853	237	0.0214
Powerine	453	47	0.0267
Chevron	2822	226	0.0342
UNOCAL	1518	119	0.0350
Mobil	1897	127	0.0409
Texaco	1499	95	0.0432

The scrapping program, however, is not without its critics. During the hearings in September and October 1993, the most vocal were the collectors of older vehicles and the mechanics that maintain them, who found the mainstay of their business removed from the marketplace. Their major point was that older cars are not necessarily the largest polluters. That tracks with the work of Donald Stedman, a professor at the University of Colorado, who has actually sampled emissions from vehicles as they exit expressways.

The prelude to a possible compromise arose during the hearings on October 15, 1993. Chevron offered a 5-day period between the \$700 acquisition of an old vehicle and the actual scrapping. During this 5-day period, old car enthusiasts would be free to cannibalize the vehicles for spare parts. At least one old car enthusiast expressed approval of the plan offered by Chevron. It should be noted that the potential deal resulted from direct communications between principals, not through mediation by the district. Indeed, the district's last minute reaction was to cap the overall annual number of scrappings to 30,000 autos.

Conclusion

The Regional Clean Air Incentives Market is substantially flawed. The small reductions in

NO_x and SO_x emissions have come at a cost of millions of dollars per year. Moreover, the benefits from health improvements have not been shown by the South Coast Air Quality Management District.

The RECLAIM trading credits have been denied property rights status and that will (indeed, already has) put a damper on the trading of credits. Very little emission reduction will come as a result of installation of abatement equipment. Most will come from emission sources that depart from the Basin, taking with them incomes and jobs. The one-year term of the trading credits will also curb trading by limiting their use as a risk management tool.

Indeed, should anyone have expected a government attempt at inventing a market to succeed?

Uncertainties in the federal income tax treatment of credits will also hamper trading, as will the SCAQMD plan to levy a fee on the credits.

On the other hand, firms have found other ways of reducing the costs of improving air quality in the basin. The old auto scrapping program is an example that is already working. A variation on this theme is that firms planning to remain in the Basin might purchase the assets, including the emission reductions, from other sources that shut down and leave the Basin. These are just two examples that help alleviate the RECLAIM property rights problem.

But these fixes cannot repair the basic flaws in the design of RECLAIM. Indeed, should anyone have expected a government attempt at inventing a market to succeed? The often cited Nobel laureate "father" of these government market mechanisms, Ronald Coase, clearly saw

the problem nearly 35 years ago ... to make the owner of the factory liable for the damaged caused to those injured by the smoke, or alternatively, to place a tax on the factory owner varying with the amount of smoke produced and equivalent in money terms to the damage it would cause, or finally to exclude the factory from residential districts ... lead to results which are not necessarily, or even, usually, desirable.

The crucial lesson that must be learned is that existing, tried-and-true market solutions, not government surrogates, are the only institutions that are likely to be effective in dealing with air pollution and other environmental problems.

Will RECLAIM develop into a workable system develop? The answer to that question will turn on the willingness of the district to learn from its mistakes and repair the faulty design before it is too late. Society needs a good experiment with sound property rights and real market institutions in order to improve the environment. Unneeded is a poorly designed system that gives market trading a bad name.

Could the district actually reform the RECLAIM system before it is too late? It is possible. After all, stranger things have happened in Southern California.

Selected Readings

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- Milliman, Jerome W., "Can Water Pollution Policy Be Efficient?" *Cato Journal*, Vol. 2, no. 1, Spring 1982, pp. 165-194.