

## **PART THREE – CONCLUSIONS AND RECOMMENDATIONS**

Developing a cap-and-trade program is a very challenging endeavor. Properly designed, this type of market incentive program can secure emission reductions that are inflation-proof (i.e. locked in despite economic growth) and certain. Appropriate allocations, robust monitoring, and carefully monitored trading are critical for achieving real emission reductions.

It is difficult to develop program rules that major stakeholder groups will support, because the viewpoints of various industry sectors, environmental and community groups, and the needs of the regulatory agency are often diverse. Finding the right balance between the interests requires significant time and resources, and innovative approaches.

District staff, based on its overall experience with RECLAIM program implementation, continues to support the use of well designed cap-and-trade programs, which can be used effectively in combination with traditional command-and-control approaches to reduce air pollution.

This section includes summaries of the RECLAIM experience and general recommendations for future cap-and-trade programs. With over a dozen years of implementing RECLAIM, District staff has a number of observations and recommendations to offer that may help in the design and implementation of future cap-and-trade programs.

### **Conclusions**

On balance, District staff believes that the RECLAIM program has proven to be a valuable tool in reducing air pollution in the South Coast region. After more than a decade of implementation, there are several elements that District staff recommends as general considerations for future cap-and-trade programs.

#### **Summary of the RECLAIM Experience – What Worked Well**

##### **Program Emission Reduction Objectives Achieved**

RECLAIM locked in a cap and declining balance that has been met every year except for 2000 and 2001, with the convergence of the crossover point and the California energy crisis. The program met all statutory requirements upon adoption and in subsequent years when updates were required pursuant to Health and Safety Code §39616. Compliance with annual allocations each year has been very high (96 to 98 percent), since the energy crisis. Significantly more stringent monitoring provisions have led to better emissions information.

From 1994 to 2005, additional emission reductions of 43 tons per day of NO<sub>x</sub> and 10 tons per day of SO<sub>x</sub> have been realized from hundreds of facilities that started the program already well controlled through decades of source-specific, command-and-control regulations. This represents a 62 percent and 50 percent net decrease in actual emissions of NO<sub>x</sub> and SO<sub>x</sub>,

respectively, in spite of Basin-wide employment growth of 26 percent in that same time period. RECLAIM locked in emission reductions from many rules that had yet to be written, which may have been contentious or controversial to develop.

### **Credits Were Not to Create a Property Right**

To preserve flexibility to amend the program, suspend or terminate credits, or even abolish the program if it is not working, it is necessary to design the credit not to constitute a property right. This is done by including appropriate rule language in the credit definition, and reserving the right to amend or terminate credits or the program.

### **Offsets: Mobile Source Credits**

To provide increased program flexibility, pilot credit generation rules for mobile and area source credits were designed. Such programs can provide a “safety valve” by creating the opportunity to add additional credits into the system. Some have argued that this threatens the integrity of the cap. Unique enforcement issues included assuring that these credits remain surplus over time, that the reductions occurred within the District, and that adequate monitoring and recordkeeping occurs. Finally, because these credits were issued based on commitments for future reductions, the rules required that any shortfall be made up by the credit generator, and failing that, by the credit user.

### **Periodic Technology Reviews and Allocation Adjustments**

In 2005, a BARCT assessment resulted in rule amendments to reduce RTCs by over 20% by the year 2011 to reflect the current level of technology available for the types of equipment in NOx RECLAIM. Such periodic assessments would be valuable for future cap-and-trade programs.

An extensive evaluation was undertaken for each of the major categories of equipment in the program. Staff evaluated what controls or changes had been implemented by RECLAIM and non-RECLAIM facility operators, what rules were in place by any other local air district or state, and what technologies had been employed. Cost-effectiveness was also a consideration, as some districts had rules with lower emission limits than the rules subsumed by RECLAIM. However the equipment covered was less controlled than the starting universe in RECLAIM, so the incremental reductions would not be cost-effective in RECLAIM. Another criteria that staff evaluated was whether a rule would be pursued in the absence of our cap-and-trade program. The evaluation resulted in rule amendments with 19 emission categories identified with new BARCT levels. Reductions will be realized by applying a greater than 20 percent reduction to all allocations or RTC holdings by the year 2011. A review for SOx BARCT is currently underway for potential rule amendments in 2008.

### **Summary of the RECLAIM Experience – What Could Have Been Improved**

The following sections describe aspects of the program that have been problematic or could have been done differently.

### **Over-Allocation at Program Start-Up**

The RECLAIM program design intentionally led to higher allocations than actual emissions during the first few years of the program because of concerns that facility production fluctuates from year to year and there was a desire not to lock in production levels during a recessionary period. Letting each facility pick a peak year for the basis of 1994 and 2000 allocations, allowing correction of prior-year emission reports to increase allocations, and addition of existing ERCs held by RECLAIM facilities contributed to the inflated start point. The anticipated crossover point was five to six years after the program started.

District staff did not expect that the amount of over-allocation would be as high as what occurred. The first year of the program there were 37 percent unused RTCs. In the second year there were 28 percent unused RTCs, in spite of the large use of RTCs to cover conservative emission estimates required under missing data procedures. Except for 2000 and 2001, the typical amount of unused RTCs each year is about 20 percent.

### **Delayed Installation of Control Equipment**

Initial over-allocation led to an abundant supply of inexpensive credits for the first few years of the program, which likely substantially lessened the pressure to install control equipment from program participants. Many facility operators became complacent and accustomed to purchasing RTCs at the end of the compliance cycle to cover their emissions. In addition, some facility managers exhibited short-term thinking and intentionally delayed capital expenditures for emission reduction projects in order to increase profits in the near-term.

RECLAIM subsumed rules with future compliance dates that had already been adopted, including requirements for refineries and power plants. Many critics of RECLAIM point to the delayed installation of SCR at power plants as one of the key contributing factors to the lack of availability of RTCs during the California energy crisis in 2000 and 2001. However, RECLAIM may not have been the cause of such delay, although it made such delay easier. Since many power plant operators were aware of pending sales of their facilities as a result of electricity deregulation, they chose not to follow through on purchase orders for SCR to delay that capital expense.

District staff recommends that future cap-and-trade programs carefully evaluate which rules to roll into the program. Rules on the books with future control requirements based on known, cost-effective technology for major emitters may be best left in place. This would have largely avoided the power plant problems seen in 2000 and 2001 with RECLAIM, as Rule 1135 - Emissions of Oxides of Nitrogen from Electric Power Generating Systems, if it had remained in effect, would have required Selective Catalytic Reduction (SCR) on power plants by the year 2000. The market incentive approach would work well for existing rule requirements based on technology-forcing rules and rules yet to be written.

Not all RECLAIM facilities relied primarily on credit purchases. Some facilities implemented process changes, added controls, and deployed cleaner equipment more frequently as a means to manage emissions. Early equipment replacement is also a strategy that facilities used to reduce

overall emissions. More robust emission information and higher attention given to emissions also contributed to reductions at many facilities. However, some contend that technology advancement may not have occurred at the same rate as what would have happened under command-and-control. Overall program reductions included expected reductions from many control measures in the 1991 AQMP that would have been scrutinized closely in the rule development process and may not have fully materialized. Therefore, it is difficult to fully quantify this aspect of the program.

## **Summary of the RECLAIM Experience – General Observations on Implementation, Administration, and Enforcement**

### **Implementation**

Initial implementation of the RECLAIM program presented many resource-intensive challenges not fully anticipated during the rule development process. Transition from command-and-control permits and compliance processes to the cap-and-trade program raised issues requiring special attention of the participating facilities, as well as District staff.

Once the cap-and-trade program rules were adopted, the rule development process was far from being finished. Many rule amendments have been necessary to make the program clearer, more enforceable, more flexible, and to reflect the evolution of market participants and types of trades. In addition, standardized implementation guidelines needed to be developed for all aspects of the program.

Formal implementation guidance documents and training help ensure consistent interpretation and application of program rules. Significant ongoing training is needed for agency staff and the participants in the program. This is a perpetual process, as the program evolves over time. Also, it has been District staff's experience that facility personnel and responsibilities change over time and in many cases the replacement person does not receive adequate training.

A centralized administration team is highly recommended to ensure consistency and to identify necessary changes to the guidance documents and rules.

### **Resources**

The resource requirements for a cap-and-trade program are very significant. Future programs need to recognize this and plan for these changes. Computer systems to support the new program are one example where significant time, funds, and staff are needed to make sure that the program implementation goes smoothly and that the information needed to ensure compliance is accurate and available.

### **Outsourcing**

Care should be taken when considering whether some aspects of the program management can be handled outside of the agency responsible for the program. Credits represent a large amount of money, which has a potential to lead to fraud and/or abuse. Check out credentials carefully

and include tight oversight for any outsourced functions. The ultimate responsibility for the program resides with the agency that developed it and problems can cast a shadow on an agency's program.

### **Missing Data**

As discussed in this paper, it is critical to have good procedures for missing data. This provides an incentive to get and maintain the proper systems, and also deters turning off systems in periods of equipment upset or high production. Monitoring systems need sufficient time for installation and de-bugging, so missing data procedures should take this into account.

## **Recommendations for Future Cap-and-Trade Programs**

The following sections describe District staff's recommendations for future cap-and-trade programs. The intent is to help avoid some of the difficulties encountered in RECLAIM and to further ensure enforceable programs that can deliver real, verifiable emission reductions to meet environmental objectives.

### **Specific Topic Areas**

#### **Time for Implementation**

District staff suggests that adequate time be allowed before a new program starts. This will allow a smoother transition, better trained staff and program participants, and time to install monitoring equipment.

#### **Ability to Change the Regulatory Structure Midstream**

When RECLAIM was developed, the District staff carefully constructed the rules to make sure that RTCs were not property rights. RTCs can be reduced or revoked, and the program could be suspended, if warranted. However, future cap-and-trade program developers should keep in mind that there are such significant resources that go into implementation of these programs that it is impractical to reverse directions and return to a command-and-control program.

For example, RECLAIM required significant changes to the permit and information management systems that cost millions of dollars and tremendous staff resources. To change these major systems is not trivial. In addition, reinstating previously subsumed rules and developing all the rules to implement each control measure in the AQMP would take years.

For facilities, it could also be a large burden if a cap-and-trade program did not work and a return to command-and-control was required. Consider a facility that installed some controls, but did not go fully to the BARCT level under a command-and-control rule that was subsumed into RECLAIM. That facility could have very expensive costs to make an incremental reduction in their control system to reach BARCT. Other facilities that purchased a stream of credits to take

care of future needs would also have that investment voided if RECLAIM RTCs were all suspended.

The problems which would be presented by trying to revert to a command-and-control system only highlight the need to carefully design the cap-and-trade program.

### **Avoid Over-Allocation**

As described previously, RECLAIM started with very generous allocations. The anticipated crossover point was five to six years after the program started. Overall emissions in key years matched, by design, but actual emission reductions in the early years may have been less than what might have occurred under command-and-control.

Other ways to prevent locking in recessionary activity levels while not causing as much over-allocation should be considered. For example, facilities could be required to use their average activity levels for the last five years rather than their highest level. Additionally, allocations could be set at levels closer to actual emissions, but perhaps with a program set-aside of credits which could be accessed by facilities upon a demonstration that their activity levels exceeded baseline by a specified amount.

### **Avoid Lack of Planning**

A cap-and-trade program gives facilities the ability to consider emissions and reduction strategies as part of their long-term plans. However, in RECLAIM, many facilities did not do adequate planning and were caught without enough time to install controls to react to the energy crisis. RECLAIM rules were amended to require BARCT from power plants and compliance plans from the larger facilities to reduce the likelihood that such a problem could occur in the future. Future cap-and-trade programs should consider having a 5- or 10-year plan from participants and their progress should be closely monitored. Economic theories behind cap-and-trade programs assume that rising market prices for trading credits, occurring as allocations are reduced over time, will provide a market “signal” to facilities that it may be more economical to obtain reductions by installing controls, rather than by purchasing credits. The assumption is that necessary controls will then be installed. However, this model does not account for the lag time between receiving the “signal” from market prices and actually obtaining reductions from installing controls, due to the time needed to obtain permits and construct the control equipment. Since RECLAIM also experienced a nearly instantaneous spike in RTC prices as a result of the power crisis, it is difficult to determine whether this inherent “lag time” would have caused a credit shortage even in the absence of a power crisis. However, this “lag time” presents another reason to require compliance plans to assure that facilities are adequately planning ahead.

### **Enforceability Issues Must be Considered in Program Design**

Designing a cap-and-trade program with enforcement in mind will help develop a more successful program. For example, penalties must be sufficient to provide adequate deterrence, including separate violations for each day of the compliance period, and additional penalties based on the amount of exceedance. In addition, the need to preserve the integrity of the cap, as

by precluding variances, must be balanced against the desire for a “safety valve” for unforeseen extreme circumstances. To preserve flexibility to amend the program, credits should not constitute property rights. Trading credits must be reliable, and provisions for enforcement against out-of-jurisdiction traders must be included.

Enforcement must not be viewed as an afterthought that can be handled after the program is up and running. Before any credits are issued, it must be clear to everyone what constitutes a violation; how the violation will be enforced; what evidence and presumptions will prove the violation; and what general and tailored penalties will be assessed for a violation. Design consideration must also be given to unique enforcement situations that may arise in the implementation phase of the program. If an audit process will be used to demonstrate compliance, there will be an “enforcement lag” that will separate the time period of the violation from the time period of the prosecution of the violation. The effects of this lag must be acknowledged and minimized. If allocation exceedances cannot be made up without creating a negative credit balance, or if credits become scarce or unaffordable, enforcement discretion may be needed to avoid business failures. And if fraud occurs in the purchase, transfer, or registration of credits – and this must be anticipated – requirements must be built into the design of the program to expose fraud at the earliest opportunity to limit its harmful effects.

Mobile source credits may present unique enforcement issues, such as assuring the reductions are surplus, that the reductions occur in the required geographic area, and that any shortfall is made up, either by the credit generator or credit user.

The following sections provide information on some specific topics that relate to enforceability.

### Penalties

A key design feature of RECLAIM is to assure that penalty provisions will adequately deter intentional or negligent violations. Because a violation of the cap would only occur at the end of each quarterly reconciliation period, there was concern that a maximum of four violations per year might not provide adequate deterrence value, even at maximum penalties. Therefore, the RECLAIM rules provided that a violation of the cap would constitute a violation for each day in the year in which the cap is exceeded unless the source proves on which days it had not exceeded the cap. An additional violation was established based on the number of pounds by which the cap was exceeded. Finally, the program required deduction of the amount of the exceedance from future allocations, which imposes substantial cost, thus providing additional deterrence as well as an environmental benefit.

### Trading

A robust trading market requires that credits be reliable and that fraud be deterred. RECLAIM required that all trades be registered with the District, the seller and buyer jointly register a trade, and that credits be deducted from the seller’s account before a trade could be registered. Trades were required to be reported within 5 days of occurrence.

The rules also prohibited the making of any false statement in connection with a trade. Finally, during program implementation, out-of-state and even out-of-country traders began participating in the market. The rules were amended to require these traders to designate a California agent

for service of process, and stipulate to jurisdiction and venue in the Los Angeles County Superior Court.

### Variations

The program prohibited variations from the cap or from missing data provisions. The concern was that if a variation could be received, the cap would be rendered uncertain and unenforceable. However, during the extreme circumstances of the California energy crisis, creative enforcement mechanisms were needed to avoid shutting down certain companies that could not afford credits, or in some cases obtain them at any price. Thus, the need to preserve the integrity of the cap must be balanced with the desire for a “safety valve” for unforeseen extreme circumstances.

### **Implementation and Ongoing Training**

Formal implementation guidance documents and initial and ongoing training help ensure consistent interpretation and application of program rules. Future cap-and-trade programs should include periodic training and certification of individuals responsible for compliance at facilities. This will enhance compliance rates and avoid problems seen with staff turnover.

### **What Reductions Qualify for Credits**

Future cap-and-trade programs should also avoid giving credit for emission reductions that would occur under other regulatory requirements (local, state or federal) or natural industry trends.

### **Emission Auditing**

Resources are also needed to ensure the integrity of the emissions reported under the program. In order for a program to be accepted after implementation, it must be shown that the reductions are real and permanent. Therefore, the program must not only have clear and concise ways to calculate emissions, it must also have robust recordkeeping protocols to substantiate the emissions reported. The agency must also be diligent in field verification that emissions were determined correctly and be able to substantiate, with actual data sufficient to convince all stakeholders, that the data is dependable. Additionally, periodic progress reports on the program are also essential to provide assurance that the emission reduction goals are achieved. This requires the goals and criteria for measuring progress to be clearly defined from the onset of the program.

### **Automation**

Automation in a cap-and-trade program is necessary because of the complex interaction between the regulatory components, including more stringent emissions monitoring, facility-based permitting that captures device-based data, emission credit trading, and the need to bring all elements together to confirm compliance with allocations. The degree of automation incorporated must be practical, however, considering both schedule and costs, and requires close consultation between the program designers and information technology staff. The key is to focus on the most stable business processes first and allow evolving business processes to

stabilize before fully automating. Fluidity in the cap-and-trade rules is to be expected as the program evolves over time, but small rule changes can have large impacts on automated systems.

Equally important, the program designers must take into account the degree of automation that is achievable. For example, many related existing systems and business processes needed to be altered in order to support the sophisticated level of automation originally envisioned for RECLAIM, including incorporation of device-level data in Hearing Board processes, permit modification and renewal, NC and NOV, etc. However, resources were insufficient for making the changes in these other areas that were necessary to support the full RECLAIM automation needs. The level of automation that was developed for RECLAIM has helped to make the program successful but falls short of the initial conceptual vision.

The key elements in RECLAIM automation include:

- Electronic emission reporting for all sources, large and small,
- A facility permit system that captures device-based data,
- A trading system that tracks all emission credit trading, and
- A centralized database that stores all data from each component in a single repository.

### **General Recommendations**

The following key lessons learned are offered for consideration for development of future cap-and-trade programs. For convenience, sections of the paper that provide more information relative to these ideas are referenced.

**Resources and Time** - There must be adequate resources and time to design, implement, and monitor the program.  
(I-1, II-1, II-2, II-5)

**Foundation** - The technical, economic, and political foundations must be solid.  
(I-1, I-3)

**Engaged Stakeholders** - Early and frequent stakeholder involvement is critical – keep in mind the key interests and ensure that each group perceives some positive outcomes.  
(I-1)

**Equity and Fairness in Allocations** - Determining allocations is one of the most sensitive and difficult parts of program design.  
(I-1, I-2, II-1)

**Robust Emission Information** – Accurate emission quantification is necessary to ensure that the environmental benefits are realized and that reductions being traded are real.  
(I-1, II-1, II-2, II-4, II-5)

**Dispute Resolution** - An administrative mechanism is needed for settling differences (such as allocation issues) and minimizing lawsuits.

(I-2, II-1)

**Market Issues** - Market issues are critical – types and term of credits, whether banking is acceptable, types of markets, and who manages the trades are important design considerations.

(I-2, I-5, II-4, II-5)

**Integration** - Integration of monitoring reporting and recordkeeping (MRR), permitting, inspections, and tracking emissions and trading are critical to successful implementation.

(I-2, I-6, II-5)

**New Enforcement Tools** - Develop specific penalties and backstops for non-compliance.

(I-2, I-3, II-2)

**Periodic and Program Assessments** - Build in periodic program assessments against key benchmarks, such as Health and Safety Code §39616. Make program changes as easy as possible.

(I-1, I-2, II-3)

**Planning** - Make sure participants plan ahead to avoid problems like those seen in RECLAIM due to the energy crisis. Allocations and ‘crossover’ points should be considered.

(I-2, I-4, II-3)

**Environmental Justice** – Consider whether restrictions are necessary on maximum credit purchases in lieu of emission reductions on site. Provide information to stakeholders on whether there are local impacts. If there could be local impacts, consider incentives for local reductions rather than credit purchases.

(I-1)

**Balance** - Make sure other programs still have adequate resources and attention.

## Acronym List

AB32	Assembly Bill 32
APEP	Annual Permit Emission Program
AQIP	Air Quality Investment Program
AQMP	Air Quality Management Plan
BARCT	Best Available Retrofit Control Technology
Basin	South Coast Air Basin
BBS	Bulletin Board System
BTU	British Thermal Unit
CAA	Clean Air Act
Cal. Evid.	California Evidence
CARB	California Air Resources Board
CEM	Continuous Emission Monitor
District	South Coast Air Quality Management District
EPA	Environmental Protection Agency
ERC	Emission Reduction Credit
ERS	Emission Reporting System
Fed. Reg.	Federal Register
IP	Internet Protocol
ISO	Independent System Operator
LAER	Lowest Achievable Emissions Rate
LAP	Laboratory Approval Program
MDP	Missing Data Provisions
MRR	Monitoring, Recordkeeping, and Reporting
MRS	Manual Reporting System
N/C	Notice to Comply
NO <sub>x</sub>	Oxides of Nitrogen
NOV	Notice of Violation
NSPS	New Source Performance Standards
NSR	New Source Review
PC	Personal Computer
QA/QC	Quality Assurance/Quality Checks
QCER	Quarterly Certification of Emissions Report
RACT	Reasonably Available Control Technology
RATA	Relative Accuracy Test Audit
RECLAIM	Regional Clean Air Incentives Market
RTC	RECLAIM Trading Credit
RTU	Remote Terminal Unit
SCR	Selective Catalytic Reduction
SIP	State Implementation Plan
SO <sub>x</sub>	Sulfur Oxides
U.S.	United States
VLAN	Virtual Local Area Network
VOC	Volatile Organic Compound
WATERS	Web Access to Electronic Reporting System

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